

VI.

**Uluslararası
Mobilya
Kongresi**

**International
Furniture
Congress**

“ FURNITURE: Design&Production ”

02-05 November 2020



IFC2020 ABSTRACT BOOK



TRABZON
2020

ifc2020@ktu.edu.tr
www.ktu.edu.tr/ifc2020

KARADENIZ TECHNICAL UNIVERSITY
FACULTY OF FORESTRY & FACULTY OF ARCHITECTURE
DEPARTMENT OF WOOD INDUSTRY ENGINEERING
DEPARTMENT OF ARCHITECTURE

VI. INTERNATIONAL FURNITURE CONGRESS

NOVEMBER 2th – 5th, 2020

TRABZON / TURKEY

ABSTRACT BOOK



KARADENİZ
TEKNİK ÜNİVERSİTESİ
KARADENİZ TECHNICAL UNIVERSITY
1955

"FURNITURE:
Design & Production"
02-05 November 2020

KTÜ Osman Turan Congress Center, TRABZON
and/or Online



www.ktu.edu.tr/ifc2020
ifc2020@ktu.edu.tr

FACULTY OF FORESTRY / FACULTY OF ARCHITECTURE

VI. Uluslararası International Mobilya Furniture Kongresi Congress



SPONSORS

OUR CONGRESS IS SUPPORTED BY TUBITAK 2223-B GRANT PROGRAM FOR ORGANIZING SCIENTIFIC MEETING WITHIN THE COUNTRY



Fagus GreCon

BETA KIMYA
SANAYİ VE TİCARET A.Ş.

POW
COAT
WOOD COATINGS

kastamonu
ENTEGRE AĞAÇ SANAYİ VE TİC. A.Ş. İNTEGRATED FORESTRY INDUSTRY AND TRADE INC.

STARWOOD®

AQUACOOOL
Water-Based Coating Systems





"FURNITURE:
Design & Production"
02-05 November 2020

KTÜ Osman Turan Congress Center, TRABZON
and/or Online



www.ktu.edu.tr/ifc2020
ifc2020@ktu.edu.tr

FACULTY OF FORESTRY / FACULTY OF ARCHITECTURE

VI. Uluslararası International Mobilya Furniture Kongresi Congress



ORGANIZED BY

Karadeniz Technical University
Department of Forest Industry Engineering
Department of Interior Architecture

HONARARY COMMITEE

Prof. Dr. Hamdullah ÇUVALCI (Rector)
Prof. Dr. Gürsel ÇOLAKOĞLU (Dean)
Prof. Dr. İlkey ÖZDEMİR (Dean)

CONGRESS CHAIR

Prof. Dr. Hülya KALAYCIOĞLU

ORGANIZING COMMITTEE

Prof. Dr. Abdulkadir MALKOÇOĞLU (Retired)	Karadeniz Technical University
Prof. Dr. Ali KASAL	Muğla Sıtkı Koçman University
Prof. Dr. Ali TEMİZ	Karadeniz Technical University
Prof. Dr. Hülya KALAYCIOĞLU	Karadeniz Technical University
Prof. Dr. Veliddin KALINKARA	Pamukkale University
Assoc. Prof. Dr. Ayhan AYTİN	Düzce University
Assoc. Prof. Dr. Erkan AYDINTAN	Karadeniz Technical University
Assoc. Prof. Dr. Funda KURAK AÇICI	Karadeniz Technical University
Assoc. Prof. Dr. Muteber ERBAY	Karadeniz Technical University
Assoc. Prof. Dr. Samet DEMİREL	Karadeniz Technical University
Asst. Prof. Dr. Dilara ONUR	Karadeniz Technical University
Asst. Prof. Dr. Füsün CURAOĞLU	Eskisehir Technical University
Asst. Prof. Dr. İbrahim YILDIRIM	Karadeniz Technical University



"FURNITURE:
Design & Production"
02-05 November 2020

KTÜ Osman Turan Congress Center, TRABZON
and/or Online



www.ktu.edu.tr/ffc2020
ffc2020@ktu.edu.tr

FACULTY OF FORESTRY / FACULTY OF ARCHITECTURE

VI. Uluslararası International Mobilya Furniture Kongresi Congress



Dr. Mustafa Bilgehan İMAMOĞLU

Karadeniz Technical University

Lecturer Uğur ARAS

Karadeniz Technical University

Res. Asst. Dr. Aydın DEMİR

Karadeniz Technical University

Res. Asst. Dr. Gaye KÖSE DEMİREL

Karadeniz Technical University

Res. Asst. Abdullah Uğur BİRİNCİ

Karadeniz Technical University

Res. Asst. Ayşenur GÜRGEN

Karadeniz Technical University

Res. Asst. Tolga CÜRGÜL

Karadeniz Technical University

Res. Asst. Doğan MEMİŞ

Bursa Technical University

CONGRESS SECRETARIAT

Prof. Dr. Ali TEMİZ

Asst. Prof. Dr. İbrahim YILDIRIM

Assoc. Prof. Dr. Samet DEMİREL

Anteneh GEZAHEGN KEBEDE

Derya KALAYCIOĞLU

ADVISORY COMMITTEE

Prof. Dr. Ahmet KURTOĞLU - Doğu University

Prof. Dr. Ali KASAL - Muğla Sıtkı Koçman University

Prof. Dr. Hasan EFE - Gazi University

Prof. Dr. Hülya KALAYCIOĞLU - Karadeniz Technical University

Prof. Dr. İlkey ÖZDEMİR - Karadeniz Technical University

Prof. Dr. İlker USTA - Hacettepe University

Prof. Dr. Küçük Hüseyin KOÇ - İstanbul University Cerrahpaşa

Prof. Dr. Osman GÖKTAŞ - Muğla Sıtkı Koçman University

Prof. Dr. Tuncer DİLİK - İstanbul University Cerrahpaşa

Prof. Dr. Veliddin KALINKARA - Pamukkale University

Assoc. Prof. Dr. Ayhan AYTİN - Düzce University

Assoc. Prof. Dr. Kadir ÖZKAYA - Pamukkale University



Asst. Prof. Dr. Cevdet SAÇLI - Mersin University

Asst. Prof. Dr. Füsun CURAOĞLU - Eskisehir Technical University

KEYNOTE SPEAKERS

Prof. Dr. Ahmet KURTOĞLU - Doğuş University

Prof. Dr. Eva HAVIAROVA - Purdue University / USA

Prof. Dr. Jelena MATIC - Belgrade University / Serbia

Prof. Dr. Jerzy SMARDZEWSKI - Poznan University / Poland

Prof. Dr. Önder KÜÇÜKERMEN - Haliç University

Prof. Dr. Vassil Jivkov JIVKOV - University of Forestry / Bulgaria

Prof. Dr. Vedat ÖZSOY - TOBB University of Economics and Technology

Assoc. Prof. Dr. Denes LEVENTE - University of Sopron / Hungary

Adnan BOSTAN - Vice President of Istanbul Furniture, Paper and Forest Prod. Export. Assc.

Aliosman MERTÖZ - MAKSDER - Furniture Accessories

Alper BEKTAŞ - MOBIAD - Furniture Industry Businessmen Association

Ali Rıza ERCAN - President of the Turkish Woodwork Tradesmen and Artisans Federation

Cihat SAYACI - BETA Chemistry Inc. - General Manager

Emrah KAYMAK - Chamber of Interior Architects of Turkey

Eray Sertaç ERSAYIN - Industrial Designers Society of Turkey

Erkan KALAFAT - AHSAPDER

Ferhat ARICAN - International Forest Industry Engineering Association

Haluk YILDIZ - MDF and Particleboard Manufacturers Association

Hasan TÜRKYILMAZ - The Chamber of Forest Engineers

Hüseyin YILDIZ - Starwood Forest Product Inc.Co.

İlhan GÜVEM - POWCOAT - Marketing Manager

Mete AKTER - Aquacool Water Based Coating System

Muhammet TAŞLI - Ham:m Design / MOBDER

Murat DURULAR - TAMDER - All Woodworking Machinery Comp. Assoc.

Muzaffer ÇİLEK - Çilek Inc.Co.



Nazar ŞİGAHER - Daedalus Furniture - Designer

Nesip UZUN - Furniture Decoration Magazine

Talha Timur HAN- Mobileium Mall

SCIENTIFIC COMMITTEE

Prof. Dr. Abdullah SÖNMEZ - Gazi University

Prof. Dr. Agron BAJRAKTARI - University of Applied Sciences in Ferizaj / Kosovo

Prof. Dr. Ahmet KURTOĞLU - Doğu University

Prof. Dr. Ali KASAL - Muğla Sıtkı Koçman University

Prof. Dr. Ali TEMİZ - Karadeniz Technical University

Prof. Dr. Alpay ER - Özyeğin University

Prof. Dr. Asia Petrova MARİNOVA - University of Forestry / Bulgaria

Prof. Dr. Ayhan ÖZÇİFÇİ - Aksaray University

Prof. Dr. Ayşe Müge BOZDAYI - TOBB University of Economics and Technology

Prof. Dr. Ayşe UĞUR TÜTENGİL - Beykent University

Prof. Dr. Bruno ESTEVES - Polytechnic Institute of Viseu / Portugal

Prof. Dr. Burçin Cem ARABACIOĞLU - Mimar Sinan Fine Arts University

Prof. Dr. Burhanettin UYSAL - Karabük University

Prof. Dr. Bülent KAYGIN - Bartın University

Prof. Dr. Bülent YILMAZ - Bilecik Şeyh Edebali University

Prof. Dr. Carl Albert ECKELMAN - Purdue University / USA

Prof. Dr. Cevdet SÖĞÜTLÜ - Gazi University

Prof. Dr. Deniz HASIRCI - İzmir University of Economics

Prof. Dr. Derya SEVİM KORKUT - Düzce University

Prof. Dr. Didem BAŞ - İstanbul Arel University

Prof. Dr. Elçin TEZEL - Bahçeşehir University

Prof. Dr. Elena NIKOLJSKI PANEVSKI Ss. Cyril and Methodius University in Skopje

Prof. Dr. Erol BURDURLU - Gazi University

Prof. Dr. Esat GÜMÜŞKAYA - Karadeniz Technical University



- Prof. Dr. Fatma Meltem ETİ PROTO - Marmara University
- Prof. Dr. George MANTANIS - Technical University of Thessaly / Greece
- Prof. Dr. George NTALOS - Technical University of Thessaly / Greece
- Prof. Dr. Goran ZLATESKI - Ss. Cyril and Methodius University / North Macedonia
- Prof. Dr. Gökay NEMLİ - Karadeniz Technical University
- Prof. Dr. Gülser ÇELEBİ - Çankaya University
- Prof. Dr. Hasan EFE - Gazi University
- Prof. Dr. Havva Meltem GÜREL - Yaşar University
- Prof. Dr. Hilmi TOKER - Muğla Sıtkı Kocman University
- Prof. Dr. Hülya KALAYCIOĞLU - Karadeniz Technical University
- Prof. Dr. Hüseyin KIRCI - Karadeniz Technical University
- Prof. Dr. Hüseyin PEKER - Artvin Coruh University
- Prof. Dr. Ioannis BARBOUTIS - Aristotelian University of Thessaloniki / Greece
- Prof. Dr. Işık GÖR - Yeditepe University
- Prof. Dr. Ivica GRBAC - University of Zagreb / Croatia
- Prof. Dr. İlhan DENİZ - Karadeniz Technical University
- Prof. Dr. İlkay ÖZDEMİR - Karadeniz Technical University
- Prof. Dr. İlker USTA - Hacettepe University
- Prof. Dr. İnci Deniz ILGIN - Marmara University
- Prof. Dr. İpek FİTÖZ - Mimar Sinan Fine Arts University
- Prof. Dr. İsmail AYDIN - Karadeniz Technical University
- Prof. Dr. Jelena MATIC - University of Belgrade / Serbia
- Prof. Dr. Jerzy SMARDZEWSKI - Poznan University / Poland
- Prof. Dr. Jilei ZHANG - Mississippi State University / USA
- Prof. Dr. Kadri Cemil AKYÜZ - Karadeniz Technical University
- Prof. Dr. Kemal YILDIRIM - Gazi University
- Prof. Dr. Küçük Hüseyin KOÇ - İstanbul University Cerrahpaşa
- Prof. Dr. Liming SHEN - Nanjing Forestry University / China
- Prof. Dr. Marko PETRIC - University of Ljubljana / Slovenia
- Prof. Dr. Mary Lou MAHER - College of Computing and Informatics / South Carolina



- Prof. Dr. Mehmet BUDAKÇI - Düzce University
- Prof. Dr. Mehmet ÇOLAK - Muğla Sıtkı Koçman University
- Prof. Dr. Mehmet Hakkı ALMA - Iğdır University
- Prof. Dr. Mehmet Lütfi HİDAYETOĞLU - Selçuk University
- Prof. Dr. Murat KILIÇ - Kırıkkale University
- Prof. Dr. Musa ATAR - Gazi University
- Prof. Dr. Mustafa ALTINOK - Gazi University
- Prof. Dr. Mustafa Erdem ÜREYEN - Eskişehir Technical University
- Prof. Dr. Mustafa USTA - Karadeniz Technical University
- Prof. Dr. Nafia Gül ASATEKİN - İstanbul Bilgi University
- Prof. Dr. Nasko TERZİEV - Swedish University of Agricultural Sciences / Sweden
- Prof. Dr. Nurgül AY - Karadeniz Technical University
- Prof. Dr. Nusret AS - İstanbul University Cerrahpaşa
- Prof. Dr. Osman GÖKTAŞ - Muğla Sıtkı Koçman University
- Prof. Dr. Özay GÜRTUĞ - Maltepe University
- Prof. Dr. Panayot A. PANAYOTOV - University of Forestry / Bulgaria
- Prof. Dr. Pavlo BEKHTA - Ukrainian National Forestry University / Ukraine
- Prof. Dr. Pelin YILDIZ - Hacettepe University / Turkey
- Prof. Dr. Ramazan KURT - Bursa Technical University
- Prof. Dr. Róbert NÉMETH - University of Sopron / Hungary
- Prof. Dr. Sedat ONDARAL - Karadeniz Technical University / Turkey
- Prof. Dr. Semra ÇOLAK - Karadeniz Technical University / Turkey
- Prof. Dr. Sibel YILDIZ - Karadeniz Technical University / Turkey
- Prof. Dr. Srini R. SRİNIVASAN - University of Mumbai / India
- Prof. Dr. Şebnem TİMUR ÖĞÜT - İstanbul Technical University
- Prof. Dr. Takaharu TEZUKA - Tokyo City University / Japan
- Prof. Dr. Tuncer DİLİK - İstanbul University Cerrahpaşa / Turkey
- Prof. Dr. Turgay ÖZDEMİR - Karadeniz Technical University / Turkey
- Prof. Dr. Tülay ZORLU - Karadeniz Technical University / Turkey
- Prof. Dr. Ümit Cafer YILDIZ - Karadeniz Technical University / Turkey



Prof. Dr. Vedat ÖZSOY - TOBB University of Economics and Technology / Turkey

Prof. Dr. Veliddin KALINKARA - Pamukkale University / Turkey

Prof. Dr. Wengang HU - Nanjing Forestry University / China

Prof. Dr. Yusuf GÜRÇİNAR - İstanbul Aydın University / Turkey

Prof. Dr. Yusuf Ziya ERDİL - Muğla Sıtkı Koçman University

Prof. Dr. Zhivko GOCHEV - University of Forestry / Bulgaria

Assoc. Prof. Dr. Abdullah SÜTÇÜ - Isparta University of Applied Sciences / Turkey

Assoc. Prof. Dr. Alev ERARSLAN GÖÇER - İstanbul Aydın University / Turkey

Assoc. Prof. Dr. Ali Rıza PARSA - İstanbul Esenyurt University / Turkey

Assoc. Prof. Dr. Ayfer DÖNMEZ ÇAVDAR - Karadeniz Technical University

Assoc. Prof. Dr. Ayhan AYTİN - Düzce University / Turkey

Assoc. Prof. Dr. Aytaç AYDIN - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Cenk DEMİRKİR - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Daniela TESAROVA - Mendel University in Brno / Czechia

Assoc. Prof. Dr. Denes LEVENTE - University of Sopron / Hungary

Assoc. Prof. Dr. Dimitar Hristov ANGELSKİ - University of Forestry / Bulgaria

Assoc. Prof. Dr. Engin Derya GEZER - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Erkan AYDINTAN - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Ertan ÖZEN - Muğla Sıtkı Koçman University / Turkey

Assoc. Prof. Dr. Eva HAVIAROVA - Purdue University / USA

Assoc. Prof. Dr. Filiz TAVŞAN - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Funda KURAK AÇICI - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Gülçin Cankız ELİBOL - Hacettepe University

Assoc. Prof. Dr. Hüseyin YÖRÜR - Karabük University / Turkey

Assoc. Prof. Dr. Kadir ÖZKAYA - Pamukkale University / Turkey

Assoc. Prof. Dr. Lidia GURAU - Transilvania University / Romania

Assoc. Prof. Dr. Mehmet ASATEKİN - Bahçeşehir University / Turkey

Assoc. Prof. Dr. Milan GAFF - Czech University of Life Sciences Prague / Czechia

Assoc. Prof. Dr. Muteber ERBAY - Karadeniz Technical University / Turkey

Assoc. Prof. Dr. Nevzat ÇAKICIER - Düzce University / Turkey



- Assoc. Prof. Dr. Onur ÜLKER - Kırıkkale University / Turkey
- Assoc. Prof. Dr. Öncü BAŞOĞLAN AVŞAR - Muğla Sıtkı Koçman University / Turkey
- Assoc. Prof. Dr. Özge CORDAN - İstanbul Technical University / Turkey
- Assoc. Prof. Dr. Özlem ÖZGENÇ - Karadeniz Technical University / Turkey
- Assoc. Prof. Dr. Samet DEMİREL - Karadeniz Technical University / Turkey
- Assoc. Prof. Dr. Şebnem ERTAŞ BEŞİR - Karadeniz Technical University / Turkey
- Assoc. Prof. Dr. Şengül YALÇINKAYA - Karadeniz Technical University / Turkey
- Assoc. Prof. Dr. Şerife Ebru OKUYUCU - Afyon Kocatepe University/ Turkey
- Assoc. Prof. Dr. Tonguç TOKOL - Marmara University / Turkey
- Assoc. Prof. Dr. Vassil JIVKOV - University of Forestry / Bulgaria
- Assoc. Prof. Dr. Zeynep TUNA ULTAV - Yaşar University / Turkey
- Asst. Prof. Dr. Bekir KELÇEOĞLU - Syracuse University / USA
- Asst. Prof. Dr. Celal GÜNGÖR - İzmir Kâtip Çelebi University / Turkey
- Asst. Prof. Dr. Cevdet SAÇLI - Mersin University / Turkey
- Asst. Prof. Dr. Derya USTAÖMER - Karadeniz Technical University / Turkey
- Asst. Prof. Dr. Desislava Ivanova ANGELOVA - University of Forestry / Bulgaria
- Asst. Prof. Dr. Dilara ONUR - Karadeniz Technical University / Turkey
- Asst. Prof. Dr. Ferhat ÖZDEMİR - Kahramanmaraş Sütçü İmam University / Turkey
- Asst. Prof. Dr. Füsun CURAOĞLU - Eskisehir Technical University / Turkey
- Asst. Prof. Dr. Hacı İsmail KESİK - Kastamonu University / Turkey
- Asst. Prof. Dr. Harun DİLER - Akdeniz University / Turkey
- Asst. Prof. Dr. Hikmet YAZICI - Zonguldak Bulent Ecevit University / Turkey
- Asst. Prof. Dr. İbrahim YILDIRIM - Karadeniz Technical University / Turkey
- Asst. Prof. Dr. İlker AKYÜZ - Karadeniz Technical University / Turkey
- Asst. Prof. Dr. Kemal ÜÇÜNCÜ - Karadeniz Technical University / Turkey
- Asst. Prof. Dr. Kubilay ÇAĞATAY - Nuh Naci Yazgan University / Turkey
- Asst. Prof. Dr. Marija DJURKOVIC - University of Belgrade / Serbia
- Asst. Prof. Dr. Muhittin ADIGÜZEL - İstanbul Commerce University / Turkey
- Asst. Prof. Dr. Önder TOR - Kastamonu University / Turkey
- Asst. Prof. Dr. Todor PETKOV - University of Forestry / Bulgaria



Asst. Prof. Dr. Vedat ÇAVUŞ - İzmir Kâtip Çelebi University / Turkey

Asst. Prof. Dr. Violeta J. POPOVSKA - Ss. Cyril and Methodius University / N. Macedonia

Lecturer Dr. Arif Çağlar KONUKÇU - İzmir Kâtip Çelebi University / Turkey

Lecturer Dr. Mustafa Selmani MUSLU - Konya Technical University / Turkey

Dr. Eugenia MARIANA TUDOR - Salzburg University of Applied Sciences / Austria

Dr. Sylwia OLENSKA - Warsaw University of Life Sciences / Poland



VI. INTERNATIONAL FURNITURE CONGRESS

Our VI. International Furniture Congress was held in partnership with the Faculty of Forestry, Department of Forest Industry Engineering and the Faculty of Architecture, Departments of Interior Architecture.

The Furniture congress series are held by another university every year. 6th Furniture Congress, which is held at our university, is the first congress on being held in partnership with two departments and being online. It has been a role model for following congress series.

Many academicians and prominent names of the sector from abroad (USA, Hungary, Poland, Portugal, Serbia, Bulgaria) and domestic participated in the congress. Participants shared their knowledge, experience and work, further strengthening university-industry cooperation.

In the congress, 111 scientific works were presented to all attendees and audiences in 15 sessions. On the other hand, 26 invited speakers from Turkey and abroad, who have a voice in the sector, shared their knowledge and experiences. The speakers referred on current problems and solution suggestions. They also stated that they will always be in good relations with Karadeniz Technical University.

The congress, with the number of participants consisting of all paper speakers and listeners around 400, was successfully and efficiently completed. The congress lasted for 4 days. In the secretariat of the congress, the Department of Forest Industry Engineering has made great efforts. The Forestry Faculty Meeting Hall has been turned into a congress control room and the participation from all over the world has been successfully organized. This success attracted the attention of the participants and the sector, and after the congress numerous congratulatory calls were received.

The opening speech of the congress was delivered by KTU Rector Prof. Dr. Hamdullah Çuvalcı. The deans of both faculties delivered their opening speeches. The invited speakers in the first two days made an analysis of the sector. Scientific sessions were conducted in the last two days. The program ended with the closing speech of Congress Secretary Prof. Dr. Hülya Kalaycıoğlu.



CONTENTS

	<u>Page</u>
A CRITICAL OVERVIEW ON THE UNIVERSITY-INDUSTRIAL COOPERATION PROCESS OPENING WITH FURNITURE PRODUCTION ENTERPRISES Göksel ULAY, Nevzat ÇAKICIER	1
A REPRESENTATION PROCESS IN MODERN FURNITURE HISTORY EDUCATION Aslan NAYEB KHOSROSHANI, Havva Beril BAL	2
A STUDIO EXPERIENCE ON FURNITURE DESIGN IN INTERIOR ARCHITECTURE EDUCATION: BANK DESIGN WITH ANALOGICAL APPROACH Hüseyin Emre ENGİN, Mukaddes ATAMAN, Havva Beril BAL, İrem BEKAR	3
A STUDY FOR THE INVESTIGATION OF THE CAUSES OF WORK ACCIDENTS IN THE FURNITURE SECTOR Aytaç AYDIN, Gizem CEYLAN	4
ADAPTIVE DESIGN PROPOSAL IN THE ARCHITECTURAL SPACE AND URBAN FURNITURE INTERFACE Ferhat HACIALİBEYOĞLU, Deniz DOKGÖZ	5
ADVANTAGES OF WOOD IN CREATIVE STREET FURNITURE Turgay ÖZDEMİR, Banu ÇİÇEK KURDOĞLU, Kadir Tolga ÇELİK, Cenk DEMİRKİR	6
AN EVALUATION ON THE DESIGN OF OFFICE SPACES AND REINFORCEMENT ELEMENTS Mehmet NORASLI, Ali AKÇAOVA	7
AN EVALUATION ON THE HISTORY OF FURNITURE AFTER THE INDUSTRIAL REVOLUTION Okşan ÖLMEZ, İnci Versan ALKAN	8
AN EXAMPLE STUDY ON THE RELATIONSHIP BETWEEN INTERIOR DESIGN AND SHOPPING BEHAVIOR Kübra ÖZLÜ DEĞER, Erkan AYDINTAN	9



AN EXPERIMENTAL STUDY ON THE CHANGE IN PERCEPTION OF RECOGNISABILITY OF STYLES IN THE DESIGN EDUCATION PROCESS Ayşenur DAĞ GÜRCAN, Betül HATİPOĞLU ŞAHİN, Şule ERYÜRÜK	10
AN INQUIRY FROM USER'S PERSPECTIVE INTO THE FURNITURE WITH OPEN-SOURCE RECIPES IN THE CONTEXT OF DO-IT-YOURSELF THEME Ceren KOÇ SAĞLAM, İsmail BEZCİ, Vildan DÜNDAR TÜRKKAN	11
AN INVESTIGATION OF ART WORKS CONSISTING OF WOOD MATERIAL AND EVALUATION OF THE INVENTORY INFORMATION Göksel ULAY, Mustafa YILDIRIM.....	13
ANALYSIS OF CAT-FRIENDLY FURNITURE IN THE CONTEXT OF THE RELATIONSHIP BETWEEN SPACE, FURNITURE AND USER IN HOUSING UNITS Ashl TAŞ, Ceren KOÇ SAĞLAM	14
ANALYSIS OF FURNITURE CHARACTER RELATIONSHIP IN STAR WARS MOVIES IN THE CONTEXT OF POWER REPRESENTATION Selva BAŞÇI.....	15
ANALYSIS OF MUSCULOSKELETAL DISORDERS IN FURNITURE INDUSTRY ACCORDING TO ANTHROPOMETRIC DATA Taner TAŞDEMİR, Kemal ÜÇÜNCÜ, Murat TOPBAŞ, Aytaç AYDIN.....	16
ANALYSIS OF URBAN FURNITURE IN TERMS OF RENEWABLE ENERGY CONCEPT: EXAMPLES FROM TURKEY AND WORLD Ayşegül TEREÇİ, Merve ATMACA.....	17
ANTHROPOMETRIC INVESTIGATION OF OCCUPATIONAL ACCIDENTS WITH HAND TOOLS IN FURNITURE FACTORIES Taner TAŞDEMİR, Kemal ÜÇÜNCÜ, Murat TOPBAŞ, Yasin BALABAN.....	18
ASSESSMENT OF INTEGRATION MATURITY OF ENTERPRISE RESOURCE PLANNING SOFTWARE IN U.S. FURNITURE INDUSTRY Çağatay TAŞDEMİR	19
BURSA GREEN MOSQUE ORNAMENTS AND GENERAL FEATURES OF WOOD ORNAMENTS Kubulay ÇAĞATAY, Tolga SUBAŞI, Rahmi ARAS.....	20



BYZANTINE FURNITURE IN THE ILLUSTRATED MANUSCRIPTS IN THE 9TH-12TH CENTURIES	
Didem GÜZEL	21
CARAVAN-TRAILER (TOWED TRAILER) INTERIOR EQUIPMENT	
Hakkı Tonguç TOKOL	22
CHANGE OF BEDROOM AND FIXED FURNITURES IN APARTMENT BUILDINGS IN KONYA FROM EARLY REPUBLIC OF TURKEY TO THE PRESENT	
Betül HATİPOĞLU ŞAHİN, Ayşenur DAĞ GÜRCAN	23
CONTEMPORARY APPROACHES IN THE INNOVATIVE FURNITURE CO-DESIGN CRITERIAS’ SCOPE AND FORMATION	
Esin FAKIBABA DEDEOĞLU, Meryem YALÇIN	24
DESIGN AND EVALUATION OF THE STRENGTH OF A NEW EXTERNALLY INVISIBLE FASTENER BY NUMERICAL ANALYSIS FOR CABINET FURNITURE JOINTS	
Jerzy SMARDZEWSKI, Lukasz KRZYZANIAK, Tolga KUŞKUN, Ali KASAL.....	25
DESIGN FOR EXPORT’ THE FURNITURE DESIGN COMPETITIONS: AN EVALUATION ON THE MEANINGFUL EXPERIENCES AND THEIR CONTRIBUTIONS TO DESIGN EDUCATION	
Jülide EDİRNE ERDİNÇ	26
DESIGNING DRAWING TABLE FOR UNIVERSITY STUDENTS: FUNCTIONALITY AND COMFORT	
Mehmet DEMİR, Bülent KAYGIN	27
DETERMINATION OF AGING APPLICATION PARAMETERS BY BRUSHING EASTERN SPRUCE (<i>PICEA ORIENTALIS</i> (L) LINK.) WOOD	
Turgay ÖZDEMİR, Taner GÖÇER, Emre SÖZEN	28
DETERMINATION OF DESIGN VALUES FOR MORTISE AND TENON JOINTS WITH PROBABILISTIC APPROACH AND DESIGN OF JOINTS IN FRAME TYPE FURNITURE CONSTRUCTIONS	
Mesut UYSAL, Eva HAVIAROVA	29



DETERMINATION OF MATERIAL PROPERTIES OF HISTORICAL WOODEN STRUCTURES IN THE EASTERN BLACK SEA REGION-RİZE/FINDIKLI/ÇAĞLAYAN REGION EXAMPLE Ümit Cafer YILDIZ, Gülşah Esra TÜLÜCE	30
DETERMINATION OF SOME CHARACTERISTICS OF SOME VARNISHING VARIETIES USED IN WOOD YACHT AND YACHT FURNITURE MANUFACTURING Murat ALTIPARMAK	31
DETERMINATION OF THE AGING TEST TYPES THAT CAN BE APPLIED TO WOOD AND WOODEN COMPOSITES USED IN YACHT/ BOAT AND FURNITURE Göksel ULAY, Nevzat ÇAKICIER	32
DETERMINATION OF THE EFFECT OF FIBER GLASS REINFORCED LAMINATED MATERIAL OBTAINED FROM DENSIFIED BLACK POPLAR (<i>POPULUS NIGRA L.</i>) ON PRESSURE STRENGTH İlker YALÇIN, Raşit ESEN	33
DETERMINATION OF THE EFFECTIVENESS OF TURKEY FURNITURE MANUFACTURING WITH DATA ENVELOPMENT ANALYSIS İbrahim YILDIRIM, Doğan MEMİŞ, Kadri Cemil AKYÜZ	34
DETERMINATION OF THE IMPORTANCE OF THE FACTORS THAT AFFECT THE FURNITURE SELECTION WITH THE FUZZY ANALYTICAL HIERARCHY PROCESS Alper AYTEKİN, Gülşah AKTAŞ	35
DETERMINING THE PLACE OF INTERDISCIPLINARY COOPERATION IN THE EDUCATION PROCESS IN THE CONTEXT OF WOOD FURNITURE DESIGN AND PRODUCTION Hande Gül KANCA, Erkan AYDINTAN	36
EFFECT OF LIGHTING VALUES ON PRODUCTION EFFICIENCY IN SMES WORKING ON FURNITURE Onur ÜLKER, Haldun Ender ERDEM	37



EFFECT OF PAINT APPLICATION WITH MARBLE-LIKE APPEARANCE ON SURFACE ADHESION STRENGTH Hasan Hüseyin CİRİTOĞLU, Ahmet GÜMÜŞ, Serkan ÖZDEMİR	38
EVALUATION IN LINE WITH ERGONOMIC STANDARDS OF SHIP FURNITURE MANUFACTURED IN TURKEY Nurdan ÇETİN YERLİKAYA, Esra AYIK	39
EVALUATION OF BIOCOMPOSITE MATERIALS IN THE CONTEXT OF SUSTAINABILITY IN FURNITURE APPLICATIONS Filiz İrem MEMİŞOĞLU, Elif ALTIN	40
EVALUATION OF CARBON FOOTPRINT AND ENVIRONMENTAL IMPACT IN WOOD BASED PRODUCT Uğur ARAS, Hülya KALAYCIOĞLU	41
EVALUATION OF FABRIC WASTE IN MDF (MEDIUM DENSITY FIBERBOARD) PRODUCTION Cengiz GÜLER	42
EVALUATION OF OUTDOOR DURABILITY OF ACRYLIC COATINGS CONTAINING TREE BARK EXTRACT OF WOOD MATERIAL TO BE USED IN GARDEN FURNITURE, PART I: SURFACE COLOR, ROUGHNESS AND CHEMICAL STRUCTURE Özlem ÖZGENÇ, Ebru BİLİCİ.....	43
EVALUATION OF OUTDOOR DURABILITY OF ACRYLIC COATINGS CONTAINING TREE BARK EXTRACT OF WOOD MATERIAL TO BE USED IN GARDEN FURNITURE, PART II: DRY FILM THICKNESS AND ADHESION STRENGHT Özlem ÖZGENÇ, Ebru BİLİCİ.....	44
EVALUATION OF TOOL PATH STRATEGIES IN CNC WOODWORKING MACHINES AND A CASE STUDY Özer ÖZÇELİK, Küçük Hüseyin KOÇ.....	45
EXAMINATION OF THE CURRENT SITUATION OF THE BOSNA, PIRI REIS AND JAPON PARKS IN KONYA PROVINCE, ACCORDING TO THE ANTHROPOMETRIC PROPERTIES OF 10 BASIC CITY FURNITURE TYPES Sertaç GÜNGÖR.....	46



EXAMINATIONS ON COVER CONSTRUCTIONS USED IN FURNITURE INDUSTRY	
Tuncer DİLİK, Mehmet DAĞLI, AHMET KURTOĞLU	47
EXAMINING RESPONSIBLE FURNITURE DESIGN FOR PUBLIC SPACES IN TERMS OF ENVIRONMENTAL AND SOCIAL SUSTAINABILITY: CASE OF INDOOR PUBLIC SPACE	
Oğuzhan TUNCA.....	48
FAIR STANDS FOR THE EFFECT OF CORPORATE IDENTITY IN DESIGNED FURNITURE; INTERIOR ARCHITECTURE STUDIO EXPERIENCE	
Ali AKÇAOVA, Mehmet NORASLI	49
FIRE RISKS AND PREVENTION METHODS IN THE FURNITURE INDUSTRY	
Murat AKTAŞ, Hülya KALAYCIOĞLU, Uğur ARAS	50
FORM AND FUNCTION INTEGRITY IN DESIGN BASED ON EXAMPLES	
Nazmiye Naz ÖZTÜRK	51
FURNITURE AND ERGONOMICS IN THE RE-USE HISTORIC BUILDING	
Okşan ÖLMEZ, İnci Versan ALKAN	52
FURNITURE ARRANGEMENTS AND SUPPORT OF AGING IN PLACE OF OLDER ADULTS	
Velittin KALINKARA	53
FURNITURE DESIGN AND PRODUCTION IN THE INTERSECTION OF ART-CRAFT AND INDUSTRY	
Seçil ŞATIR	54
FURNITURE DESIGN FOR MODERN TIMES: CONSTANT CHANGE AS A LIFESTYLE	
João MARTINS, João PEREIRA	55
FURNITURE DESIGN IN EDUCATIONAL ENVIRONMENT THAT ENABLING SOCIALIZATION	
Reyhan MİDİLLİ SARI, Eda AKTÜRK, Sümeyye AYBÜKE TÜRK	56



FURNITURE SOLUTIONS FOR CREATING PERSONAL SPACE IN OPEN-PLAN OFFICES	
Füsün SEÇER KARİPTAŞ, Fatih KARİPTAŞ.....	57
FURNITURE SOLUTIONS IN MICRO HOUSING INTERIORS	
Füsün SEÇER KARİPTAŞ, Fatih KARİPTAŞ, Sevgi YÜCEL	58
FURNITURES IN GERMİR TRADITIONAL HOUSES	
Gözde KUZU DİNÇBAŞ	59
GIVING FUNCTION OF STAIRS BY INTEGRATED FURNITURE	
Ayça AKKAN, Ebru ŞANLI	60
HISTORICAL DEVELOPMENT OF THE SHAKERS MOVEMENT AND EVALUATION OF ITS EFFECTS TO THE FURNITURE DESIGN THROUGH EXAMPLES	
Anday TÜRKMEN, Didem TUNCEL.....	61
IMPORTANCE OF FURNITURES IN INTERIORS' STYLES AFTER MODERNISM	
Ebru ERDOĞAN, Aybüke ESER.....	62
IN THE CONTEXT OF PROTECTION AND RE-USE OF HISTORICAL KESKİN MANSIONS TRANSFORMATION PROCESS ANALYSIS	
Onur ÜLKER, Haldun Ender ERDEM	63
INDOOR AIR QUALITY IN OLD AND NEW SCHOOL BUILDINGS AT MERSİN UNIVERSITY	
Cevdet SAÇLI	64
INFLUENCES OF SOME FACTORS UPON THE ACCELERATED CURING OF POLYURETHANE VARNISH COATING BY UV IRRADIATION	
Dimitar ANGELSKI	65
INNOVATION IN FURNITURE DESIGN: CLICK SYSTEM	
Özer ÖZÇELİK, Sabit TUNCEL, Zeki CANDAN	66
INSTALLATION-DESIGN RELATIONSHIP IN KITCHEN FURNITURE	
Merve ASLAN, Mustafa ZOR, Yeliz CİRİTÇİ	67



INTERIOR DESIGN AND FURNITURE IN THE 19TH CENTURY Burcu ÜLKER, Gökben PALA AZSÖZ	68
INVESTIGATION OF ADHESION STRENGTH OF REINFORCED LAMINATED PANELS USING GLASS FIBER WOVEN FABRIC Hasan Hüseyin CİRİTCİOĞLU, Seymen ÇİFTÇİ, Serkan ÖZDEMİR, Nusret AS	69
INVESTIGATION OF BENDING STRENGTH (MOR) OF SELECTED HARDWOODS ACCORDING TO THE CROSS SECTIONAL GEOMETRY AND FORCE DIRECTION Erkan CEYLAN, Selçuk DEMİRCİ, Ersan GÜRAY, Ali KASAL	70
INVESTIGATION OF FURNITURE DESIGN COURSE IN THE CONTEXT OF INTERIOR DEPARTMENT IN TURKEY Serpil ÖZKER.....	71
INVESTIGATION OF FURNITURE INDUSTRY PRODUCTION CAPACITY OF TURKEY Aytaç AYDIN	72
INVESTIGATION OF MULTIFUNCTIONAL FURNITURE IN CHILDRENS FURNITURE Hülya YAVUZ ÖDEN, Nurdan ÇETİN YERLİKAYA	73
INVESTIGATION OF OUTDOOR EQUILIBRIUM MOISTURE CONTENT CHANGES IN MARMARA REGION–TURKEY Hızır VOLKAN GÖRGÜN, Öner ÜNSAL, Ramazan KANTAY, Mustafa TORAMAN.....	74
INVESTIGATION OF THE EFFECT OF HORIZONTAL AND VERTICAL ALIGNMENT OF STAPLES ON THE CREEP RESISTANCE OF TWO STAPLE FURNITURE JOINTS CONSTRUCTED FROM BEECH WOOD Samet DEMİREL	75
INVESTIGATION OF THE POSITIVE AND NEGATIVE EFFECTS OF URBAN FURNITURE IN KONYA SELÇUKLU DISTRICT PARKS BOSNA AND CUMHURİYET ON CHILDREN Sertaç GÜNGÖR.....	76
INVESTIGATION OF URBAN FURNITURE AS A BUILDING DESIGN FACTOR Duygu KURTOĞLU.....	77



JAPANESE INTERIOR AND FURNITURE DESIGN Seylan ÖZTÜRK	78
LOAD BEARING CAPACITY OF DOMINO JOINTS Dénes LEVENTE, Seda BAŞ	79
MODELLING AND TESTING OF AUXETIC DOWELS WITH RECTANGULAR INCLUSIONS FOR FURNITURE JOINTS Jerzy SMARDZEWSKI, Ali KASAL, Tolga KUŞKUN	80
MODELLING SOME PHYSICAL AND MECHANICAL PROPERTIES OF HEAT TREATED SCOTCH PINE USING ARTIFICIAL NEURAL NETWORK Sibel YILDIZ, Ayşenur GÜRGEN	81
NATURAL WEATHERING AND BIOFINISHING OF WOOD MODIFIED WITH EPOXIDIZED VEGETABLE OILS Gaye KÖSE, Ali TEMİZ, Nasko TERZIEV	82
ONLINE EDUCATION ON FURNITURE DESIGN FOR HOUSEHOLD PEOPLE DURING LOCKDOWN L. N. Ece ARIBURUN KIRCA	83
PHYSICAL PROPERTIES OF WOOD MATERIAL WITH SAMPLE QUESTIONS AND SOLUTIONS İlker USTA.....	84
PROBLEMS AND SOLUTION SUGGESTIONS OF ENTERPRISES PRODUCING FURNITURE AND WOODEN YACHTS/BOATS (EXAMPLE OF BARTIN-KURUCAŞİLE) Göksel ULAY	85
“QUALITY” AS A BEHAVIORAL PATTERN IN FURNITURE DESIGN AND PRODUCTION Ahmet Şadi ARDATÜRK	86
READING THE HISTORICAL PROCESS OF FURNITURE USED IN DRAMA FILM SPACES Gülşah ÜNER, Ebru ERDOĞAN.....	87



REUSING RESIDUAL MATERIAL OF FURNITURE PRODUCTION IN NEW DESIGN ARTIFACTS BY UNIVERSITY-INDUSTRY COLLABORATION Mehmet Ali ALTIN	88
SITUATION OF THE FURNITURE INDUSTRY PRODUCT GROUPS IN TURKEY AND THE WORLD İbrahim YILDIRIM	89
SOME TECHNOLOGICAL PROPERTIES OF WALNUT (JUGLANS REGIA) TIMBER DRIED WITH HIGH FREQUENCY VACUUM DRYING (HF-V) TECHNIQUE Cengiz GÜLER, Öner ÜNSAL, Burak DİLEK	90
TEXTILE USAGE IN OPEN SPACE FURNITURE OF NAUTICAL VEHICLES Candan AYL A, Müge ERTEMLİ	91
TEXTURE, COLOR, LIGHT AND MATERIAL IN INTERIOR PERCEPTION: CHILDRENS ROOM FURNITURE Burcu ÜLKER, Gökben PALA AZSÖZ	92
THE ADVENTURE OF INTRODUCTION AND CHANGE OF THE “CLOCK” IN THE OTTOMAN WORLD Gamze AKBAŞ	93
THE CHANGES OF FIBERBOARD PROPERTIES WITH ADDITION OF PALM BARK FIBER Derya USTAÖMER, Elif TOPALOĞLU	94
THE EFFECT OF ACCELERATED WEATHERING ON COLOR AND SURFACE ROUGHNESS IN THERMOWOOD WILD CHERRY WOOD Ayhan AYTİN, Süleyman KORKUT	95
THE EFFECT OF SOME FIRE RETARDANT CHEMICALS ON WOOD TO MASS REDUCTION Kubulay ÇAĞATAY, Hacı İsmail KESİK, Mehmet Ali AKSU	96
THE EFFECT OF THE AGING FACTOR ON THE SURFACE ROUGHNESS OF THE SANDED SCOTS PINE Cevdet SÖĞÜTLÜ, Ramazan BÜLBÜL, Murat UZEL	97



THE EFFECT OF TRADITIONAL AND LASER CUTTING ON WOOD MATERIAL SURFACE ROUGHNESS USED IN FURNITURE INDUSTRY Cebrail AÇIK, Ahmet TUTUŞ.....	98
THE EFFECTS OF THE RUBBER USED AS REINFORCEMENT MATERIAL ON THE BENDING STRENGTH OF THE LAMINATED SCOTCH PINE WOOD Murat UZEL, Pascal NZOKOU, Cevdet SÖĞÜTLÜ.....	99
THE EVALUATION OF ROADSIDE BARRIERS AS URBAN STREET FURNITURE Emre BİRİNCİ, Hüseyin YÖRÜR, Halil İbrahim YUMRUTAŞ	100
THE FUTURE OF SMART FURNITURE WITH INDUSTRY 4.0: THE EXAMPLE OF THE SMART MANAGER CHAIR Alper AYTEKİN, Eda BEKTAŞ.....	101
THE IMPORTANCE OF CUSTOMER SEGMENTATION FOR FURNITURE ENTERPRISES AND A SAMPLE APPLICATION Emel ÖZTÜRK, Küçük Hüseyin KOÇ, Merve Kaplan ŞAYAN.....	102
THE PLACE OF GAN ALGORITHM IN DESIGN WITH ARTIFICIAL INTELLIGENCE Gökhan DUYUR	103
THE POSSIBILITIES OF USING THE PANELING TOOLS PLUG-IN FOR DESIGN EDUCATION AND FURNITURE DESIGN Nazmiye Naz ÖZTÜRK	104
THE RELATIONSHIP OF FURNITURE AND PHYSICAL COMFORT IN COMPUTER WORK ENVIRONMENTS İsmail SARI, Taner DİZEL.....	105
THE ROLE OF IN-HOUSE INDUSTRIAL DESIGNERS IN THE TURKISH FURNITURE INDUSTRY Nimet Başar KESDİ, Pınar KAYGAN	106
TIME STUDY AND AN EXAMPLE OF APPLICATION IN WOOD URBAN FURNITURE Tuncer DİLİK, Halil Erdem YÜCEL.....	107



TRADITIONAL TURKISH MOTIFS AS INTERIOR DECORATION ELEMENTS YAHYALI EXAMPLES	
Harun DİLER, Derya ÇAKMAK	108
TRANSFORMATION OF WASTE INTO ECO-FRIENDLY PRODUCT: SAMPLE OF WOOD BARKS	
Yener TOP	109
USE OF DESIGN RESEARCH METHODS IN THE TRANSFORMATION OF FURNITURE IN CARE HOMES	
Mehmet Erçin OKURSOY	110
USE OF FINITE ELEMENT METHOD IN THE DESIGN OF POLYMERIC CARRIER & ACCESSORY LEGS FOR PANEL FURNITURE	
Burak DEMİRTAŞ, Abdülkadir ÖZÇELİK	111
USE OF FURNITURE IN NARROW SPACES, MULTI-FUNCTIONAL FURNITURE	
Hamide TEMEL	112
WORKSHOP OUTCOMES: REINTERPRETATIONS OF VERNACULAR ARTIFACTS IN THE CONTEMPORARY FURNITURE DESIGN	
Esra NASIR	113
CHALLENGES FOR FURNITURE DESIGN WITH THIN STRUCTURAL MATERIALS	
Vassil JIVKOV, Boryana PETROVA	114



A CRITICAL OVERVIEW ON THE UNIVERSITY-INDUSTRIAL COOPERATION PROCESS OPENING WITH FURNITURE PRODUCTION ENTERPRISES

Göksel ULAY^{a*}, Nevzat ÇAKICIER^b

^aDepartment of Furniture and Decoration, Van Yüzüncü Yıl University, Van, Turkey.

^bDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

*Corresponding author: gokselulay@gmail.com

Turkey Furniture manufacturing sector export potential, employment creation capability, the presence of added-value products, with many features such as branding and to the development of the industry is an important sector for our country. With the rapid change in the world of science and technology, the developments have eliminated the boundaries between the countries, and as a result of globalization, the whole world has become a single and big market for everyone. In order to compete in these market conditions, it is very important to gain branding, technology, quality, qualified personnel, R&D and URGE success and the ability to produce scientific knowledge and turn it into a product. Within the scope of the study, the collaborations that furniture enterprises can develop with universities that produce scientific knowledge will be discussed. Problems encountered in the process of establishing University-Industry cooperation in the furniture sector will be identified and examined with a critical perspective. The suggestions for the issues, disruptions and new methods to be considered while establishing new collaborations are addressed by addressing the effects and roles of professional representatives in the sector, experts in the field with working experience, managers and academic staff and administrators in the University-Industry cooperation process

Keywords: University, collaboration, industry, furniture, businesses.



A REPRESENTATION PROCESS IN MODERN FURNITURE HISTORY EDUCATION

Aslan NAYEB KHOSROSHANI^{a*}, Havva Beril BAL^a

^aDepartment of Interior Architecture and Environmental Design, Avrasya University, Trabzon, Turkey.

*Corresponding author: thenayeb@gmail.com

Representation is for one that makes it easier to transfer an idea to the other party. In the field of design, representations help to distinguish the thoughts that the designer has in his mind, as well as creating a space where that thought can simplify what is in mind during the upload. Today, representation has become a tool that is needed especially in conveying thoughts. In this context, it can be said that representation is the embodiment of thought.

In this study subject to this paper, it is aimed to make architectural representations of chairs belonging to modern period furniture styles. When looking at the history of furniture, it is divided into two as the classical period and the modern period after the industrial revolution. Within the scope of the study, firstly, the students were given information about the history of furniture in a wide perspective from Antiquity to the end of the 20th century. The application phase of the study consists of collecting information, sketching process, two-dimensional drawing and three-dimensional application. The furniture of the modern period was given to the students and they were asked to do research first. Later, students carried out sketches on representation alternatives. The suggestions selected from the sketches were developed, and 2D and 3D representations were realized.

In the process of representation made in this direction, it has been observed that the relationship between students and furniture has increased significantly. This situation, contrary to the fact that furniture history lessons remain only verbal expression; It has been demonstrated that more efficient results can be obtained by thinking interactively with students and producing products

Keywords: Furniture, modern furniture history, furniture history education, architectural representations



A STUDIO EXPERIENCE ON FURNITURE DESIGN IN INTERIOR ARCHITECTURE EDUCATION: BANK DESIGN WITH ANALOGICAL APPROACH

Hüseyin Emre ENGİN^{a*}, Mukaddes ATAMAN^a, Havva Beril BAL^a, İrem BEKAR^b

^aDepartment of Interior Architecture and Environmental Design, Avrasya University, Trabzon, Turkey

^bDepartment of Interior Architecture, Karadeniz Technical University, Trabzon, Turkey

*Corresponding author: emrengin@hotmail.com

In interior architecture education, which aims to raise individuals who can think critically and analytically, have an aesthetic perception, and interpret all the variables in an original way while solving problems, it is an extremely important phenomenon to gain creative thinking systematics and multi-faceted perspective skills. Design studios, where theoretical knowledge is put into practice in terms of gaining these skills, have great importance in interior architecture education. In design studios, there is active learning based on the individual playing an active role in the process rather than the ready transfer of information.

In interior design education, furniture design is also a part of these design studios and active learning, where the design process is experienced.

This study, which is the subject of the paper, focuses on the furniture design studio experience at Avrasya University Department of Interior Architecture and Environmental Design in 2018-2019 academic year, which is based on the active role of the students from the theoretical basis to the design process and implementation. The subject of the project has been determined as developing the bank design that can be used in the waiting areas of the educational buildings through analogy based on any living/non living objects being in nature” therefore, the students were asked to address the design problem from different perspectives and while making formal abstraction through analogy, to produce solutions by considering the parametric design criteria. In the study, it is aimed to ensure the active participation of the students in every stage from the conceptual thought phase of the design to the idea phase, from the formal research process to the application of the design.

At the end of the study, it has been observed that making an analogical design by associating the main idea with a concept in a design problem, enables the students to develop many alternatives in the formal research process, and in this sense, it has been observed that the process is beneficial as the students have made significant contributions to their designs in terms of being original and creative, and developing the problem solving systematic especially for application.

Keywords: Furniture, furniture design, creativity in design, analogical design



A STUDY FOR THE INVESTIGATION OF THE CAUSES OF WORK ACCIDENTS IN THE FURNITURE SECTOR

Aytaç AYDIN^{a*}, Gizem CEYLAN^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: aytac@ktu.edu.tr

In order to ensure occupational health and safety in enterprises, only the inadequacy of legal regulations has been fully revealed by the increasing number of work accidents and occupational diseases. When the causes of occupational accidents are analyzed, it is seen that approximately 80 of them originate from the employee, 19 from the structure of the working environment and 1 from unknown reasons. In the furniture sector, which is an important sector that creates added value in the forest products industry, production is mostly carried out by micro and small enterprises. Due to this structure, it is an important issue to investigate the factors that change the probability of work accidents depending on the factors at the workshop level and as a family business. Within the scope of the study, it is aimed to determine the situations that cause work accidents and the factors that cause work accidents by applying a questionnaire in enterprises operating in the furniture sector. When the results are analyzed, it was revealed that the most important factor that could cause a work accident was personal problems with 72.3, and the least important factor was the lack of state control with 58.9.

Keywords: Furniture industry, Occupational accident, Occupational health



ADAPTIVE DESIGN PROPOSAL IN THE ARCHITECTURAL SPACE AND URBAN FURNITURE INTERFACE

Ferhat HACIALİBEYOĞLU^{a*}, Deniz DOKGÖZ^a

^aDepartment of Architecture, Dokuz Eylül University, İzmir, Turkey.

*Corresponding author: f.hacialibeyoglu@deu.edu.tr

TIRTIL/The Caterpillar; It is a design awarded and applied as a result of the competition organized to obtain a design object that defines portable multi-purpose space that can accommodate design and art exhibitions, performance and other daily use activities in various public areas of İzmir. With its simplicity and adaptable setup in dimensions and combination details, It is a design proposition that can be adapted to many different places, allows user interventions, and accommodates different experiences with its spatial and mass variations. Optimum TIRTIL, which enables the activities such as exhibition, performance and relaxation with its closed / optimum status, can be defined as an open design space-urban furniture that creates an effect on its environment through its size and surfaces it creates in the area where it is located. Therefore flexibility and adaptability are evident as an important feature of TIRTIL. Due to its simplicity in dimensions and joint details, the application process can be carried out quickly and easily in the area where it will be located. In the space formed by using laminated wooden panels, the motion system of the panels is provided with hinges, while under these panels, height adjustable fixation system is used which facilitates movement and provides harmony with the variable floor. The joints in the fixed section are made by using a plug-in connection system. Seats inside and outside of the space and display niches on the surfaces are provided by variations in the cross-section of the laminated wooden panels. In this way, TIRTIL is a holistic design object. With specified features The design, that completed at the first designated location, will be discussed through parameters such as manufacturing and application process, everyday use experiences and design value in urban open space.

Keywords: Adaptability, design, architectural space, urban furniture



ADVANTAGES OF WOOD IN CREATIVE STREET FURNITURE

Turgay ÖZDEMİR^{a*}, Banu ÇİÇEK KURDOĞLU^b, Kadir Tolga ÇELİK^b, Cenk DEMİRKİR^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^bDepartment of Landscape Architecture, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: turgay@ktu.edu.tr

In urban spaces, street furniture meeting the need of changing and evolving for user has different quantity and quality, meaning loader and identity participant in pint of functional and esthetic. The right relationship between urban spaces and street furniture must be established in order for spaces to be usable. In constructing this right relationship, identity, creative, sustainable street furniture are created and designed using basic design criteria. In order to be used in street furniture, wood materials which are in the right integrity with the environment, which have aesthetic properties and which provide ease in design and application are utilized. In this paper, the current situation of wood technology, the possibility of wood, the advantages it creates, and the different street furniture that it forms together with other used materials (glass, flexi, steel, and fiberglass) in terms of color, texture, form and size are discussed with domestic and international examples.

Keywords: Street furniture, wood-based materials, sustainability



AN EVALUATION ON THE DESIGN OF OFFICE SPACES AND REINFORCEMENT ELEMENTS

Mehmet NORASLI^{a*}, Ali AKÇAOVA^a

^aDepartment of. Interior Architecture and Environmental Design, Selçuk University, Konya, Turkey.

*Corresponding author: mehmetnorasli@selcuk.edu.tr

Offices, which are specialized areas of information-based work, were first activated within the living spaces and official spaces of individuals. With the industrial revolution, office spaces have changed as production evolved from body strength to machine power. Over time, the development of technology and the enrichment of corporate ideas have brought innovation to offices. In this context, it is known that offices are designed by organizing with different space organizations.

The use of office spaces in different ways over time has been effective in updating the equipment used in these spaces. The design of office furniture in different ways plays an active role in creating the identity of the spaces. In this context, it is observed that the space and reinforcement elements can be associated exactly and that the correct results can be obtained by thinking together at the design stage.

With this study, it is aimed that the students studying in the interior design department to design the space and reinforcement elements together. In this context, in 2019, Selçuk University, Faculty of Fine Arts, Department of Interior Architecture and Environmental Design, worked with the method of projecting the space and reinforcement design together, by giving them the subject of office space design, by considering the space design theme.

As a result, it has been determined that the design of the space and the reinforcement elements are complementary elements in the project process of the students studying design. It is understood that the reinforcement elements designed specifically for office spaces are an element that emphasizes the image of the institution. The vision and mission of an institution can be better expressed by the design of its location and equipment.

Keywords: Office spaces, reinforcement elements, design



AN EVALUATION ON THE HISTORY OF FURNITURE AFTER THE INDUSTRIAL REVOLUTION

Okşan ÖLMEZ^{a*}, İnci Versan ALKAN^b

^aDepartment of Architecture, Trakya University, Edirne, Turkey

^bDepartment of Interior Architecture, Trakya University, Edirne, Turkey

*Corresponding author: oksanolmez@gmail.com

Since prehistoric times, people have built shelters to survive and live in a sheltered place. In the built shelters, raised areas according to the needs, protrusions or hollows formed on the walls, softened and ovalized parts of natural materials; although we have not reached the present and do not see a precise example, it can be thought that it includes the first approaches that reveal the concept of furniture. These furnitures, which were originally produced to meet the needs in order to facilitate the living conditions, have become reflective of the socio-economic, political and cultural situation of the period. And its purpose produced of these furnitures show in connection with concepts such as showing status, power, wealth, divinity. With the development of tools and machine, furniture styles and models have changed with the increasing needs, and the artisans started to reflect their own style on the furniture by being influenced by the environment and the period they live in. After the industrial revolution, the furniture, the use of furniture has become widespread, not only its handmade production but also with its ability to produce in factories and with provide cost less; diversified in form, function and material. In this work, the currents emerging as reflections of changing thought systems with the development of furniture in history and the beginning of the industrial revolution will be examined and furniture styles, models and types that will change with the currents will be compared.

Keywords: Furniture, industrial revolution, furniture history



AN EXAMPLE STUDY ON THE RELATIONSHIP BETWEEN INTERIOR DESIGN AND SHOPPING BEHAVIOR

Kübra ÖZLÜ DEĞER^{a*}, Erkan AYDINTAN^a

^aDepartment of Interior Architecture, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: kozludeger@gmail.com

Interiors are designed and handled with various dimensions by designers in order to serve their basic function in the best way. In this direction, the surfaces that limit and determine the space and the furniture to be found in the space are handled as a design object with all its physical (color, texture, pattern, etc.) and perceptual (warm, cold, formal, intimate, etc.) features. On the other hand, the positioning of the furniture and surfaces in the spatial volume, its layout, intensity, its relationship with the light and shadow, etc. are taken into consideration in order to contribute to the general concept and function of the space by considering many parameters. As a result, a designed interior can change the subjective thoughts and even behaviors by directing the world of perception as well as affecting its user physically. This is how interior design affects trade volume, especially in commercial buildings; raised the questions of the designers preference for space and user interaction. Searching for answers to these questions, revealing the experiences gained in a scientific framework will be a guide for designers to design and manage the design process. Based on this, the purpose of the study is to reveal how the interior action areas and shop spaces designed according to the brand, the corporate identity and the concept affect the shopping behaviors of the users (purchasing, store stay etc.). In addition, in order to support the main purpose of the study, it is aimed to determine how the designers prediction about the perceptual aspect of the space corresponds to the user. Within the scope of the study, the design process of Trabzon Forum AVM “Nocturne” store was examined and case analysis was made. The data were obtained by using visual analysis and survey techniques. First of all, forecasts, decisions taken and the process of the store construction site were explained in the interior design process of the store. Then, through the surveys applied to 50 users, it was tried to determine in what direction and how effective the space design was in the shopping behaviors of the customers and whether the design predictions and the goals were met.

Keywords: Interior design, brand, corporate identity, showcase design, commercial feedback asses



AN EXPERIMENTAL STUDY ON THE CHANGE IN PERCEPTION OF RECOGNISABILITY OF STYLES IN THE DESIGN EDUCATION PROCESS

Ayşenur DAĞ GÜRCAN^{a*}, Betül HATİPOĞLU ŞAHİN^a, Şule ERYÜRÜK^b

^aDepartment of Architecture, KTO Karatay University, Konya, Turkey.

^bDepartment of Industrial Engineering, KTO Karatay University, Konya, Turkey.

*Corresponding author: aysenur.dag@karatay.edu.tr

Design education is aimed at enhancing visual thinking and creativity while enriching the visual memory of the individual. In this education process, visual images that contribute to the professional development of students are analysed by them and stored in their memories. In this study, experimental research was conducted to measure the change in students recognition of styles through the educational process that shapes the individuals aesthetic and visual perception level. Within the scope of the study, sample size was created with student groups with and without receive design education, and asked them to interpret images that represent styles. Student groups with receiving design education are determined as students of architecture, interior design, and industrial design and the groups who not receive design education are students of the mathematics department. The survey applied to the both groups which consist of the first and fourth-grade students. In the survey study mixed images of two buildings and two industrial designs belonging to seven architects (Antonio Gaudi, Gerrit Rietveld, F. Lloyd Wright, Mies van der Rohe, Mario Botta, Frank Gehry, Zaha Hadid) who represent different architectural styles (Art Nouveau, De Stijl, Modernism, Minimalism, Postmodernism, Deconstructivism, Futurism) were given to student groups. The images consisting of 14 buildings and 14 industrial designs were asked to match from students. Based on the findings of previous studies, the main hypothesis of this study is the idea that students who have reached the end of design education can perceive styles differently than students who have never received design education or at the very beginning of design education. While architecture students are familiar with the building images; students of industrial design are familiar with the product design images used in the survey. The idea of the interior architecture students will give more positive results in perceiving and interpreting the images has been determined as the sub-hypothesis, because of they are familiar with both the product design and the buildings. In this study, which is aim to measure the perceptual change of the individuals in the design education process, statistical evaluation was made, and the hypotheses are corroborated with the results obtained. It is foreseen that the study will be a reference for future research.

Keywords: Design education, perception, architectural styles



AN INQUIRY FROM USER'S PERSPECTIVE INTO THE FURNITURE WITH OPEN-SOURCE RECIPES IN THE CONTEXT OF DO-IT- YOURSELF THEME

Ceren KOÇ SAĞLAM^{a*}, İsmail BEZCİ^b, Vildan DÜNDAR TÜRKKAN^b

^aDepartment of Interior Architecture, Marmara University, Istanbul, Turkey.

^bDepartment of Interior Architecture and Environmental Design, Hacettepe University, Ankara, Turkey.

*Corresponding author: ibezci@icloud.com

The frontiers of today's world which we know and perceive of and which is defined as the modern changed along with globalization and digitalization. In this regard, new concepts which come into play by virtue of the influence exerted by changing paradigms and fringe experiences on human being's understanding of consumption and production and the existence of these new concepts on the agenda shape the theoretical and practical literature in relation to design. Along with fast growth of consumption and change in consumption culture and the accessibility of information and expansion of information base, the human being began to be interested either in the production by himself/herself of the objects which he/she desired to own or owned or in the improvement of such objects by adding something from himself/herself. This interest launched the advancement of the 'Do-It-Yourself' movement whose tracks we could see on the perspective of humanity's historical process concerning the practice of doing. In the context of this movement, recipes including information on how human beings will do the objects which they are interested in doing are shared as open source on web pages developed under 'do-it-yourself' theme. As a response to this approach, human being as the consumer started to produce what he/she needed and to consume what he/she produced. The relationship of the user, who took a passive and/or an active part in traditional furniture design, with the furniture of today's changing understanding of consumption was addressed through do-it-yourself theme. For this study which was performed on furniture produced with do-it-yourself theme, an experimental research was configured on the basis of user's experience. In the study, an internet site which had a wide network was selected from among internet sites replete with uploads allowing consumption through production and designated as open source, equipped with do-it-yourself theme, current in terms of recognition, supported by well-known institutions and agencies and/or associated with well-known institutions and agencies and endowed with an experience of more than a decade at least. Three recipes posted on the internet site which was called as Instructables and categorized under do-it-yourself theme were selected and utilized by authors of this study who assumed the role of users. The only precondition for selected recipes which would be practically applied through this study was for them to be for furniture. Authors selected and utilized furniture which they needed solely in the context of their own life routines. In this process of practice, authors themselves experienced the do-it-yourself theme on a one-on-one basis directly through the furniture which they themselves produced. Besides this practice, evaluations on conventional furniture and user roles were presented in conjunction with the topic. Through theoretical framework and experimental research under this study, answers to the following questions were sought: Can a different definition of user be offered under do-it-yourself theme? How is the dialog between user, producer, designer, design and design recipe from user perspective? Can anybody produce furniture? What are its



differences from conventional furniture production and consumption processes? Is there any difference between do-it-yourself furniture and mass-produced or special fabrication furniture made by furniture manufacturing sector? In conclusion, it was observed that do-it-yourself theme would be an area of experience in consumption culture for the user, user's roles became vaguer, and there would be different dynamics of production processes and accessibility of information. In the consumption culture, the user is not just the one who purchases the final product and uses it, but he/she is in a position to experience the production process fully and the design process partially and to exert influence on these processes. The user is able to reshape and contribute to the recipe of furniture which is supposed to be emerging as the final product and consumed by himself/herself. Thus, the user adds new dynamics to the design process as he/she is involved in processes under the current system of do-it-yourself theme. In this conjunction, it was found that furniture produced in the context of this theme could not be characterized as the final product, rather, as the furniture in constant motion.

Keywords: Furniture, furniture design, user, do it yourself, design recipe



AN INVESTIGATION OF ART WORKS CONSISTING OF WOOD MATERIAL AND EVALUATION OF THE INVENTORY INFORMATION

Göksel ULAY^{a*}, Mustafa YILDIRIM^a

^aDepartment of Furniture and Decoration, Van Yüzüncü Yıl University, Van, Turkey.

*Corresponding author: gokselulay@gmail.com

Due to its superior properties, wood material has been influenced by cultural and technological developments throughout human history and has found a place in peoples lives. When the valuable works of art that have been revealed throughout history are examined, it is seen that wood materials are used in many works that have survived to the present day. The purpose of this study is to reveal the process of defining the properties of wood art works and the evaluation of inventory information. In the study, descriptive information about the wooden art works in the current academic literature and inventory records in the museums where the works are studied were examined. Whether the information given about wooden artworks is based on scientific evidence and data of the works will be discussed. The use of scientific and evidence-based methods in the process of producing reliable information of the works will be discussed. As a result, it is thought that the real values of art works will be understood by revealing the properties of wooden art works with correct and reliable methods and techniques. This process requires interdisciplinary work and collaboration of experts. In this way, it can contribute to providing reliable information to the public who are interested in wooden artworks.

Keywords: Wood product, timber, identification, wooden artworks



ANALYSIS OF CAT-FRIENDLY FURNITURE IN THE CONTEXT OF THE RELATIONSHIP BETWEEN SPACE, FURNITURE AND USER IN HOUSING UNITS

Aslı TAŞ^{a*}, Ceren KOÇ SAĞLAM^a

^aDepartment of Interior Architecture, Marmara University, Istanbul, Turkey.

*Corresponding author: aslitas26@hotmail.com

Along with the diversification of lifestyles across time, changes occurring in the interaction between human beings and animals reshaped common living areas. By taking into consideration the factors such as the ease of establishing ties, ease of care and physical advantages, human beings prefer having cats more often as pets in order to live together in their own common living areas. The furniture is one of the important tools which satisfy cats' needs such as establishing relations and communicating with human beings, strengthening ties between themselves & human beings and creating a safe zone for themselves. Cat-friendly furniture is the piece of furniture which is designed to allow the cat and/or human being to meet their needs and to perform their activities on a daily basis. In this study, the furniture utilized in housing units was analyzed as it acted as the place where human being and cat spent most of their time together. Furniture was analyzed under four categories in terms of the purpose of its uses in the housing unit (self-care/activity), its relationship with the space (fixed/mobile), its relationship with the user (common/single use) and the mode of production of the design (special fabrication/mass-production). In terms of the purpose of uses of furniture, the study addressed compulsory forms of furniture by which cat could satisfy its self-care needs such as nourishment, toilet and scratching and evaluated pieces of furniture equipped with alternative functions through which the cat could enjoy activities such as playing games, sleeping, climbing and hiding. Upon the examination of the relationship of furniture with the space in which it existed, the furniture was categorized as fixed and mobile. Moreover, upon the review of the relationship of furniture with the user, the furniture was categorized into two groups as common use and single use furniture on the basis of its joint use by human being and cat. As per the mode of production, it was discerned that the furniture was designed to be special- fabrication and mass-production on the basis of basic needs, forms, aesthetics and spatial harmony concerns. In this connection, by examining samples of furniture in terms of above four categories identified in the context of this study, the study aimed to analyze the effect of cat-friendly furniture on furniture design in housing units at the intersection of human being, cat and space.

Keywords: User, furniture, cat, house, furniture design



ANALYSIS OF FURNITURE CHARACTER RELATIONSHIP IN STAR WARS MOVIES IN THE CONTEXT OF POWER REPRESENTATION

Selva BAŞÇI^{a*}

^aDepartment of Interior Architecture and Environmental Design, İstanbul Gedik University, İstanbul, Turkey

*Corresponding author: selva.basci@gedik.edu.tr

The common point of all the Star Wars series, which is a revolution both in terms of technique and narrative for the cinema world, is the struggle of good and evil, the biggest paradox of human history. 1970s when the movie was created; It is considered as a process in which the USA is involved, where economic troubles and political instabilities are experienced, and that western societies are in a political crisis. Star Wars, which are very rich in character and space designs, contain political elements in terms of being the story of freedom fighters struggling with an evil empire, the war of taking power in the struggle between the light and dark sides. In this study, a literature review was conducted on the subject of the research, and the furniture used by the characters representing power and who are in the status of managing those under their command, were examined in detail over Star Wars, considering their relationship with the user. It is aimed to contribute to the literature, which examines the relationship between cinema and architecture, which are two different disciplines that feed each other, in the context of the interaction between character and furniture in science- fiction films.

Keywords: Star wars, character, furniture, power



ANALYSIS OF MUSCULOSKELETAL DISORDERS IN FURNITURE INDUSTRY ACCORDING TO ANTHROPOMETRIC DATA

Taner TAŞDEMİR^{a*}, Kemal ÜÇÜNCÜ^a, Murat TOPBAŞ^b, Aytaç AYDIN^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^bDepartment of Internal Medicine, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: ttasdemir@ktu.edu.tr

As in many industries, employees in furniture factories have to move their bodies, organs such as hands, arms and feet many times due to the machine bench systems they are in contact with during work. While these movements are often within body limits, they sometimes exceed these limits. Even movements within body limits may reveal some health problems in the long term for employees, due to repetitions or being in the same position continuously. In this study, the relationship between anthropometric data of employees working in a large-scale furniture factory and musculoskeletal system disorders due to machine tools in Turkey has been questioned. The study was carried out on 7 provinces, 11 factories and 411 employees. Within the scope of the study, 15 static anthropometric data were taken and the nordic musculoskeletal system questionnaire was applied to the employees. As a result of the work, the workers report the areas of pain in their body during work or at any time of the day as knees, feet and wrists and legs.

Keywords: Musculoskeletal disorders, anthropometrics, furniture industries



ANALYSIS OF URBAN FURNITURE IN TERMS OF RENEWABLE ENERGY CONCEPT: EXAMPLES FROM TURKEY AND WORLD

Ayşegül TEREÇİ^{a*}, Merve ATMACA^a

^aDepartment of Architecture, KTO Karatay University, Konya, Turkey.

*Corresponding author: aysegultereci@gmail.com

People need energy to sustain their lives. Human beings in the 21st century has faced two important problems regarding the increasing population and consequently the need for energy. One of them is the decrease in energy resources and the other is the pollution of fossil-based energy resources. In the solution point of these problems, it is necessary to make plans and designs that reduce energy expenditures in each area and do not harm the environment. At this point, renewable energy sources in designs is an important support in solving problems. Integration of renewable energy sources into our current life can take place in many areas from urban scale to product scale. Within the scope of this article, the integration of renewable energy sources to urban furniture is discussed. Issues to be considered in the design of urban furniture and the integration of renewable energy into furniture are discussed. The development of self-contained products by integrating renewable energy sources (solar energy, wind energy, etc.) into urban furniture brings a solution to the energy consumption problem. For this purpose, in this research; examples of sustainable urban furniture from the world and Turkey were analyzed.

Keywords: Renewable energy, urban furniture, sustainable



ANTHROPOMETRIC INVESTIGATION OF OCCUPATIONAL ACCIDENTS WITH HAND TOOLS IN FURNITURE FACTORIES

Taner TAŞDEMİR^{a*}, Kemal ÜÇÜNCÜ^a, Murat TOPBAŞ^b, Yasin BALABAN^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^bDepartment of Internal Medicine, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: ttasdemir@ktu.edu.tr

In this study, in order to reduce the occupational accidents in the furniture factories in Turkey, it was investigated that the problems caused by the accident on the workers, the number of accidents, injury caused by the accident and dimensional problems between the hand tools and the workers causing the accident were investigated. The research was conducted on 411 workers in seven provinces and 11 large-scale furniture factories throughout Turkey. Research consists of three phases. At the first stage, a questionnaire including work-related accidents and dimensional problems was applied to the workers. In the second phase, 15 anthropometric data were obtained from the workers. In the third stage, the dimensions of the workbenches and hand tools used by the workers were measured. According to the results of the research, the most used hand tools were determined as floor guns (40.2), the most common accidents were compression of hands or feet into the machine (38.7) and parts handling (54.4 26.9). Organs with the most damage were identified as hand (42.7) and fingers (24.7) and more than half of the workers who were involved in the accident were left in excess of 17 days.

Keywords: Occupational accidents, hand tools, anthropometrics



ASSESSMENT OF INTEGRATION MATURITY OF ENTERPRISE RESOURCE PLANNING SOFTWARE IN U.S. FURNITURE INDUSTRY

Çağatay TAŞDEMİR^{a*}

^aDepartment of Forest Industry Engineering, Bursa Technical University, Bursa, Turkey.

*Corresponding author: cagatay.tasdemir@btu.edu.tr

Increased competitiveness and tightening profit margins in U.S. furniture industry force companies to re-consider their management methods. On the other hand, factors such as product line expansions, ever changing customer requirements and entering new markets significantly increase the amount of required computational work and data tracking activities. Under such circumstances, firms try to increase efficiency and profitability by managing costs and cutting waste both in the means of production and management. Today, one of the most useful management innovations that could help with streamlining management practices is integrated enterprise resource planning (ERP) software. World class manufacturers across many industries have already started to use ERP for their operational and supply chain management activities. However, furniture industry members, especially small and medium sized enterprises, have been following the members of other industries one step behind. In this study, 75 furniture companies from 4 different regions of the U.S. were invited through e-mail communication to participate in a 20-questions survey to assess integration maturity of ERP software in furniture companies. 22 firms provided meaningful input for the study. The results revealed that only 5 of the participants had an ERP software that had all the modules required to manage all operational and supply chain activities. 65 of the participants had at least one software that is capable of keeping track of real time data for operational activities. It was found out that furniture firms place less importance on keeping track of real-time data for supply chain management activities when compared to production activities. It can be concluded that U.S. furniture industry members should pay more attention to advanced technologies and the state-of-the-art management methods and tools if collective profitability and efficiency of the sector are to be increased.

Keywords: Enterprise resource planning, Furniture industry, Management systems, Supply chain management



BURSA GREEN MOSQUE ORNAMENTS AND GENERAL FEATURES OF WOOD ORNAMENTS

Kubulay ÇAĞATAY^{a*}, Tolga SUBAŞI^b, Rahmi ARAS^b

^aDepartment of Interior Architecture and Environment Design, Nuh Naci Yazgan University, Kayseri, Turkey.

^bDepartment of Furniture and Decoration, Gazi University, Ankara, Turkey.

*Corresponding author: kcagatay@nny.edu.tr

In this study, green mosque decorations in the Yildirim district of Bursa province were examined. Bursa Green Mosque, built during the Ottoman period, is one of the most important architectural structures in Bursa. Wood, marble, stone made on the rumi and hatai style decorations, especially the tile decorations have an important place. The kundekari technique applied on the doors is one of the important examples in terms of wood application technique. Within the scope of the research, determinations were made about the period of the structure, the renovations he had seen and his physical condition. Information was given about the mihrab, lectern, temporal office, sultans room, tabhane, muezzin room located in the interior of the mosque. At the same time, wooden sections such as crown door, under arch, tabhane room window, eyvan part window, tabhane room walkway door, prayer gah section window and pulpit, such as wooden parts are illustrated and decorated and general characteristics has been determined. In 2012, the mosque was restored and it was observed that decorations and wooden works were carefully preserved. We think that it is important to preserve similar examples with Bursa Green Mosque, which is an important example of traditional mosque architecture and decorations, and to benefit from these examples as well as the transfer of new works to future generations.

Keywords: Ornament, wood use, wood ornament, cultural heritage



BYZANTINE FURNITURE IN THE ILLUSTRATED MANUSCRIPTS IN THE 9TH-12TH CENTURIES

Didem GÜZEL^{a*}

^aDepartment of Art History, University of the Republic, Sivas, Turkey.

*Corresponding author: didemguzel.58@gmail.com

The purpose of this study is to identify the furniture types given place to in manuscripts written and illustrated in the 9th-12th centuries and analyze and evaluate the ones which can be defined. Since our purpose is to identify Byzantine furniture kinds and types, the subject and iconography of the scenes and ornaments other than furniture were not dealt with in the study. The main reason why we chose the subject of furniture is that, there are no Byzantine furniture samples which have reached the present time to be preserved at a museum or collection with the exception of Archbishop Maximianus' ivory cathedra (6th century.) The illuminated manuscripts were analyzed, it was seen that there are many types of Byzantine furniture produced in various styles. Lecterns, two-layered pedestals, cabinets with shelves whose top part were used as tables, armchair and chairs whose back rests are either curved or knitted like nets with thread, beds with mattresses and railings, engraved cradles and colored stone studded ornamented thrones are among some of the furniture types we came across in the manuscripts.

Keywords: Byzantine, middle byzantine period, illustrated manuscripts, furniture.



CARAVAN-TRAILER (TOWED TRAILER) INTERIOR EQUIPMENT

Hakkı Tonguç TOKOL^{a*}

^aDepartment of Interior Design, Marmara University, İstanbul, Turkey.

*Corresponding author: tonguctokol@gmail.com

Caravan-trailers, or more commonly known as towed trailers, are mobile space that are designed to be mobile in highways via being towed by motor vehicles. This mobility is achieved by attaching the trailer to a vehicle equipped with a tow hook. While they are widely used for recreational purposes, it is not uncommon to see them being used for various other reasons. For example, caravan-trailers could help fulfill the need for shelter during extraordinary events such as the Covid-19 pandemic, or during natural disasters. Caravan-trailers are designed to attain a basic level of functionality to that of a dwelling in order to meet the demands of highway guidelines and regulations. These functions include spaces for food preparation, dining, resting, sleeping, bathrooms, and storages. Due to limited space, some functions of caravan-trailers may coexist in the same section, and the equipment inside may be designed in fixed positions to save space. In addition, designs may include multipurpose furniture or furniture that can be folded after use to gain living space. For instance, a seating unit that can be converted into a bed, or a dining table that can be folded after eating to alleviate room circulation. Furthermore, the interior equipment and features of caravan-trailers are designed with the portability of the environment in mind. This study will analyze the features and functions of caravan-trailers through design examples with regard to historical advancements and the concept of mobile space.

Keywords: Interior design, interior equipment, mobile space, furniture, caravan



CHANGE OF BEDROOM AND FIXED FURNITURES IN APARTMENT BUILDINGS IN KONYA FROM EARLY REPUBLIC OF TURKEY TO THE PRESENT

Betül HATİPOĞLU ŞAHİN^{a*}, Ayşenur DAĞ GÜRÇAN^a

^aDepartment of Architecture, KTO Karatay University, Konya, Turkey.

*Corresponding author: betulhatip@gmail.com

Housing emerges as an architectural product provides to individuals needs such as shelter, rest, nutrition, social and economic. Development process of the housing is affected in social factors such as culture, privacy, social events, economic condition, lifestyle, as well as environmental factors such as topography, climate, wind, sun, direction. In our country, especially with the effect of the Industrial Revolution, the participation of women in business life has changed the family structure. Large family structure evolved into nuclear families has also been an important factor in shaping the housing. At this point, the “bedroom” unit, which is one of the most important part of housing, responding to basic needs such as sleeping and resting, was also affected by these developments. The location of the bedroom in the housing, size and the fixed furnitures in it has transformed at this period. In this study, four periods were determined by 1923-1950, 1950-1980, 1980-2002, 2002 to date and the place, size and role of the bedroom in the house were examined. In the city of Konya, which has been chosen as a research area, three individual apartment buildings have been selected for each period, especially reflecting the characteristics of the period. The change of bedroom unit was discussed with the location reading and visible area analysis made on the plans of these structures. As a result, it has been observed that units such as lumber room and closet have disappeared, and today, places such as dressing room, en-suite bathroom, night hall have joined the bedroom. It is anticipated that this study will be important and reference future studies in order to open discussions of the changes of the bedroom, which is the most personal space of the house.

Keywords: Housing, bedroom, fixed furniture



CONTEMPORARY APPROACHES IN THE INNOVATIVE FURNITURE CO-DESIGN CRITERIAS' SCOPE AND FORMATION

Esin FAKIBABA DEDEOĞLU^{a*}, Meryem YALÇIN^a

^aDepartment of Interior Architecture and Environmental Design, TOBB University of Economics and Technology, Ankara, Turkey.

*Corresponding author: e.dedeoglu@etu.edu.tr

The aim of this study is to develop an insight into the development and formation of furniture within the scope of innovative, collaborative, continuously developing process design approaches that have developed and diversified since the 90s in today's world. (Burnett 2009; Rylander 2009; Sanders & Stappers, 2008). Since, for the contemporary approaches; it is not possible for a single design discipline to respond to the scale or complexity of the issues. Covering experimental, virtual and real mixed spaces, emerging design in the future; it is not possible to ignore that the fields which are holistic with the integrated disciplines in the field of design areas and which work in the sense of common gain will become widespread. Co-Design expertise/disciplines are involved in furniture design and production; Many design disciplines such as communication design, interface design, brand design, graphic design, digital design, system design, transformation design, organization design and space design are due to their efforts to create holistic values of design; it requires simultaneous/joint/ integrated work. Inclusive and binding objective that it serves under the perspective of design and service based on this study. In addition, sample of innovative furniture co-design in various approaches will be offered from Turkey and the World.

Keywords: Co-design; innovative furniture; multi-design approaches



DESIGN AND EVALUATION OF THE STRENGTH OF A NEW EXTERNALLY INVISIBLE FASTENER BY NUMERICAL ANALYSIS FOR CABINET FURNITURE JOINTS

Jerzy SMARDZEWSKI^{a*}, Lukasz KRZYZANIAK^a, Tolga KUŞKUN^b, Ali KASAL^c

^aDepartment of Furniture Design, Poznań University of Life Sciences, Poznan, Poland.

^cDepartment of Woodworking Industrial Engineering, Mugla Sıtkı Kocman University, Muğla, Turkey.

^bDepartment of Forest Industry Engineering, Mugla Sıtkı Kocman University, Muğla, Turkey.

*Corresponding author: lukasz.krzyzaniak@up.poznan.pl

Consumers on the whole world search for cheap furniture, easy to transport, assemble, disassemble and repair without tools. Striving to satisfy this need, manufacturers have launched new ready-to-assemble (RTA) furniture items sold in flat packages. Such RTA furniture comprises many elements and fasteners. The most common methods to generate assembly forces in the joint include tightening of screws, eccentric joints, insertion of wedges, transfer of catch joints, increasing or decreasing connector volume typically using screwdrivers, electrical tools, rotating magnetic field, hammers, heat or ultrasound generators

It was planned in this study to manufacture innovative prototypes of externally invisible cabinet furniture joints and to evaluate their strength with numerical analysis. Accordingly, the aim of this study was to determine the effect of assembly forces on contact pressures at the joints. Based on the analysis of obtained results, several conclusions and observations have been formulated. It can be said that the prototype connectors manufactured from polyamide (PA12) as slide mortise and tenon joints in the scope of the study are an attractive construction for RTA cabinet furniture joints. They are externally invisible and generate contact pressures which effectively provide high assembly forces. According to the numerical analysis results, the value of assembly forces depends on the type of material from which the joints are made.

Keywords: Cabinet furniture, externally invisible fastener, assembly force, contact pressure, numerical analysis



DESIGN FOR EXPORT' THE FURNITURE DESIGN COMPETITIONS: AN EVALUATION ON THE MEANINGFUL EXPERIENCES AND THEIR CONTRIBUTIONS TO DESIGN EDUCATION

Jülide EDİRNE ERDİNÇ^{a*}

^aDepartment, University, City, Country. Department of Architecture, Haliç University, Istanbul, Turkey.

*Corresponding author: julideedirne@halic.edu.tr

OİAB National Furniture Design Competition Design For Export is a furniture design competition which is opened by Orta Anadolu Mobilya, Kağıt ve Orman Ürünleri İhracatçıları Birliği to increase the export of the furniture sector in Turkey. Since 2007, it is held at the national level with the contributions of the institutions directly related to the sector.

In this study, while revealing the studies carried out in the direction of the objectives it has targeted since the beginning of the OİAB National Furniture Design Competitions, its contributions to design education are discussed in addition to the sectoral effects it creates.

As the source of the study, the opening speeches of Prof. Dr. Önder Küçükerman who is president of the jury and has been designer of the Design for Export competitions from the first day and the contest books that were published as a very comprehensive and important resource after each competition were scanned.

With the Furniture Design Competition, which has been held for 12 years, both a communication network containing the information of designers in our country has been established, and a bridge has been established between the educational institutions and industrialists providing education in this field.

Keywords: Design For Export Competition, design education, furniture



DESIGNING DRAWING TABLE FOR UNIVERSITY STUDENTS: FUNCTIONALITY AND COMFORT

Mehmet DEMİR^{a*}, Bülent KAYGIN^b

^aDepartment of Forest Industry Engineering, Izmir Katip Çelebi University, İzmir, Turkey.

^bDepartment of Forest Industry Engineering, Bartın University, Bartın, Turkey.

*Corresponding author: mehmet.demir1@ikcu.edu.tr

Drawing tables are widely used in design studios of Bartın University in Turkey. The purpose of this study is to identify musculoskeletal disorder risks that students in Bartın University face and to resolve these problems with innovative solutions during the design phase. The results of the literature review on the drawing tables used in universities in Turkey revealed that functionality and comfort features are not sufficiently taken into account. In this scope, the functionality and comfort features of the existing drawing tables were examined. A survey was carried out among the university students in Bartın to assess the functionality and comfort levels of fixed-type and adjustable drawing tables. Based on the results of the questionnaire, functionality and comfort problems were identified and a sample furniture design was carried out by using Computer-Aided Design (CAD) software in 3-dimension mode. The required material and construction type for the production of the prototype of the suitable drawing table design was determined. The drawing table prototype was produced as a result of the appropriate dimensioning and combining of composite, metal, plastic, glass, wood, etc. materials. It is also aimed to contribute to the literature in the field by composing awareness in terms of functional and comfortable drawing table design and production for the universities in Turkey.

Keywords: CAD, comfort, design, drawing table, functional furniture, prototype production



DETERMINATION OF AGING APPLICATION PARAMETERS BY BRUSHING EASTERN SPRUCE (*PICEA ORIENTALIS* (L) LINK.) WOOD

Turgay ÖZDEMİR^{a*}, Taner GÖÇER^a, Emre SÖZEN^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: turgay@ktu.edu.tr

In our country, the forest products sector cannot show any development except for large companies. They provide financial success by combining existing technologies with innovations rather than innovations with the advantage of cheap labor and realizing high energy consumption. In this study, it is to create a potential for the domestic and foreign markets by obtaining products with increased added value by adding natural forest assets, labor and technology, which have low added value in general. In this study, it is especially concentrated on the spruce tree, which is found in our region. The eastern spruce is one of the primary forest tree species spread over an area of approximately 350,000 hectares. The Eastern Black Sea region, where it spreads, has the best ecological conditions for forestry in our country. In this regard, carrying out all kinds of forestry activities in Eastern spruce forests in accordance with the requirements of science and technique is of great importance in terms of continuity of the forests of the region. One of the most important features of spruce tree is natural tulle formation and dyeing performance. On the other hand, Doğu Laden completes its economic life after using 2-3 times of construction timber and provides an added value between 10-20 at most. The use of the spruce tree, which has a low value added, as an aged wood, will increase its added value and bring it to the economy. In this study, it is aimed to determine the aging characteristic in accordance with the optimum strength values required for the places of use by mechanical etching method without using chemicals in Eastern Spruce wood.

Keywords: Eastern spruce, brushing, aging



DETERMINATION OF DESIGN VALUES FOR MORTISE AND TENON JOINTS WITH PROBABILISTIC APPROACH AND DESIGN OF JOINTS IN FRAME TYPE FURNITURE CONSTRUCTIONS

Mesut UYSAL^{a*}, Eva HAVIAROVA^b

^aDepartment of Forest Industry Engineering, Bursa Technical University, Bursa, Turkey.

^bDepartment of Forestry and Natural Resources, Purdue University, Indiana, United States.

*Corresponding author: mesut.uysal@btu.edu.tr

In this study, it was aimed to determine design values for mortise&tenon joints in frame type construction in order to estimate its strength in design process. T-shaped mortise&tenon joints made of red oak wood were subjected to a static load to determine their ultimate moment capacity. Then, its design values were determined by using lower tolerance limits method. These values were used to design mortise&tenon joint where is located back post-to-side rail joints under bending force in the case of the a chair frame is subjected to external load (2000 N). Afterwards, load capacity of chair frame with designed mortise&tenon joints were determined under static and cyclic performance testing. In static load test, chair frames were expected to resist at least 2000 N load level. In other hand, load capacity levels of chair frames in cyclic load test were compared to acceptable load level specified by American Library Association. According to test results, all chair frames failed above 2000 N load level in static load test. In the cyclic load test, all chair frames were successfully passed specified acceptable low load capacity levels. The study showed that strength of a frame construction can be determined in its design process.

Keywords: Mortise and tenon, design of joints, lower tolerance limits, design value



DETERMINATION OF MATERIAL PROPERTIES OF HISTORICAL WOODEN STRUCTURES IN THE EASTERN BLACK SEA REGION - RİZE / FINDIKLI / ÇAĞLAYAN REGION EXAMPLE

Ümit Cafer YILDIZ^{a*}, Gülşah Esra TÜLÜCE^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: yildiz@ktu.edu.tr

Historical wooden buildings are a heritage that almost witnesses sustainable practices. To make a real assessment of this heritage, it is imperative to understand the past and present situations in depth. In this context, as an example of rural architecture; Uzunhasanoğlu Residence in Çağlayan village, Fındıklı District of Rize Province was investigated. First of all, a situation assessment form related to the building was created and the plan features were examined. Then, anatomical, physical, mechanical strength and non-destructive test properties of the wooden material used in the building were investigated. Compression strength, MOR, MOE and impact bending strength tests were carried out on old and new wood samples. Moreover, non-destructive tests were carried out with a resistograph device on the carrier beams and columns of the building. In addition, deteriorations in the structural wooden elements of the building were determined. Decays were mostly determined in wood materials in basement, flooring materials, beams embedded in the wall, roof elements and window joinery. Insect destruction was mostly detected on beams and columns on the roof. Despite some decay and insect damage detected in the structure, it was determined that a significant loss of strength did not occur in the original wood material.

Keywords: Historical wooden structures, strength, deterioration, non-destructive tests

DETERMINATION OF SOME CHARACTERISTICS OF SOME VARNISHING VARIETIES USED IN WOOD YACHT AND YACHT FURNITURE MANUFACTURING

Murat ALTIPARMAK^{a*}

^aDepartment of Shipbuilding, Fettah Tamince Vocational and Technical Anatolian High School, Antalya, Turkey.

*Corresponding author: mu.altiparmak@outlook.com

In this study; Scratch, adhesion and hot cold resistance of different varnishes used in the interior and exterior equipment of wooden yachts are determined. Samples of 100x100x10mm for scratching, 150x75x5mm for adhesion, 100x100x10mm for hot cold resistance, Limba (*Combretaceae Terminalia Superba*), Chestnut (*Castanea Sativa Mill.*), Sapelli (*Entandrophragma Cylindricum*) trees were prepared.

Three types of varnish were used as yachts, yachts, polyurethanes and epoxy varnishes. In the study, a total of 135 experimental samples were prepared: 3 tree types, 3 varnish types, 3 different process types, 5 repetitions. In scratch resistance; among the species, the highest value was obtained in Sapelli and the lowest value was obtained in Limba tree.

In adhesion resistance, it was seen in yacht varnish with the highest adhesion value in all woods, followed by polyurethane varnish and epoxy varnish respectively. In the study conducted with yacht varnish, the highest adhesion was seen in chestnut samples, followed by limba and sapelli wood, respectively. Polyurethane varnish provided the highest adhesion value in chestnut respectively, followed by sapele and limba woods. The highest adhesion value in epoxy varnish was determined in limba samples, followed by chestnut and sapelli wood.

In hot cold resistance; No capillary cracks were observed in any of the panels after 20 cycles of cold-check test after applying varnishes to limba, chestnut and sapelli wood. All three types of varnish have given excellent results in this regard, in accordance with the standards.

Keywords: Varnish performance tests, wood material, yacht varnish, polyurethane varnish, epoxy varnish



DETERMINATION OF THE AGING TEST TYPES THAT CAN BE APPLIED TO WOOD AND WOODEN COMPOSITES USED IN YACHT/ BOAT AND FURNITURE

Göksel ULAY^{a*}, Nevzat ÇAKICIER^b

^aDepartment of Furniture and Decoration, Van Yüzüncü Yıl University, Van, Turkey.

^bDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

*Corresponding author: gokselulay@gmail.com

In this study, it is aimed to determine the appropriate aging test techniques that can be applied to wood and wood composites that constitute furniture and other building elements used in marine vehicles such as yachts and boats. Salt water, ultraviolet rays, wind, torrential rains, sun effect, temperature difference, evaporation should be taken into consideration in the selection of surface protector treatment for wooden materials in yachts and boats used in sea and open weather conditions. Because the protection measures for other factors such as inclination, direction, height from the ground, direct contact with water in the marine conditions of the wood and composite material can be very different from those used in the residential environment. Different levels of aging (deformation) may occur against the severity and impact of the wood and composite material deformation source. Determination of the performance of the protective layers applied on wood material can be determined by natural aging in marine conditions and artificial aging test devices in laboratories. In the study, aging test methods suitable for wood and wood composites used in marine conditions and issues that are important for application will be included. As a result, scientific test methods to be used in the yacht and boat industry and reliable predictions will contribute to the use of correct materials and protection methods.

Keywords: Wood, marine, yacht/boat, aging, furniture



DETERMINATION OF THE EFFECT OF FIBER GLASS REINFORCED LAMINATED MATERIAL OBTAINED FROM DENSIFIED BLACK POPLAR (*POPULUS NIGRA* L.) ON PRESSURE STRENGTH

İlker YALÇIN^{a*}, Raşit ESEN^b

^aDepartment of Furniture and Decoration, İzmir University of Economics, İzmir, Turkey.

^bDepartment of Department of Industrial Design, Karabük University, Karabük, Turkey.

*Corresponding author: ilker.yalcin@ieu.edu.tr

Wood as a traditional material; It is widely used due to its easy processing, resistance properties and cost advantages, renewable and aesthetic properties. On the other hand, wood material is subjected to some applications in order to eliminate these negative properties due to its various disadvantageous properties such as biodegradability, flammability, varying moisture content, changing dimensions, ultraviolet (UV) light, degradability by acids and bases. Lamination technology is used to improve the physical and mechanical properties of the wood material, to save material, and to obtain structural elements in the desired length or form. Laminated wood materials are used in the furniture industry as well as for structural purposes, in the production of curved parts such as door-window, seat and chair frames. In addition, low density wood material is commercially transformed into a high value product with the densification process. In this study, the effect of 3-layer laminated material obtained from black poplar (*Populus nigra* L.) wood material, which was applied to the densification process after impregnation with melamine formaldehyde resin, on pressure resistance was determined. The densification process was applied as 50, after the densification process, laminated material was obtained from these layers. As a result, the laminated test samples obtained from densified black poplar material; pressure resistance and density values were determined to be higher than massive samples.

Keywords: Densification, black poplar, lamination, compressive strength



DETERMINATION OF THE EFFECTIVENESS OF TURKEY FURNITURE MANUFACTURING WITH DATA ENVELOPMENT ANALYSIS

İbrahim YILDIRIM^a, Doğan MEMİŞ^{b*}, Kadri Cemil AKYÜZ^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^bDepartment of Forest Industry Engineering, Bursa Technical University, Bursa, Turkey.

*Corresponding author: doganmemis12@gmail.com

In today's world, where scarce resources are even more valuable, achieving the targets set by using fewer resources has been the most important competitive factor. Organizations should utilize their resources more effectively and they have to aim the increase in their effectiveness continuously. To increase their effectiveness, organizations should analyze whether they are effective or not. Data Envelopment Analysis is a method that is non-parametric based on math equations to calculate the activity levels by evaluating input and output variables together. In this study, it is aimed to determine the efficiency of the furniture manufacturing sub-sector within the manufacturing industry as of 13 years. Eight different variables of five were input variables and three were output variables determined. Data envelopment analysis; Output oriented CCR, output-oriented BCC, output-oriented super BCC, and output-oriented super BCC models are used. According to the results of the output-oriented CCR model, 11 years are considered as "1" effective, while 2 years are not fully effective. In the output-oriented BCC model, 11 years are considered as "1" effective, while 2 years are not fully effective. In BCC model, efficiency values are equal to or greater than CCR model.

Keywords: Efficiency, data envelopment analysis, furniture manufacturing, Turkey



DETERMINATION OF THE IMPORTANCE OF THE FACTORS THAT AFFECT THE FURNITURE SELECTION WITH THE FUZZY ANALYTICAL HIERARCHY PROCESS

Alper AYTEKİN^{a*}, Gülşah AKTAŞ^a

^aDepartment of Management Information Systems, Bartın University, Bartın, Turkey.

*Corresponding author: aytekin@bartin.edu.tr

Furniture industry, like other sectors developing in Turkey, led to the increase in furniture consumption by enhancing the effects on humans. With increasing consumption, it has become important to analyze the factors that consumers pay attention to in furniture selection for furniture companies, whose numbers are increasing day by day. One of the most important factors to consider when choosing furniture is that the furniture is useful and the user feels comfortable. However, besides this important issue, its compliance with home decoration has become more noticeable by individuals. The price, durability and maintenance of the furniture to be chosen are other factors to be considered. In this study, the importance levels of factors affecting furniture selection were investigated by the fuzzy analytical hierarchy process. AHP is a decision-making method based on one-to-one evaluation, creating alternatives and criteria to achieve the specified goal. In the light of the data obtained as a result of the study, it was determined that the factors such as furniture life, price, furniture style, warranty period, functionality and material quality are prominent in the preferences of the people.

Keywords: Furniture selection, analytical hierarchy process, fuzzy logic



DETERMINING THE PLACE OF INTERDISCIPLINARY COOPERATION IN THE EDUCATION PROCESS IN THE CONTEXT OF WOOD FURNITURE DESIGN AND PRODUCTION

Hande Gül KANCA^{a*}, Erkan AYDINTAN^b

^aDepartment of design, Arsin Vocational School, Trabzon, Turkey.

^bDepartment of Interior Architecture, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: handegulkanca@ktu.edu.tr

In the process of the emergence of furniture as a design product, cooperation of related disciplines is needed in terms of design, production and marketing. For example, in this sense, especially when it comes to furniture using wood-based materials, it is important for interior architects to have experience gained through joint work with forest industry engineers starting from the education process. Functionality of furniture, creative and original aspects of furniture, aesthetics, correct material selection, application detail drawing, etc. is in the field of competence and responsibility of the interior designer. On the other hand, when the main material is wood, there may be a lack of knowledge / experience of the interior architect in matters as the type of wood, the chemistry of the wood, the processing condition (possibilities of the material) and other determination of compatibility with materials, creation of production process, cost calculation, etc. In this case the forest industrial engineer who is lack of design skills can step into the process and work in partnership with interior architect on creating a marketable product. As a result, each discipline can create joint studies in line with the same goal by supporting the areas where the other party is weak with their own areas of expertise. In this context, the study pointed out the benefit of making interdisciplinary joint studies in the process of furniture design and production, especially during the education period and it was emphasized that the deficiencies found in the education process at this point in terms of both disciplines should be eliminated urgently. In the study, first to put forward this lack of lesson plans, in Turkey the state and private universities lesson plans in the departments of interior architecture / interior architecture and environmental design and forestry industrial engineering, which are currently studying were examined. It has been determined that the courses on furniture in interior architecture departments generally focus on design and technical knowledge of interior architecture and are weak in matters of the production process, cost calculations, marketing etc. On the other hand, it has been observed that the mentioned processes are carried out in Forest Industrial Engineering, but the design context is ignored. This is due to the nature of both disciplines. Within the scope of the study later, the cooperation between KTU Interior Architecture Department and KTU Forest Industry Engineering Department students in the fall semester of 2019-2020, and the result of the collaboration of wooden furniture, was examined and its efficiency was questioned. For this purpose, as a result of the interviews with the directors and students, it has been determined that such a cooperation is very beneficial in many different aspects. As a result, it has been observed that the fact that both designer candidates and forest industrial engineer candidates have complementary acquisitions during the training process has an effect on increasing the work efficiency and product quality.

Keywords: Wooden furniture, interior architectural education, inter-disciplinary education



EFFECT OF LIGHTING VALUES ON PRODUCTION EFFICIENCY IN SMES WORKING ON FURNITURE

Onur ÜLKER^{a*}, Haldun Ender ERDEM^b

^aDepartment of Interior Architecture and Environmental Design, Kirikkale University, Kırıkkale, Turkey.

^bDepartment of Material and Material Processing Technology, Kirikkale University, Kırıkkale, Turkey.

*Corresponding author: onurulker@kku.edu.tr

Providing of comfortable working environments, which is one of the most basic issues of affecting the work efficiency of employees in furniture manufacturing. The most important factors affecting the working comfort can be evaluated as indoor brightness values, the amount of noise generated during operation, humidity, ambient temperature and indoor air quality. Indoor brightness values are very important for working conditions and safely operations. Since furniture manufacturing is made using high-speed machines, employees must follow the machine knives moving while performing cutting or shaping processes and comply with the occupational safety rules. For this reason, the most important factor affecting both work efficiency and working comfort is in-workshop lighting. In this study, selected 10 businesses in Ankara Siteler Furniture Industrial Zone were examined, the general lighting levels in the workshop, regional lighting values, lighting values in the regions where the knives of the machines were examined, and the relationship between efficiency and lighting was evaluated on a workshop basis. It has been determined that the productivity values are higher in the enterprises using natural lighting.

Keywords: Interior space lighting values, efficiency, furniture production, SMEs



EFFECT OF PAINT APPLICATION WITH MARBLE-LIKE APPEARANCE ON SURFACE ADHESION STRENGTH

Hasan Hüseyin CİRİTOĞLU^{a*}, Ahmet GÜMÜŞ^a, Serkan ÖZDEMİR^a

^aDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

*Corresponding author: hasanciritcioglu@duzce.edu.tr

Different surface applications are used to protect furniture surfaces against environmental influences. Finishing applications are applied not only to protect the furniture, but also to meet their aesthetic expectations. Nowadays the use of covering paints, especially lacquer paints, is among the popular finishing applications. Materials and methods used in these applications can affect the adhesion strength. In this study, marble-like paint application (spider technique) was used for aesthetic integrity and product diversification in bathroom furniture. Within the scope of the study, the appearance of marble was obtained by using spider technique with covering paints prepared on 3 different recipes on 18 mm single-faced medium density fiberboard (MDF Lam). The adhesion strengths of the painted surfaces were determined according to ASTM D 4541 standard and the results obtained were compared statistically. The findings show that the adhesion resistance to the surface is related to the material and/or application that first touches the surface. As a result of the study, the highest adhesion strength was obtained with UV (ultraviolet) primer and lacquered paint recipe applied on topcoat.

Keywords: MDF Lam, lacquer, paint adhesion, spider technique



EVALUATION IN LINE WITH ERGONOMIC STANDARDS OF SHIP FURNITURE MANUFACTURED IN TURKEY

Nurdan ÇETİN YERLİKAYA^{a*}, Esra AYIK^a

^aDepartment of Interior Architecture, Yalova University, Yalova, Turkey.

*Corresponding author: esraayik93@gmail.com

The term ergonomics, which has an important place in our lives, is applied in many fields. Products that provide maximum comfort for users are produced in line with ergonomic and anthropometric data. Ergonomics is an approach that should be applied in ships with a limited area. Efficiency should be given importance for users in small areas. Today, ergonomic standards are given importance in ships under the name of working ergonomics. On ships used on seaways, furniture should be produced in line with these data. Living spaces should be productive for the comfort of users. Furniture in these areas should be a solution for problems that may occur in sea voyages such as; long road, lurch, fire etc. Turkey has an important place in the shipbuilding industry. Therefore, the furniture used on the ships should be in harmony with the users. In this study, ship furniture manufactured in Turkey which is an important shipyard area has been evaluated in line with ergonomic standards. As a result of these comparisons, it is aimed to evaluate the data used in the production of ship furniture within the framework of ergonomic standards.

Keywords: Furniture, ergonomics, ship interior



EVALUATION OF BIOCOMPOSITE MATERIALS IN THE CONTEXT OF SUSTAINABILITY IN FURNITURE APPLICATIONS

Filiz İrem MEMİŞOĞLU^{a*}, Elif ALTIN^b

^aDepartment of Architecture, Maltepe University, İstanbul, Turkey.

^bDepartment of Interior Architecture, Maltepe University, İstanbul, Turkey.

*Corresponding author: filiziremmemisoglu@maltepe.edu.tr

The process of differentiation of materials that started with the industrial revolution continues today as a requirement of the needs of the age. Increasing environmental awareness in societies, concern for the future, the effects of deteriorating ecosystems, have led people to think of sustainability and to search for new products and methods. This has led to more research on environmentally friendly new materials, it has become almost imperative to produce sustainable materials using renewable resources. Composite materials, which have been used for a long time, have taken a new dimension with the development of science and technology, biocomposite materials have been started to be produced by using natural fibers of plant origin instead of synthetic fibers in their structure in accordance with the concept of sustainability. The aim of this study is to express the importance of the material in the project production of the designs that can be produced, re-constructed over and over again within the scope of sustainability with the biocomposite material, construction techniques in furniture sector, application methods and analysis of examples will be discussed. As a result of the study, the material is sustainable and usable for the building industry with the advantageous properties provided by biocomposite materials.

Keywords: Material, composite, biocomposite, sustainability, furniture



EVALUATION OF CARBON FOOTPRINT AND ENVIRONMENTAL IMPACT IN WOOD BASED PRODUCT

Uğur ARAS^{a*}, Hülya KALAYCIOĞLU^b

^aDepartment of Materials and Materials Processing Technologies, Arsin Vocational School, Trabzon, Turkey.

^bDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: uaras@ktu.edu.tr

The climate change is becoming an increasingly important problem for life. It is now recognized that greenhouse gas emissions caused by humans have a negative impact on the environment. The total greenhouse gas emission caused directly and indirectly by an individual and an organization is generally called a carbon footprint. Determining an organizations carbon footprint is an important step in reducing emissions generated during its activities. Wood-based products have many advantages in terms of environmental impact compared to their alternatives. Documentation of these advantages and detection of environmental impacts will contribute significantly to the competitiveness of wood materials in future building materials. Moreover, thanks to the detection and control of the emission outputs from the production of wood-based products, it will be possible to realize a more environmentally friendly production. In this study, the concept of carbon footprint in wood based products and their effects on the environment will be emphasized.

Keywords: Carbon footprint, Wood based products, Greenhouse gas emissions, CO₂



EVALUATION OF FABRIC WASTE IN MDF (MEDIUM DENSITY FIBERBOARD) PRODUCTION

Cengiz GÜLER^{a*}

^aDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

*Corresponding author: cengizguler@duzce.edu.tr

Textile waste has an important potential in Turkey. The amount of fiber produced during production is more than 500,000 tons. The amount obtained by recycling from domestic waste is about 250.000 tons. When considered together with household waste and industrial waste each year in Turkey seems to occur approximately one million tons of textile waste. These wastes are recyclable. In addition, the discovery of the economic profitability of recovery has increased the interest in this area. It is thought that the evaluation of these wastes in composite material production such as fiberboard may partially produce a solution to the raw material deficit. In this study, it is aimed to evaluate the tekstil wastes in MDF production. For this purpose, fiber boards were produced by adding 5, 10, 15, 20 and 25 textile fibers at a target density of 0.75 g / cm³, respectively. Some physical and mechanical properties of the fiberboards produced were examined and evaluated according to the standards. As a result, it has been observed that the production by using textile wastes up to rate 20 is compliant with the standard.

Keywords: Fiberboard, tekstil fabric, MDF, domestic waste, physical and mechanical properties



EVALUATION OF OUTDOOR DURABILITY OF ACRYLIC COATINGS CONTAINING TREE BARK EXTRACT OF WOOD MATERIAL TO BE USED IN GARDEN FURNITURE, PART I: SURFACE COLOR, ROUGHNESS AND CHEMICAL STRUCTURE

Özlem ÖZGENÇ^{a*}, Ebru BİLİCİ^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: oozgenç@ktu.edu.tr

One of the important problems, especially in garden furniture, is the fading of the colors with the effect of UV rays from the sun. Furniture that has faded is left out of use even if they lose nothing from other features. While this situation causes financial losses, it causes damage to the national wealth. It even creates a negative impact by creating waste for the environment. In the study, it is planned to improve the color-losing properties of waterborne acrylic coatings containing bark extract as UV absorber for wood materials that can be used in the production of outdoor furniture, and to increase the service life of the pre-protected and unprotected wood material. For this purpose, waterborne acrylic coatings were produced using extracts from the bark of 10 tree species, and their outdoor resistance was tested on the scotch pine and eastern beech wood surfaces. The woods covered with bark extracts, commercial UV absorbers and control coatings that contain no UV absorbers have been subjected to natural outdoor testing in Trabzon. After the experiment, the color and roughness parameters and macroscopic structure of the test and control coatings were examined. The chemical structure was analyzed by ATR-FTIR spectroscopy. It was observed that the coatings containing bark extract were close to the control coatings on the heat treated (Z group) surfaces, and the lowest results in the change in the color and roughness values in the scotch pine applied the impregnation (Y). Macroscopic evaluation of all coatings on wood surfaces of Z group was quite high. The color change of test coatings on Z group scotch pine surfaces gave close results to the control coatings. ATR-FTIR spectroscopy analysis supported color change results.

Keywords: Bark extract, acrylic coating, outdoor conditions, color change, roughness change, ATR-FTIR

EVALUATION OF OUTDOOR DURABILITY OF ACRYLIC COATINGS CONTAINING TREE BARK EXTRACT OF WOOD MATERIAL TO BE USED IN GARDEN FURNITURE, PART II: DRY FILM THICKNESS AND ADHESION STRENGTH

Özlem ÖZGENÇ^{a*}, Ebru BİLİCİ^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: oozgenç@ktu.edu.tr

The effects of weather conditions (sunlight, rain, strong winds, etc.) occur in outdoor furniture, as well as problems such as deterioration, loss of resistance and color loss. Thus, outdoor conditions shorten the life of the furniture. In this study, the protective effect of waterborne acrylic coatings containing bark extract as an UV absorber on the pre-protected or unprotected wood surface used in the production of furniture planned for outdoor conditions was investigated. The waterborne acrylic coatings were produced by using extracts from the bark of 10 different tree species as additives. The outdoor durability of coatings were tested on pretreated and untreated scotch pine and oriental beech surfaces and coating containing bark extract and control coating containing commercial UV absorber and no UV absorber were compared. The change in the layer thickness and adhesion resistance of the test and control coatings were evaluated and the change in the microscopic structure of the coating layers was determined by light microscopy. After the weathering test, the change in the layer thickness and adhesion resistance of acrylic coatings containing bark extract was found close to the control coatings on heat treated wood surfaces (Z group). The change in adhesion resistance values in test coatings on scotch pine surfaces was determined close to control coatings. It has been observed that acrylic coatings containing bark extract have higher protection performance compared to commercial UV absorbers on scotch pine surfaces, where impregnation pretreatment (Y) is applied under outdoor conditions. The increase in the antioxidant effect in the bark extract had a positive effect on scotch pine wood to increase the durability in outdoor conditions, while it had a low effect on beech wood.

Keywords: Bark extract, acrylic coating, outdoor conditions, adhesion resistance, layer thickness, light microscope



EVALUATION OF TOOL PATH STRATEGIES IN CNC WOODWORKING MACHINES AND A CASE STUDY

Özer ÖZÇELİK^{a*}, Küçük Hüseyin KOÇ^a

^aDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: ozerozcelik@trakya.edu.tr

Since computerised numerical controlled (CNC) machines began to be used in the manufacturing industry, accurate determination of tool path strategies has always been an important problem area. In addition to the increasing design expectations especially in products and parts, developments in CNC machines have increased the efficiency expectation in tool path applications. The tool path can also vary according to the nature of the work and the geometric structure needed. Different tool path strategies can be used depending on product structure and machine characteristics in different sectors. The geometry of the workpiece to be machined, especially designed for machining complex shaped parts, plays an important role in determining the cutting tool path and tool to be used. In addition, the preferred tool path strategy raises issues such as reducing manufacturing costs, reducing manufacturing time and improving surface quality. In this context, the parameters such as the form of the workpiece, the quality of the workpiece, the characteristics of the cutting tool, the machine characteristics, the cutting conditions are among the main factors to be considered in the tool path evaluations. In this study, tool path strategies for a sample piece of product were evaluated in a CNC woodworking machine. A three-axis CNC machine was chosen for the application. For this purpose, first of all, product part is modeled in CAM program and tool path strategies are developed on product design. These strategies were applied on CNC woodworking machine and the results of preferred tool path strategies were evaluated with comparative analysis. As a result of the research, the approaches that can be applied in determining the correct way of tool path strategies and the benefits that can be obtained are discussed.

Keywords: CNC Woodworking, tool path, CAM, CAD



EXAMINATION OF THE CURRENT SITUATION OF THE BOSNA, PIRI REIS AND JAPON PARKS IN KONYA PROVINCE, ACCORDING TO THE ANTHROPOMETRIC PROPERTIES OF 10 BASIC CITY FURNITURE TYPES

Sertaç GÜNGÖR^{a*}

^aDepartment of Landscape Architecture, Selçuk University, Konya, Turkey.

*Corresponding author: sertac@selcuk.edu.tr

All the details used to shape a city and make it functional, from lighting elements to garbage cans, all kinds of seating elements, plant boxes, flooring and covering materials, fountains and water elements, warning and direction signs, and bus stop to telephone booths fall within the scope of urban equipment elements. The places where people visiting the parks meet their recreational and leisure needs have been selected as research areas. Observation-analysis-synthesis method was used in this study. Suggestions for making the right decisions have been made. The interaction of the city and people has been examined in the context of the urban environment, these theoretical concepts and discourses are supported by urban observations and research and visual analysis methods and some inferences are revealed, and in line with the needs and uses of the parks, the 10 basic urban furniture in these 3 parks; Their suitability to anthropometric measurements, their availability, whether they are well-groomed or not were examined and the results of this examination were evaluated. According to this evaluation; It has been determined that some of the reinforcement elements have lost their functionality due to completely or partially destroyed, some of them are not suitable for human health due to various ergonomic reasons, and some of them are insufficient on the basis of amount, while the most neglected park is Bosna Park, the most well-maintained park is the Japon park. It has also been determined that the Bosna park may become sufficient provided that it is revised and urban furniture is maintained.

Keywords: Urban furniture, anthropometry, landscape architecture, urban park



EXAMINATIONS ON COVER CONSTRUCTIONS USED IN FURNITURE INDUSTRY

Mehmet DAĞLI^a, Tuncer DİLİK^{b*}, AHMET KURTOĞLU^c

^aDağlı Furniture and Decoration Enterprise, Giresun, Türkiye

^aDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

^cDepartment of of Interior Architecture, Doğuş University, İstanbul, Turkey.

*Corresponding author: tuncerd@istanbul.edu.tr

In recent years, in furniture designs, it is seen that enterprises try to take part in the furniture market by creating new models only with the changes in the cover constructions. Therefore, the cover constructions in wooden furniture were examined in this paper. In the furniture industry where module standards exist, cover constructions are undoubtedly the most important part of the module. The cover is the first eye-catching part of the module that requires more and careful work than the other parts of the body. So, the production stages of the cover constructions are of great importance.

In the research, it is revealed that the type of the cover constructions is determined by the movement patterns of the cover and it is necessary to apply the joining methods according to the place of use. Furthermore, it can be clearly stated that the covers have a significant share in the production costs of the furniture. In addition, it is determined that the covers having the highest share in the production cost are the lacquered application models.

As a result, in the framework of the study findings, it was emphasized and suggested the importance of furniture manufacturers to prioritize R&D studies for cover constructions in terms of increasing international competitiveness and efficiency in model development.

Keywords: Furniture covers, cover constructions, kitchen furniture, membran cover, lacquered cover



EXAMINING RESPONSIBLE FURNITURE DESIGN FOR PUBLIC SPACES IN TERMS OF ENVIRONMENTAL AND SOCIAL SUSTAINABILITY: CASE OF INDOOR PUBLIC SPACE

Oğuzhan TUNCA^{a*}

^aDepartment of Interior Architecture, Eastern Mediterranean University, Famagusta, North Cyprus

*Corresponding author: oguzhan.tunca@cc.emu.edu.tr

Sustainable design is responsible for society and should appeal to all segments of society. For this reason, interior designers need to adopt the universal design approach adopted by the entire civilized world, especially in areas designed for public use. Besides, environmental issues caused by unconscious resource consumption should be taken into account and directed towards furniture design with environmentally friendly materials. However, environmental and social factors are generally not considered in furniture design in public spaces, and there is no detailed research on this subject, and this causes an important problem. The purpose of this study is to explain the responsibilities of interior designers towards the environment and society as an example of public space designs and to discuss the use of environmentally friendly furniture in terms of sustainability and universal design principles in public spaces. It is also to analyze furniture designs in public spaces under universal design principles and to raise awareness in interior designers. Qualitative observation method will be used in the method of this research and a literature review will be made in terms of environmental and social responsibility factors in furniture design. The limits of this study are indoor public spaces and furniture designs used in these areas will be handled with a critical perspective in terms of environmental responsibilities and social responsibilities.

Keywords: Eco-friendly, universal design, furniture, environmental and social responsibility, sustainability



FAIR STANDS FOR THE EFFECT OF CORPORATE IDENTITY IN DESIGNED FURNITURE; INTERIOR ARCHITECTURE STUDIO EXPERIENCE

Ali AKÇAOVA^{a*}, Mehmet NORASLI^a

^aDepartment of Interior Architecture and Environmental Design, Selçuk University, Konya, Turkey.

*Corresponding author: aliakcaova@selcuk.edu.tr

In today's competitive environment, institutions and organizations attach importance to the concept of corporate identity. The concept of corporate identity is the summary of the vision, mission and target audience of institutions and organizations. Companies that have the instinct to differentiate and stand out in the competitive environment aim to increase the factors that form the corporate identity and the coefficients of trust and preference. Fairs, which are also defined as commercial marketing areas, have become a rapidly developing global communication platform. Firms experiencing intense global competition intend to introduce themselves to the target audiences and the world by making use of fair organizations. Fairs, which are a globally effective communication tool, corporate identity data of companies and the effect of these elements on interior design are determined as the research subject of the study. In this context, by emphasizing the effect of corporate identity on the interior furniture design in the exhibition stands, within the scope of the declaration, based on the corporate identity data of the brands determined by the students within the scope of Selçuk University Fine Arts Faculty Interior Architecture and Environmental Design Department 2018-2019 Spring Term Interior Architecture Project II studio course. It is aimed to design interior and furniture. As a result of this studio experience, how corporate identity elements are reflected on furniture design is examined. This paper will include approach to the project, research and evaluation stages, sketch processes and design outputs.

Keywords: Corporate identity, fair stand, furniture.



FIRE RISKS AND PREVENTION METHODS IN THE FURNITURE INDUSTRY

Murat AKTAŞ^{a*}, Hülya KALAYCIOĞLU^b, Uğur ARAS^c

^aA Class of Occupational Safety Specialist, Essa Occupational Health and Safety, Ankara, Turkey.

^bDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^cDepartment of Materials and Materials Processing Technologies, Arsin Vocational School, Trabzon, Turkey.

*Corresponding author: murat@murataktas.net

Production diversity has increased due to the increasing demand and needs of people and the development of technology. This has created an opportunity to increase the variety of raw materials and semi-finished products used. Important inputs in the furniture industry are machinery and raw materials. Wood-based products used in the industry, raw materials such as textiles, varnishes, paints and sponges and their waste are highly dangerous materials in terms of fire risk. One of the most important disadvantages of wooden materials is that it is easily ignited. It can ignite even at very low temperatures in the presence of an ignition flame source. In addition, easily flammable waste materials and sawdust dusts that occur after cutting in furniture plants increase the risk of fire. If the chemicals and dusts used are spread to the production lines and the environmental cleanliness is not taken into consideration, this risk becomes more damaging. This study will focus on fire risks and measures to be taken against fire in the furniture industry.

Keywords: Furniture industry, raw material, fire risk, fire safety precautions



FORM AND FUNCTION INTEGRITY IN DESIGN BASED ON EXAMPLES

Nazmiye Naz ÖZTÜRK^{a*}

^aDepartment of Interior Architecture, Iskenderun Technical University, Iskenderun, Turkey.

*Corresponding author: nazmiye.ozturk@iste.edu.tr

In design, should the form be determined first, or is it a discovered integrity? Is it more valid to create the form from parts or to allow the parts to evolve into a form? The designer tries to combine form, function and structure as the ultimate goal. These two approaches, one focused on reaching the form and the other focused on finding form, can be regarded as two separate design approaches that can be comprehended through experience in design education. In this research, in the light of the part-whole relationship based on Gestalt laws, the issue of form and function integrity in design is examined through examples. Although the Gestalt principles are sufficient to create integrity, design principles are used to ensure that the integrity is qualified. Although form and function issues are not new concepts, they are still up-to-date in design. The innovation dimension of this study is to be handled with examples.

Keywords: Design, form and function, unity in design



FURNITURE AND ERGONOMICS IN THE RE-USE HISTORIC BUILDING

Okşan ÖLMEZ^{a*}, İnci Versan ALKAN^a

^aDepartment of Interior Architecture, Trakya University, Edirne, Turkey

*Corresponding author: oksanolmez@gmail.com

Historical buildings are our cultural heritages that transfer the social, cultural and economic accumulation of past generations to the present. It is only possible to transfer the information and accumulation they carry to the present day by protecting them. Historic buildings worth protecting may lose their functions and remain idle in time, with changing conditions. One of the procedures for the protection of historic buildings that are dysfunctional is to make the building a usable place for today's needs. This application, which is examined under the name of re-functioning in conservation methods, is an approach that enables the building to continue to live while preserving its historical value and to respond to today's needs. Another situation that is as important as preserving the historical structure in the re-functioning of the historical buildings is that the building can provide the spatial comfort of its new user. Providing this comfort is possible by providing ergonomic requirements in the space. With this study, the furniture used in the historical space after the re-functioning will be examined in terms of meeting the ergonomic conditions and the questionnaires applied on ergonomics regarding the user satisfaction with the user of the space will be evaluated. In this way, in accordance with the data obtained, an evaluation will be made about whether the furniture in the space is ergonomically suitable or not. For the study; Various historical sites have been selected in the province of Edirne.

Keywords: Reuse, ergonomics, furniture in historical place

FURNITURE ARRANGEMENTS AND SUPPORT OF AGING IN PLACE OF OLDER ADULTS

Velittin KALINKARA ^{a*}

^aDepartment of Materials and Materials Processing Technologies, Denizli Technical Sciences Vocational School, Denizli, Turkey.

*Corresponding author: esrabici@gmail.com

The global population is increasingly aging. In many industrial countries, almost one in every five people is over 65 years old. Gradual changes in vision, hearing, balance, coordination and memory occur as people age. Old age means decreased physical and mental ability, gradually abandoning socio-economic activities, and transitioning from independence to dependence in economic status and needing the support of others. Due to neoliberal policies, public support and economic resources have been decreasing in recent years, the world public opinion has brought up the elderly of the aging in place. Despite all its negativities, aging on the spot is also a condition desired by elderly individuals; seniors want to live in the place they live and accustomed for years and in the close environment and to grow old on the spot. Onsite aging means that the individual has the ability to stay comfortable, safe and independent in his or her home, regardless of age, ability or income. The choice of many seniors is to stay in their own home or with their carer support, rather than moving to a long-term care institution or a supported living facility. Due to health problems encountered at older ages, the action intervals of individuals decrease and they spend most of the day at home and in the immediate vicinity of the house. For this reason, in order for the aging individual to continue living on site, the space and the equipment must be in a way to support the life of the elderly and be arranged in a way that will make life easier. Using on-site aging universal design features, it provides a safe and friendly environment for everyone, regardless of age or physical abilities at home. For this reason, due to the decrease in individual reserves, the design-arrangement of products, furniture, communication materials and physical environment to meet the needs facilitates aging in place. This review study addresses the changes that occur with sensory function, mobility, balance, memory and age, and the design of indoor furniture. Furniture designs and arrangements, which are suitable for these changes in on-site individuals and enable them to meet the needs of the elderly better, facilitate the life of the elderly and increase the quality of life. Appropriate furniture design supports physical and cognitive abilities, as well as aging in place, and enhances simplicity, flexibility and ease of use for people of all ages. The expectations of the elderly from furniture differ according to the individuals how they interact with, interpret, define and reflect. The evaluation value of a product is an evaluation of whether the product is useful or not. This also means that the negativities encountered in the interior (falling, hitting, hanging, etc.) are reduced. The driving force at the core of this work is the basic assumption of how both elderly people and society can benefit from furniture that enhances the well-being of the elderly and supports and enriches them to remain independent throughout their lives.

Keywords: Older adults, aging in place, furniture design



FURNITURE DESIGN AND PRODUCTION IN THE INTERSECTION OF ART- CRAFT AND INDUSTRY

Seçil ŞATIR^{a*}

^aDepartment of Architecture, Fatih Sultan Mehmet University, Istanbul, Turkey.

*Corresponding author: ssatir@fsm.edu.tr

The concept of mobile includes meanings that can be moved from a moving place to a moving place. Although furniture all around the world have a history as old as human life cultures, they have achieved almost the same level of development in the contemporary sense and have crossed the distances between art and industrial production. Further, it takes on a different dimension in the fact that craft production is revitalized in the context of pre-industrial revolution and even today's production. In the light of these stages, the contemporary art identity of the furniture, albeit in a small number, will be exposed to how it differs according to the material and production method on the basis of its wider functionality and finally the development of their production with the help of semi-mechanization in the production of small-scale manufacturers. The paper deals with and compares the semantic dimension and features of furniture, especially the chair, as an art work, a craft production on the basis of a function object, and a production item that responds to a series of production, both in terms of its phases and in contemporary designs.

Keywords: Artwork, craft product, furniture as mass production object



FURNITURE DESIGN FOR MODERN TIMES: CONSTANT CHANGE AS A LIFESTYLE

João MARTINS^{a*}, João PEREIRA^b

^aDepartment of Architecture, University of Lisbon, Lisbon, Portugal.

^bDepartment of Forest Research Centre, University of Lisbon, Lisbon, Portugal.

*Corresponding author: joaomartins.estgv@gmail.com

Change is constant in the modern world. What is new today, tomorrow is already outdated. This happens due to technological development, the intense flow of information, the globalization process, the deeper knowledge that drives people to want to quickly change the artifacts that support their daily lives. In this way, the modern lifestyle is characterized by constant changes, faster, more immediate results, information in large quantities, more clarification, stimulated creativity and practicality. This is good, but it also has its disadvantages. One of them is the difficulty in following all these changes and adjusting to the new style while respecting a low budget and remaining faithful to ecological principles. Thus, the times indicate a greater predisposition to adhere to modular furniture as it seems to be the perfect solution in terms of adaptation and mobility. After interpreting the basic needs of young teen users, and combining design with technology, this project aimed to develop several functional, innovative and eco efficient alternative furniture solutions. Designing a single wooden module or wooden composites that allows the construction of several pieces of furniture, in order to equip a room for a young teenager, was the problem worked on.

Keywords: Furniture design, modular, adaptation, young furniture



FURNITURE DESIGN IN EDUCATIONAL ENVIRONMENT THAT ENABLING SOCIALIZATION

Reyhane MİDİLLİ SARI^a, Eda AKTÜRK^b, Sümeyye AYBÜKE TÜRK^c

^aDepartment of Architecture, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: edaktrk@hotmail.com

Schools where children spend most of their time offer various and important opportunities in terms of socialization. Besides, schools gain a social character with the change of educational methods and the adoption of collaborative approaches. Therefore, every space in schools is expected to enable its potential to socialize. In this context, furniture design and organization become an important design element that contributes to the action of socialization. Well-organized, rich in design, meeting the needs of the required function and supporting socialization, furniture makes students and teachers feel good and makes it easier to adopt and personalize the space. In this study, it is aimed to reveal the furniture design used in innovative educational environments and how they were brought together to support the socialization of students. The material of the study is furniture and furniture organizations in schools designed in the last decade. For this purpose, the contribution of furniture in innovative educational environments to socialization was tried to be determined by three basic questions: what, where and how. The question of what was used to determine the furniture type that contributes to socialization, the question of where was used to determine the location of furniture that supports the action of socialization and the question of how was used to determine the type of socialization. As a result of the study, it was seen that new generation furniture occurred and diversified the socialization actions by handling different furniture elements together with components such as walls, flooring, and stairs, addressing different user groups in different forms.

Keywords: Furniture of learning environment, socialization, furniture design



FURNITURE SOLUTIONS FOR CREATING PERSONAL SPACE IN OPEN-PLAN OFFICES

Fusün SEÇER KARİPTAŞ^{a*}, Fatih KARİPTAŞ^b

^aDepartment of Architecture, Haliç University, İstanbul, Turkey.

^bDepartment of Architecture, Mimar Sinan Fine Arts University, İstanbul, Turkey.

*Corresponding author: fatih@ecarch.com

As the open-plan office spaces are more common in recent years, the need for spaces that provide privacy and concentration have become inevitable. Although open-plan offices provide significant advantages for people working together, too much intimacy may have its own disadvantages in terms of productivity. As a result, the lack of proper workspace has negative impacts on the employees. The deficiency of privacy has psychological effects that decrease productivity, especially during intense and stressful office conditions. When these negative conditions of office environments are investigated in terms of human psychology, it results in both physical and mental problems caused by the uneasiness and discontentment. In order to increase motivation, it is necessary to design spaces for private use that create psychological separation, for a single user as well as a group of two or three people. For the modern days in which the work life and personal life do not have a clear separation, it is almost an obligation to provide play spaces for motivation in the workplace. The constant noise and complete accessibility amongst people also decrease productivity. It has become very significant for the employers as well as the employees to avoid any negative workspace impacts, and to prevent outdated spaces that remain insufficient for the fast developing technologies, machines and work systems. This study will include examples of furniture system solutions that can provide the desired privacy in open-plan offices. The practical, economical and functional furniture applications such as sleep capsules, single/multiple user rooms, standing meeting solutions that meet the needs of the employees will be presented through drawings and images.

Keywords: Furniture systems, open-plan office, personal space, workplace.



FURNITURE SOLUTIONS IN MICRO HOUSING INTERIORS

Füsun SEÇER KARİPTAŞ^{a*}, Fatih KARİPTAŞ^b, Sevgi YÜCEL^a

^aDepartment of Interior Architecture, Haliç University, Istanbul, Turkey.

^b Department of Architecture, Mimar Sinan Fine Art University, Istanbul, Turkey.

*Corresponding author: sevgi95@gmail.com

Growing population due to migration and socio-economic developments in the world naturally brings with it, the need for space. The need for shrinking spaces has increased due to the decreasing residential areas in the cities. For this reason, the volumes required by the users have been getting so smaller and smaller places that they have begun to take form as a part of their bodies. In recent years, a trend towards small, simple, flexible and functional volumes has started in the field of design. The need for more flexible and functional use in shrinking spaces brought new furniture solutions. At this point, concepts such as modulation, standardization and interchangeability were the reasons for being preferred in furniture systems in small spaces. Since micro residences take up less space, they provide useful spaces in terms of building unit price with rational solutions used in economic and interior design. It is possible to transform small spaces into large and spacious spaces with the right interior design and furniture solutions. The solution of these furniture systems is considered to be one of the leading research topics of the design world in the future. In the paper, we will talk about micro residential areas that continue to progress very quickly in the design world and especially interior solutions will be examined. Information about furniture systems supporting these designs and details will be given. Flexible, sustainable and functional furniture systems will be examined on selected samples and their effects on the space will be explained by supporting visuals.

Keywords: Micro house, interior, furniture, furniture systems



FURNITURES IN GERMİR TRADITIONAL HOUSES

Gözde KUZU DİNÇBAŞ^{a*}

^a Department of Interior Architecture and Environmental Design, Nuh Naci Yazgan University, Kayseri, Turkey.

*Corresponding author: gkdincbas@nny.edu.tr

Every region has a cultural heritage that develops within its borders and enriched by unique elements. Traditional houses play a major role in the transfer of this heritage from generation to generation. The boundaries of the research were determined as furnitures which were in traditional houses in the Germir neighborhood of Melikgazi district. The furniture is meaning together with the environment in which they are located (başoda, tokana etc.), has become a defining element of the interiors and is designed for many purposes. These furniture which allows for eating, sleeping, bathing etc. can be sorted cupboards, serbetliks, raised wood or stone floors and sedirs/divans, zars, washing cubicles/stone drains and fireplaces” and which are mostly built together with the structure.

The region called Germir township in the 19th century population records where Muslim and Non-Muslim populations live together for many years. The interaction of different religious lifestyles over time affected use of furniture similarly. As it is understood from the building inscriptions, most of them are built in 19th century and their furniture ornaments show Baroque, Rococo, Empires and Neo-classical style. It has been identified that some of the houses in research have lost their originality rapidly, in addition, built-in furniture in house have been removed from their places, moved to different houses or sold to major cities. Therefore, in the research process, the dimensions of the room and furnitures, profiles and ornamentations have been taken with the help of analytical methods (profile combs, estampage method etc.). It was considered that these measurements could be used in the future when furniture elements were lost their originality and could be reproducible when necessary.

Keywords: Germir, furniture, ornamental features



GIVING FUNCTION OF STAIRS BY INTEGRATED FURNITURE

Ayça AKKAN^{a*}, Ebru ŞANLI^b

^aDepartment of Architecture, Recep Tayyip Erdoğan University, Rize, Turkey.

^bDepartment of Architecture Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: ayca.akkan@erdogan.edu.tr

The stairs has been one of the important tools that fulfill human requirements throughout history. Although it is not known which date, it is origin of based on, there are generally two significant aims in the past usage of the stairs. One of these aims is to satisfy functional requirements, the other is to establish a connection between the earth and heaven as a symbol of religious belief. Nowadays, the usage aims and application fields of the stairs have expanded. In general, stairs are a considerable construction element of buildings that has become the focal point of an architectural project. Also evaluation of the dead spaces formed by the stairs gives an opportunity for people to design with different approaches. The factors providing this change have been the increase in the use of goods, economic activities and user needs with the change and development of technology. In addition to the connection between the floors, diversity of usage is provided by different functions are given to the stairs. By using the bottom or steps of these stairs efficiently, both the interior design has been contributed and the structure has been added value by functional The purpose of this study is to examine many functional and design aspects of the stairs, which are the focal point of the building, integrated with furniture, providing the user with comfortable, useful, psychological and aesthetic solutions, such as storage, space creation In addition in the study, it will be analyzed the production technology, ergonomic status and dimensional requirements of the stairs through existing examples with the literature review.

Keywords: Stairs, furniture, ergonomics, manufacturing technology.



HISTORICAL DEVELOPMENT OF THE SHAKERS MOVEMENT AND EVALUATION OF ITS EFFECTS TO THE FURNITURE DESIGN THROUGH EXAMPLES

Anday TÜRKMEN^{a*}, Didem TUNCEL^b

^aDepartment of Interior Architecture and Environmental Design, İstanbul Gedik University, İstanbul, Turkey.

^bDepartment of Interior Architecture, Mimar Sinan University of Fine Arts, İstanbul, Turkey.

*Corresponding author: andayturkmen@gmail.com

Technological developments accompanying the Protestant Reformation which was fed by the reform thoughts were at the top of the agenda as a result of the pressure of the Catholic Church in terms of religion and economy by showing a tendency towards the political events, paved the way for the emergence of the religious cults which can be an alternative to the belief authorities in the 17th century. Practices regarding the representation of the religious doctrines with furniture were detailed by defining all well accepted approaches for the creation of the Shaker design culture within the available time and a literature scan was made to give a new point of view to the hypothetical limitations of the research which evaluates all process on the space scale through the furniture tradition that it witnessed from the historical development to the unique design understanding that they shaped upon their canonical belief-of the Shakers of which foundation was laid under the current conditions which were experienced as the unworldly revision process of Europe and which believe that it is possible to produce a more uniform society fiction on the earth. Within this context, as a result of this research for which hermeneutic methods were benefitted from to establish a communication between the Shakers spiritual motivations and design approaches on the furniture scale, product and furniture examples which intersected the pathfinder principles of the 20th century such as functionality and simplicity with the canonical design reflexes of the Shakers who transferred their spiritual pursuit into their spatial habits and made their spatial understanding an important layer of their spiritual world, were studied by considering the religious, cultural and social conditions of the period in which they were produced and it was aimed to contribute to the current literature regarding the subject by synthesizing various unsystematic information which is extant.

Keywords: Space, furniture, shakers, design



IMPORTANCE OF FURTINURES IN INTERIORS' STYLES AFTER MODERNISM

Ebru ERDOĞAN^{a*}, Aybüke ESER^b

^aDepartment of Architecture, Liverpool University, Liverpool, England.

^bDepartment of Construction Control, Konya Municipality, Konya, Turkey.

*Corresponding author: E.Erdogan@liverpool.ac.uk

The fact that characterizes the spaces is their self-identities shaped by their natural and cultural values. On the other hand, the elements that make up the self-identity are the style features that carry the traces of the past, together with the memories that are specific to each space, and technical knowledge. Style is generally defined as a narration, form, existing, manner, character, saying or form of production, wording. It is the artists view, sense, understanding and expression feature, or the wording, style and style of a genre. Besides that the interior style is about what the space wants to tell, its identity, design subject and function. Technique specific to an age or country includes colour, texture, formatting and pronouncing. This study inquires how the fact of style, which determines the identity of the buildings, creates a whole through furniture in the interiors by the way of induction. Based on the features such as the style of the concept details created in the space, the technical information, the material features, the colour and texture used, the history of the selected furniture, the form of production, the interior design created gives us information about the identity of the space. In the study, style identities are defined and interpreted through the compositions of the interior styles (Tropical, Industrial, Bohemian, Far East and Fusion Styles) making feel its effectiveness after the modernism. In this context, a method proposal is presented for reading and perceiving the identity of the mentioned styles in interiors and it is aimed to create these backgrounds during the undergraduate education of interior design students. With the increasing awareness and recognition, more qualified and conscious designs will be created in the future interiors.

Keywords: Style, form, interiors, furniture, art



IN THE CONTEXT OF PROTECTION AND RE-USE OF HISTORICAL KESKİN MANSIONS TRANSFORMATION PROCESS ANALYSIS

Onur ÜLKER^a, Haldun Ender ERDEM^{b*}

^aDepartment of Interior Architecture and Environmental Design, Kirikkale University, Kırıkkale, Turkey.

^bDepartment of Material and Material Processing Technology, Kirikkale University, Kırıkkale, Turkey.

*Corresponding author: herdemerdem@yahoo.com

Preserving historical wooden mansions and transferring them to next generations as a cultural heritage is a necessity for societies. According to historical mansions, some effects of weathering, incorrect restorations, in terms of application techniques made destructions over time. As a result, the historical textures and structural features of the houses face the danger of extinction. The aim of study is to protect the structural and architectural features of traditional houses in the Keskin district of Kırıkkale province and to prevent the loss of originalty of wooden works in the mansions. For this purpose, a study area has been determined in which accurate and reliable results can be obtained in order to understand the nature of physical interventions in the local homes. The damages caused by physical interventions restotation works and climatic conditions were determined in the houses. The registered buildings in the study area were studied and the wooden interior fittings used in the traditional Keskin Houses and also wooden materials used in the exteriors were examined. As a result of the examination, the characteristic features of the houses cause of architerture and used wooden materials were revealed. The protection methods required for the protection of wooden works were propped.

Keywords: Traditional Keskin mansions, restoration, wooden structure.



INDOOR AIR QUALITY IN OLD AND NEW SCHOOL BUILDINGS AT MERSIN UNIVERSITY

Cevdet SAÇLI^{a*}

^aDepartment of Materials and Materials Processing Technologies, Mersin University, Mersin, Turkey.

*Corresponding author: cevdetsacli@mersin.edu.tr

Indoor air quality IHC is a criterion that shows how good or bad the air inhaled indoors is. Bad HRC can cause illness and loss of production. “Good HRC” can provide a healthy living and working environment. In schools, students can be more effective, willing and participatory. More and more people are becoming aware of the importance of the IHC. IHC has become the basic criterion of healthy comfort in indoor environments and its standards have been determined. More and more people are becoming aware of the importance of the IHC. IHC has become the basic criterion of healthy comfort in indoor environments and its standards have been determined. Indoor air quality is a concept related to the levels of pollutants present in the air in different indoor environments, including housing, indoor gyms, public buildings and schools. The lower the levels of pollutants in the indoor air, the better the air, the higher the levels of the pollutants, the lower the indoor air. Indoor air quality directly or indirectly affects the health and performance of students and school-related people. It is not possible to give an absolute numerical value in determining the average fresh air need of the classroom according to the number of people. Therefore, the approximate values experienced per person are taken according to the purpose of the environment. In this study, it was carried out in a new and an old school in Mersin University educational buildings.

Keywords: Indoor air quality, Mersin university, dirty air, fresh air, old and new school buildings



INFLUENCES OF SOME FACTORS UPON THE ACCELERATED CURING OF POLYURETHANE VARNISH COATING BY UV IRRADIATION

Dimitar ANGELSKI^{a*}

^aDepartment of Furniture Production, University of Forestry, Sofia, Bulgaria.

*Corresponding author: d.angelski@gmail.com

It is well known that the most rational method for decreasing the curing time for varnish coatings is through UV irradiation. Quite many factors however have impact on the technological process of layering and drying (curing) varnishes. This requires determining the most influential factors on the drying process and through their purposeful change to achieve any desired result with sufficient accuracy. The purpose of the current research is to determine the influence of the main technological factors over the curing duration of protective decorative coatings via UV irradiation. In this relation, 2-factor experiment was performed so thus to determine the influence of the factors “feeding speed” and “quantity of applying” at UV curing of polyurethane varnish coating over the “curing degree” and “adhesion” towards oak veneered MDF. The experiment has been conducted by the usage of equipment for varnish application via spraying followed by drying with two UV lamps of the producer „Venjakob”. The results from those tests were extracted through two scorings that determine the curing degree for the lacquer coating and its adhesion to the veneered MDF.

Keywords: Polyurethane varnish, coatings, UV irradiation, UV dryers



INNOVATION IN FURNITURE DESIGN: CLICK SYSTEM

Özer ÖZÇELİK^{a*}, Sabit TUNCEL^b, Zeki CANDAN^c

^aDepartment of Material and Material Processing Technologies, Trakya University, Edirne, Turkey.

^bIBB Istanbul Tree and Landscape Co., Istanbul, Turkey.

^cDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: ozerozcelik@trakya.edu.tr

The industry that developed with the industrial revolution led to a rapid increase in the population in the cities. In order to meet these needs, the production of functional, easy-to-install furniture, together with mass production models, has become a necessity and directed the manufacturers to conduct R&D studies in this direction. With the reflection of the developing technology in the furniture sector, the transition from conventional machines to line machines has differentiated its design and expectations from furniture. In order to respond to the resulting demand, it is fast and packable, that is, it has enabled the development of furniture subsidiary industry along with the expansion and development of disassembled furniture. In particular, the fact that the fittings directly affect the aesthetics and robustness of the furniture has led to the acceleration of R&D studies in this regard as well as paved the way for the formation of a new market. In recent years, with the inclusion of technology in human life and the personalization of furniture, the society's view of furniture and its expectations from furniture have also started to change. The furniture, which is specially designed and produced in line with the lifestyle and expectations of its users, has evolved from a mass manufacturing model to a flexible and agile manufacturing model. All these changes led the furniture manufacturers to seek new joining techniques, materials, colors, textures and functions. In this study, a new click system, which is a new disassembling technique used in panel furniture, is emphasized. The advantages and disadvantages of the click system compared to the existing joining techniques will be examined and the innovation and conveniences brought by both the manufacturer and the user will be discussed.

Keywords: Furniture design; click system; demountable furniture; connectors; R&D and innovation



INSTALLATION-DESIGN RELATIONSHIP IN KITCHEN FURNITURE

Merve ASLAN^{a*}, Mustafa ZOR^b, Yeliz CİRİTÇİ^c

^aDepartment of Landscape Architect, Istanbul University, İstanbul, Turkey.

^bDepartment of Design, Çaycuma Vocational School, Zonguldak, Turkey.

^cDepartment of Forest Industrial Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: turgay@ktu.edu.tr

In kitchen furniture, the same product is produced for everyone with the logic of mass production, customer requests, installation, building structure, wall type, etc. depending on various factors, all kitchens are personalized at the design stage. Since the kitchen furniture is a design product, the customers first contact with the product is during the kitchen assembly. In order to identify the sources of error in advance, take precautions in this regard, to solve the problem at the source, to reduce material losses and environmental burden, the assembly design relationship must be established correctly. Therefore, all processes from material to shipment, from production to assembly should be planned at the design stage. The process that starts with customer demands in kitchen furniture is completed by design, sales, raw material supply, production, shipment and assembly. Even though they have been checked at every point in this process, many problems and errors arise during the assembly of kitchen furniture at the construction site. With this study, it is aimed to strengthen the design-assembly relationship, to propose solutions to increase the lifetime of kitchen furniture and maintain the quality cost balance. In this study, Dekor Ahşap Ürünleri A.Ş. (lineadecor), routine installer meetings, assembly reports were examined and field determinations were made. R&D studies related to earthquake safety and reducing the risk factor of fixed furniture were examined. In addition, the subjects used in the kitchen furniture, electrical mechanisms and accessories are mentioned. Assembly documents of international companies were examined, and common assembly errors were identified and solutions were proposed

Keywords: Kitchen furniture, kitchen design, installation, earthquake safety, quality, environment



INTERIOR DESIGN AND FURNITURE IN THE 19TH CENTURY

Burcu ÜLKER^a, Gökben PALA AZSÖZ^{a*}

^aDepartment of of Architecture, Kırklareli University, Kırklareli, Turkey

*Corresponding author: gokbenazsoz@klu.edu.tr

The 19th century is a century when both the style complexity is seen and the foundations of modernism are laid along with the industrial developments. Regency and Beidermier (empirical and classical influential styles) has emerged in the early 19th century and revival styles has risen towards the middle. More lean and biologically effective, styles that will ensure the formation of modernism, industrial developments, new interior space and new furniture designs with new building types have left its mark on the period. In addition to these simple styles, an eclectic attitude (using a combination of styles rather than a certain style) has also observed. It is possible to see the effects of different styles in the 19th century, a period of degeneration and search in furniture. The reflection of the social appearance to design, the degeneration characteristics in the design, the methods found by the manufacturers during the industrialization process and the studys of the intellectuals living in the 19th century determined the furniture techniques of this century. Within the scope of this study, a discussion environment has been created over the interior and furniture design products that emerged as a result of the style complex seen in the 19th century. The discourses of 19th century empirical, classical influential and revival styles, in which the foundations of modernism have laid, have researched and their reflections on furniture designs have discussed.

Keywords: Interior design, furniture, 19th century styles, industrial developments

INVESTIGATION OF ADHESION STRENGTH OF REINFORCED LAMINATED PANELS USING GLASS FIBER WOVEN FABRIC

Hasan Hüseyin CİRİTCİOĞLU^{a*}, Seymen ÇİFTÇİ^b, Serkan ÖZDEMİR^c, Nusret AS^d

^aDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

^bDepartment of Design, Düzce Vocational School, Düzce, Turkey.

^cDepartment of Woodworking Industrial Engineering, Düzce University, Düzce, Turkey.

^dDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: hasanciritcioglu@duzce.edu.tr

Wood-based composite materials have been developed and used in recent years, especially in the fields requiring mechanical strength (space and aviation, automotive, shipping and marine industry etc.) and especially in the furniture industry, based on the needs arising in different areas of use. As a result of the development of these composite materials and the widening of their areas of use, there is a need for materials with high strength, light, machinable (cutting, screwing, drilling, etc.) and formable materials in areas requiring structural performance. In this study, laminated panels were produced by using Beech (*Fagus Orientalis* Lipsky) and Samsun poplar (*Populus Deltoides* I-77/51) veneer plies and twill woven glass fiber fabric with a density of 500 g/m². The study is a preliminary trial of a comprehensive study planned for glass fiber reinforcement (CET) and for determining the production parameters in order to produce reinforced laminated panels of different production conditions. Urea formaldehyde and epoxy adhesives were used in production. Adhesion strengths between glass fiber fabrics which is used for reinforcement and veneer plies were determined. In the samples using urea formaldehyde glue, it was observed that there was no adhesion between CET and veneer plies. It has been determined that successful adhesion is provided in the samples produced by pressing at different temperatures and times by using epoxy glue. As a result, in our country and in the world, it has been concluded that poplar veneer sheets which have a limited usage area due to their low mechanical properties and low value-added, can be transformed into high value-added products by reinforcing with using glass fiber fabrics.

Keywords: GFRP, poplar, beech, laminated panel, reinforcement

INVESTIGATION OF BENDING STRENGTH (MOR) OF SELECTED HARDWOODS ACCORDING TO THE CROSS SECTIONAL GEOMETRY AND FORCE DIRECTION

Erkan CEYLAN^{a*}, Selçuk DEMİRCİ^b, Ersan GÜRAY^c, Ali KASAL^d

^aDepartment of Design, Bingöl University Vocational School Technical Sciences, Bingöl, Turkey.

^bDepartment of Wood Science and Furniture Design, Ege Vocational School, İzmir, Turkey.

^cDepartment of Civil Engineering, Muğla Sıtkı Kocman University, Muğla, Turkey.

^dDepartment of Wood Science and Industrial Engineering, Muğla Sıtkı Kocman University, Muğla, Turkey.

*Corresponding author: eceylan@bingol.edu.tr

Wood material is one of the oldest structural materials. Human being has been using wood material for shelter and protection since ancient times. Today, the decrease in forest resources and the increase in the demand for products whose raw material is wood has gradually increased the value of this material. With the developing technology, although plastic, metal, aluminum, concrete, cement etc. are used as alternative to wood, wood material always remains the primary choice due to its many positive properties and advantages. Wood material is used as a structural and decorative material in furniture production, roof elements, joinery and coating material, formwork and scaffolding. In this context, detailed studies are needed to determine the physical and mechanical properties of wood material. In this study, tests were carried out to investigate effects of the cross sectional geometry and force direction on bending strength (MOR) of selected hardwoods. The specimens were constructed of Maple (Acer Sp.), Walnut (*Juglans regia* L), Ash (*Fraxinus excelsior* L.), Birch (*Betula verrucosa* Ehrh.), Linden (*Tiliagrandifolia* Ehrh.), Oriental beech (*Fagus orientalis*), Chestnut (*Castanea sativa* Mill.), Cherry (*Prunus cerasus*.), Mahogany (*Swietenia mahogany*) and Oak (*Overcus* Sp.). Totally, 400 specimens were prepared from these ten wood species in two different type of cross sectional geometry as circular and square, identical in size of area, and tested in two characteristic force directions, tangential and radial, by 10 replications. Specimens were subjected to three points bending test according to principles of TS 2474 (2005) to obtain the bending strength. According to results of the tests, the highest MOR values were obtained from the Walnut; while the Chestnut gave the lowest MOR values. It is observed that the type of the cross sectional area and the direction of the force applied, individually or together, have a considerable effect on MOR. MOR values of circular sectioned specimens are approximately 30 higher than the square sectioned specimens. In the case of the tangential direction, MOR values are 5 higher on average.

Keywords: Hardwood, beams, bending strength, circular cross section, square cross section, radial, tangential



INVESTIGATION OF FURNITURE DESIGN COURSE IN THE CONTEXT OF INTERIOR DEPARTMENT IN TURKEY

Serpil ÖZKER^{a*}

^aDepartment of Interior Architecture and Environmental Design, Işık University, İstanbul, Turkey.

*Corresponding author: serpil.ozker@isikun.edu.tr

Interior Architecture is a profession that designs by taking user requirements into account. In his education, it is aimed to provide the students with technical skills, visual perception and design ability. Today, competition and user demand in the construction sector increase the need for furniture design as well as space design. Thanks to the furniture sector in Turkey, which has a large volume of furniture design concept is gaining importance in recent years. In order to develop original design ideas in national and international platforms, furniture and furniture design courses should be given in addition to general theoretical, applied and design courses in interior architecture departments. Also for designers and students; Increasing participation in competitions, workshops and furniture fairs will be effective in the development of original furniture design instead of imitation furniture.

In this sense, the content of courses such as Furniture and Furniture Design in Interior Architecture section of the 77 units in Turkey lesson plans, timetables and lesson workings were examined. As a result of the research, it is noteworthy that the Furniture courses in Interior Architecture departments are very few and only theoretically taught, and there are very few departments that teach both theoretically and practically. Therefore Furniture design in Turkey, not given adequate training of the construction industry also reveals that there is a lack in this area. As a result, it has been determined that besides having similar curricula, furniture design and production education in the Departments of Interior Architecture is insufficient in universities.

Keywords: Furniture design, furniture construction, furniture design education, interior architecture



INVESTIGATION OF FURNITURE INDUSTRY PRODUCTION CAPACITY OF TURKEY

Aytaç AYDIN^{a*}

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: aytac@ktu.edu.tr

Turkey furniture industry is the only sector that is not the foreign trade deficit in the forest products industry. The sector, which has been developing with the new investments made in recent years, reached the level of exporting 3.1 billion dollars in 2018. However, when the import figures are analyzed, it was 843 million dollars in the same year. The purpose of this study is to examine the change of the production capacity of the furniture industry over the years. For this purpose, the capacity utilization rate and industrial production index are taken from the Central Bank and the Turkey Statistical Institute, which will cover the years 2010-2019. The data collected were compared with the furniture industry, wood and wood products, paper and paper products and general manufacturing industry figures, and sectoral analysis was carried out. When the capacity utilization rate results are analyzed, it was determined that there was a decrease in the wood products and paper products sector throughout the manufacturing industry compared to 2018 in 2019, while an increase was observed in the furniture sector. When the industrial production index is analyzed, it is determined that there is a decrease in the manufacturing industry, wood products and furniture sector compared to 2018 and an increase in the paper industry.

Keywords: Furniture industry, capacity utilization rate, industry production index



INVESTIGATION OF MULTIFUNCTIONAL FURNITURE IN CHILDRENS FURNITURE

Hülya YAVUZ ÖDEN^{a*}, Nurdan ÇETİN YERLİKAYA^a

^aDepartment of Interior Design, Yalova University, Yalova, Turkey.

*Corresponding author: hulyavuz11@gmail.com

The word mobile is at the origin of Furniture. Furniture is portable parts that are placed to meet the requirements of the portable interior. The concept of furniture is the elements produced with materials such as wood, stone, metal and leather to be used for various purposes. At the same time, furniture are functional elements used in determining social positions, differing in material and shape according to the economic situation. Although the function expected from the furniture determines the social status in terms of form, it also meets the function requirements without going beyond the main function of that furniture. The first question that comes to mind in the shaping of furniture is undoubtedly for which need it is produced. Furniture can be arranged for different needs or multiple needs, depending on the purpose of use. These multifunctional furniture meets the needs expected from them and also includes other functions. An example of multifunctional furniture is the use of a bed as both a play, storage and sleeping area. The situation mentioned here is the protection of the main function of the furniture while applying more than one function. In this study, multi-functional applications that are frequently encountered and preferred due to their efficient use of space and formal features in childrens furniture are examined.

Keywords: Furniture, childrens furniture, function

INVESTIGATION OF OUTDOOR EQUILIBRIUM MOISTURE CONTENT CHANGES IN MARMARA REGION – TURKEY

Hızır VOLKAN GÖRGÜN^{a*}, Öner ÜNSAL^a, Ramazan KANTAY^a and Mustafa
TORAMAN^a

^aDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul,
Turkey.

*Corresponding author: volkan.gorgun@istanbul.edu.tr

Solid wood, which has a hygroscopic structure, is always in a state of change with environmental conditions. This change becomes more important due to uncontrollable climatic conditions, especially when preferred in outdoor. This is critical for employees such as furniture with working the millimeter range sensitivity. For this reason, the studies are carried out according to equilibrium moisture contents (EMCs) that determined by experience in various regions. However, it can be said that global climate change, which has been frequently mentioned in recent years, will have effects on solid wood as in many areas. In this context, make an examination in the Marmara Region (Turkey) is aimed with using meteorological data for the past 70 years. The data has been obtained from the researches of Ahmet Kurtoğlu, Kemal Üçüncü, and the General Directorate of Meteorology, with periods an average of 24 years. The determined data were converted into EMC values using a formula recommended by Forest Product Laboratory (USA). Thus, the equilibrium humidity values of massive aphthae to be used outdoors were tried to be put forward theoretically on a city basis. Thus, it has been tried theoretically to put forward the EMC values on city basis of solid wood that be used outdoor. The data were analyzed with various statistical analyzes, and some results were shown on the map by coloring them for aiming clearly reveal the possible differences. Consequently; especially the data in the last 24 years show the effects of global climate change in the Marmara Region. As a result of that, the change may reflect to the solid wood used outdoor related to calculated EMC values. Therefore, it is recommended that especially the producers should calculate EMC data in recent years where the products will be used in order to avoid any problems.

Keywords: Equilibrium moisture content (EMC), outdoor, global climate change, solid wood, marmara region

INVESTIGATION OF THE EFFECT OF HORIZONTAL AND VERTICAL ALIGNMENT OF STAPLES ON THE CREEP RESISTANCE OF TWO STAPLE FURNITURE JOINTS CONSTRUCTED FROM BEECH WOOD

Samet DEMİREL^{a*}

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: sdemirel@ktu.edu.tr

In this study, creep characteristics of horizontally and vertically aligned two stapled furniture joints made of beech wood under three different load levels were investigated. Load levels were chosen as 30, 40, and 50 of the maximum load of the furniture joints obtained by static shear test before creep loading based on the one of previous studies which determined the load levels. The maximum values of the static shear test were obtained in N and these values were converted to kg. Then, the loads based on the load levels were hanged to the joint samples as creep loadings. Results of the study showed that the joints were exposed to the lowest creep deformation at the 30 while they were exposed to the highest creep deformation at 40 and 50 load levels. At the end of study, it was realised that the creep-deformation time graph of the vertical stapled joints was generally 2-stage whereas all of the creep-deformation time graphs of the horizontal stapled joints was a 3-stage. No big difference were observed between the creep characteristics of vertically and horizontally aligned two staple joints.

Keywords: Staple, joint, creep, beech



INVESTIGATION OF THE POSITIVE AND NEGATIVE EFFECTS OF URBAN FURNITURE IN KONYA SELÇUKLU DISTRICT PARKS BOSNA AND CUMHURİYET ON CHILDREN

Sertaç GÜNGÖR^{a*}

^aDepartment of Landscape Architecture, Selçuk University, Konya, Turkey.

*Corresponding author: sertac@selcuk.edu.tr

In today's developing world, one of the most important problems of families is that children spend time indoors with technological toys, being detached from themselves, and even staying away from their rooms and growing away from green areas. That's why they look for different things and want to get away from this extreme technology a little bit and distract them. The Covid 19 pandemic in 2020 forced children a lot and reduced their interest in interior spaces where they spent a lot of time. With these recent developments, children have begun to seriously enjoy both having fun and socializing in the parks. In addition, this activity is of great importance for the personal development of children. The aim of this study is to determine the effect of the landscape equipment elements in the two parks, which are used intensively by children in Selçuklu district, based on today's social change. In the study, face-to-face survey was conducted on a voluntary basis. The survey results were evaluated and interpreted using Google Forms. As a result of the study, it has been revealed that the parks surveyed are generally insufficient for families with children, parks are not just places where children play and where parents can rest and chat, there should be places that can meet some of their needs such as cafeterias and security measures should be taken more strongly.

Keywords: Children, urban park, urban furniture, Konya



INVESTIGATION OF URBAN FURNITURE AS A BUILDING DESIGN FACTOR

Duygu KURTOĞLU^{a*}

^aDepartment of Architecture, Burdur Mehmet Akif Ersoy University, Burdur, Turkey.

*Corresponding author: dygukurtoglu@gmail.com

In the past, buildings were built to serve the basic needs of people such as shelter, workplace, education or entertainment. But today, in addition to its functional aspect, its artistic value is also important. In other words, the building is an expression of the architects work of art. This kind of change of view has led to an increased need for a psychologically relaxing environment. While buildings have social, cultural and historical meanings, they should also offer the opportunity to spend time in a clean and beautiful area. The design of the building goes beyond the interior and the shell of the building and also includes open spaces. Therefore, the function of street furniture is increasing. The standard urban furniture have lost their appeal. Non-aesthetic fabricated street furniture not only destroys the sense of belonging, but also fails to respond adequately to needs. The standard urban furniture concept is rapidly abandoning, especially in developed countries. Urban furniture, which is user-oriented and combined with exterior of building, is intended to provide psychological comfort to users and to recreate the space. Thus, while the furniture allows the user to spend their time more efficiently, it also supports the image of the building. In this study, various foreign country examples were examined and focused on urban furniture that was designed plain and simple and that relaxes the space visually and psychologically. In the findings obtained, it has been seen that the correct use of urban furniture is an effective and practical way to strengthen, change and recreate the effect of the building. In this way, it can create a different outdoor image that supports the building design. Second, depending on the user, the function and design of urban furniture should be different from similar ones. Because a good design helps users to spend their time more efficiently, while at the same time it should be unique and should be remembered with its location. Third, even if the design is extraordinary in terms of variety, street furniture needs to be familiar with users to work properly. In addition, considering the external environment conditions, it is important in terms of durability, usage and cost.

Keywords: Urban furniture, building, effective design



JAPANESE INTERIOR AND FURNITURE DESIGN

Seylan ÖZTÜRK^{a*}

^aDepartment of Interior Architecture, Marmara University, Istanbul, Turkey.

*Corresponding author: seylanc@gmail.com

An authentic culture and a peculiar social structure have developed in Japan and they have rarely been affected by other civilizations until the last century. The architectural structures and the design basics have been shaped by their respect of the nature.

The Japanese houses are built with earthquake and moisture resistant materials, within the principals of a unique system which allows the household to change the shape, the size and the function of the interior space. The reason of developing this system is probably the shortage of land and estate in proportion of the Japanese population.

The furnitures are limited as they are frequently moved from one place to another and the Japanese generally sit on the floor. Genuine aesthetic components have arised from the religious beliefs and they have integrated plain forms into design. Japanese furniture has influenced the modern European designs via their materials, forms, proportions and aesthetic features.

The Japanese furniture designers use the traditional components in the forms, the functions, the materials or in the basis of their designs. Influenced by their fine and pure traditional crafts, the Japanese designers took first place in the miracle which turned Japan into an industrial super state.

Keywords: Japan, furniture design, traditional architecture



LOAD BEARING CAPACITY OF DOMINO JOINTS

Dénes LEVENTE^a, Seda BAŞ^{a*}

^aDepartment of Wood Sciences and Applied Arts, University of Sopron, Sopron, Hungary.

*Corresponding author: sedabas93@outlook.com

A wide range of fasteners have been developed and used to make ready-to-assemble furniture. These fasteners must withstand different loads for their whole life cycle which can reach 10-15 years and even more. There are many different types of wood joints, therefore the selection of the proper joint type is critical from durability point of view. The newly developed domino joints represent a powerful joining method and can be considered a mixture of dowel and biscuit joints. In this study, the load bearing capacity of domino joints have been determined and compared with a connector system having a similar geometry. The withdrawal strength and in-plane bending moment, as well as elasticity of the glued domino joint and assembled connector system was tested and the results compared with the similar properties of other wood joint types.

Keywords: Domino joint, connectors, load bearing capacity, elasticity, withdrawal strength

MODELLING AND TESTING OF AUXETIC DOWELS WITH RECTANGULAR INCLUSIONS FOR FURNITURE JOINTS

Jerzy SMARDZEWSKI^{a*}, Ali KASAL^b, Tolga KUŞKUN^b

^aDepartment of Furniture Design, Poznan University, Poznan, Poland.

^bDepartment of Forest Industry Engineering, Muğla Sıtkı Kocman University, Muğla, Turkey.

*Corresponding author: tolgakuskun@mu.edu.tr

Auxetics are structures or materials that have a negative Poissons ratio. When stretched, they become thicker perpendicular to the applied force. This occurs due to their particular internal structure and the way this deforms when the sample is uniaxial loaded. Models of structures with a negative Poissons ratio were described more than 30 years ago. Since then, many scientific papers and reviews presenting the properties and advantages of auxetics in relation to ordinary (positive Poissons ratio) materials have been published. None of these works concerned dowels used in furniture joints.

In this study, relationship between size of inclusions, hole diameter in various auxetic dowels with rectangular inclusions and the Poissons ratio was determined.

For this purpose, 12 types of auxetic dowels with different diameter of holes and size of rectangular inclusions were designed and produced using 3D printer. In addition, dowels without inclusions (positive Poissons ratio), as a reference models, were printed. The appropriate muffs for each dowels were also produced. Polyamide PA12 was used for printing. The Poissons ratios for all dowels were observed by experimental and numerical static uniaxial compression tests. In experimental approach Digital Image Correlation method (DIC) was used. Numerical calculation was provided using finite elements method (FEM) and software Abaqus/Explicit v6.13.

The test results clearly showed that the dowels with inclusions and without holes in the core do not have auxetic properties. In case of dowels containing holes in the core, their auxetic properties have been proven. The value of the calculated Poissons ratio depends on the hole diameter and the size of the rectangular inclusions. The smallest values were obtained for dowels with large holes and inclusions with the largest dimensions.

It was decided to continue this investigation and determine the ability to mounting and withdrawal this type of dowel in furniture joints.

Keywords: Auxetic, dowel, experiment, muff, numerical analysis



MODELLING SOME PHYSICAL AND MECHANICAL PROPERTIES OF HEAT TREATED SCOTCH PINE USING ARTIFICIAL NEURAL NETWORK

Sibel YILDIZ^{a*}, Ayşenur GÜRGEN^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: sibelyildizz@gmail.com

In this study, some physical and mechanical properties of yellow pine wood (*Pinus sylvestris*), which is used extensively in furniture industry, were tested after heat treatment. The findings obtained were modelled by artificial neural network (ANN) and interval values related to temperature and time variations were tried to be estimated. This study, which makes it easier to reach intermediate values, aims to save the relevant researchers from all of the heating concentrations trial loads during the furniture design/production stages. Scotch pine samples were heat-treated at 150, 160, 170, 180, 190 and 200 °C for 2, 4 and 6 hours, under normal atmosphere conditions. Color changes, weight loss and compression strength parallel to grain values were determined. All data were modelled by ANN using two different learning algorithm- Levenberg-Marquardt (LM) and Scaled Conjugate Gradient (SCG) algorithm- 15 different hidden neurons. The best model was obtained from 2-7-6 structure using LM learning algorithm. Mean absolute percentage error (MAPE) of the best model was found below 8 percentage for estimated color parameters. The weight loss and compression strength parallel to grain were found to be 5.79 and 1.50 percentage, respectively. It was concluded that ANN could be used successfully to predict all studied parameters of heat-treated wood samples.

Keywords: Heat-treatment, modelling, Scotch pine



NATURAL WEATHERING AND BIOFINISHING OF WOOD MODIFIED WITH EPOXIDIZED VEGETABLE OILS

Gaye KÖSE^{a*}, Ali TEMİZ^a, Nasko TERZIEV^a

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: gaye.kose@hotmail.com

In recent years, interest in the use of vegetable oils has increased due to being environmentally friendly and economical in wood preservation. However, vegetable oils bond to the wood only physically, and high oil retention (400-600 kg/m³) is required for good effectiveness. In this study, the epoxidation was conducted to chemically bond vegetable oils (linseed and soybean oil) to wood and to use low oil retentions. Three impregnation methods and two retention levels were used. The weathering durability and biofinishing of wood were determined. For this purpose the color measurement, surface roughness and moisture content of the samples that were kept outside for 12 months were calculated. According to results, the lowest color changes was found in the control samples after 12 months. This could be a reason of dark discoloration caused by mold fungus over time in samples impregnated with oils. Also, the control samples are exposed to deformation for 12 months and the surface layer is exposed to any UV light. The surface roughness values of epoxidized oils were lower than that of non-epoxidized oils. Environmentally friendly upper surface layer formation was detected in the samples. This dark coloration could be formed by *Aureobasidium pullans* fungus.

Keywords: Epoxidized oils, weathering, color measurement



ONLINE EDUCATION ON FURNITURE DESIGN FOR HOUSEHOLD PEOPLE DURING LOCKDOWN

L. N. Ece ARIBURUN KIRCA^{a*}

^aDepartment of Industrial Design, Istanbul Technical University, İstanbul, Turkey.

*Corresponding author: ariburun@itu.edu.tr

During 2020 Spring academic semester, the majority of the universities in Turkey shifted to fulltime online education due to the Covid-19 pandemic. As a result theoretical and applied courses in both graduate and undergraduate programs were carried out to an online platform. “Contemporary Furniture Design” was one of the undergraduate elective courses in Istanbul Technical University, Faculty of Architecture. The course started in studio environment with face to face interaction and shifted to online education regarding the lockdown regulations.

For the final submission, students were asked to develop a detailed furniture design system for household people during lockdown. Each week a milestone has had to be achieved such as; scenario building and brainstorming ideas for the first week, developing themes and evaluation of initial ideas through sketches, collages, concept/mood boards etc. for the second week and so on. Within this context, this study aims to demonstrate the process and evaluation of designing furniture in an educational setting. The challenges and benefits of online education in applied courses is an additional finding to be discussed in this study.

Keywords: Furniture design education, lockdown furniture, online design education, spatial design



PHYSICAL PROPERTIES OF WOOD MATERIAL WITH SAMPLE QUESTIONS AND SOLUTIONS

İlker USTA^{a*}

^aDepartment of Wood Products Industrial Engineering, Hacettepe University School of Vocational Technology, Ankara, Turkey.

*Corresponding author: iusta@hacettepe.edu.tr

The physical properties of wood, which is the most important features determining the usage areas of wood, is a very comprehensive subject in terms of affecting the functionality and versatility of wood. As a general conclusion, wood physics, which requires detailed and careful evaluations by establishing a causal relationship between life and knowledge of wood, is a very special field in which a process which has a complex framework is formed due to the intertwined phenomena within its unique fiction and cause-effect pattern. In this context, wood arrangements, which are often carried out according to basic assumptions to avoid falling into an inextricable complexity, may result in inconsistent results for a product manufactured according to the design that focuses on real life. At this point, in terms of wood physics, the actual effect of the relevant property, which is essentially reflected in the present regulation with its existence, needs to be clearly identified and demonstrated. Accordingly, considering the needs and priorities of the field of wood science and technology, in this study, the physical properties of wood (on the basis of density, porosity, shrinkage and swelling, fiber saturation point, moisture content, and permeability) are determined in accordance with the cause-effect relationship, sample questions and detailed solutions are presented.

Keywords: Wood physics, physical properties of wood, cause-effect relationship



PROBLEMS AND SOLUTION SUGGESTIONS OF ENTERPRISES PRODUCING FURNITURE AND WOODEN YACHTS/BOATS (EXAMPLE OF BARTIN-KURUCAŞİLE)

Göksel ULAY^{a*}

^aDepartment of Furniture and Decoration, Van Yüzüncü Yıl University, Van, Turkey.

*Corresponding author: gokselulay@gmail.com

This study aims to identify the problems of the wooden boats and the furniture used in these boats in Bartın-Kurucaşile district center and to develop solutions. These enterprises use local chestnut woods obtained from the forests of the Black Sea Region. It is noteworthy that the number of enterprises that have been producing boats with their unique characteristics with traditional methods for many years in the district has decreased in recent years. A study demonstrating the change in recent years was supported by the Kurucaşile District Governorship and Development Agency in 2013. In this study, in order to reveal the current situation of wooden yacht / boat and furniture manufacturers with Kurucaş and the changes between 2012-2020, face-to-face interview method was used with the business owners. As a result, the current status of the manufacturers who continue their existence in the district were determined and solution suggestions for the problems were discussed and solution suggestions for the development of these enterprises were included.

Keywords: Wooden boat / yacht, furniture, chestnut, kurucaşile, businesses



“QUALITY” AS A BEHAVIORAL PATTERN IN FURNITURE DESIGN AND PRODUCTION

Ahmet Şadi ARDATÜRK^{a*}

^aDepartment of Industrial Product Design, Istanbul Aydın University, Istanbul, Turkey.

*Corresponding author: ahmetardaturk@aydin.edu.tr

In the design process formed by spirit, the design and productive relations, which have been reshaped within the framework of the patterns established through the emergence of furniture, which dates back to the emergence of humanity as well, are eminently evolving into a new reality again today, just like the major changes experienced in the post-industrial revolution era.

At this point, furniture, of which parameters are and needed to be redefined within the consumption and production factors, has many inputs from ergonomics to materials, from people to spaces in today's world. These inputs are to be observed as “merits and demerits” that the designer and manufacturer face at every point of the process.

In this context, in contrast to these “merits and demerits”, different productive minds offering different solutions to the same or similar problems have developed some reactions which, in fact, reveals the reality of what is to be produced in the future. These reactions are mainly created through the strategies used by the designer/producer himself.

Hence, the question arises: What is the impact of the craftsman strategy as a designer behavioral model on the final product to improve the quality of furniture design and manufacturing process in Turkey?

In this research, it is aimed to examine the craftsman behavior model observed in the furniture stage of the design production process. As a result of our study, the impact of the craftsman behavior model on quality in the furniture design and production process will be discussed in terms of the following parameters: the design and production of “quality”, the designers craftsman behavior model and strategy within the furniture phase and its relation with furniture itself, the behavioral patterns in terms of furniture design and production beyond the capitalist approach.

Keywords: Furniture design, quality, behavior pattern, industrial production, designers strategy



READING THE HISTORICAL PROCESS OF FURNITURE USED IN DRAMA FILM SPACES

Gülşah ÜNER^{a*}, Ebru ERDOĞAN^b

^aDepartment of Interior Architecture and Environmental Design, Selçuk University, Konya, Turkey.

^bDepartment of Architecture, Liverpool University, Liverpool, England.

*Corresponding author: gulsah.uner@selcuk.edu.tr

Addressing the relationship between cinema and architecture from different perspectives is among the topics on the agenda recently. The concept of space is considered as a common element of both disciplines, while cinema uses space as an actor, architecture produces different representations of space. In this context, architecture and cinema are the most disciplines of art that make people feel and experience the feeling of outdoors-interiors. The interior space is an area that responds to the individual and social needs of the user, has a cultural and social character, and it is physically surrounded by the instinct to be protected. The furniture provides the shaping of the interiors is shaped according to the belief, culture and identity of the society. Therefore, furniture reflecting the characteristics of the era and the period can carry important findings from a historical point of view. In this study, the relationship between the furniture used in the spaces of the selected films (*Gone With The Wind*, 1939; *Doctor Zhivago*, 1965; *Amadeus*, 1984; *Love and Friendship*, 2016) and the historical period of the story will be examined, and the relationship between film- space-furniture will be interpreted. The reflections of the architectural history process on the furniture used in the spaces of selected drama films will be read from a different perspective.

Keywords: Cinema, drama films, furniture, architectural history, interiors



REUSING RESIDUAL MATERIAL OF FURNITURE PRODUCTION IN NEW DESIGN ARTIFACTS BY UNIVERSITY-INDUSTRY COLLABORATION

Mehmet Ali ALTIN^{a*}

^aDepartment of Interior Design, Eskisehir Technical University, Eskişehir, Turkey.

*Corresponding author: malialtin@gmail.com

Furniture design classes in interior design programs mostly lack on production knowledge. Although the knowledge in this area is provided theoretically, tactile knowledge cannot be transferred neither oral nor verbally. At the other hand, furniture industry is the place where this kind of knowledge is utilized continuously. In the global World, the industry must catch up with new trends that are part of the endeavors in design in Universities. Problems due to the nature of industry and design problems of students and teachers meet at furniture itself but industry and University are still not close enough. In this paper, possible collaborations between industry and University are discussed. The furniture design class which is held in an interior design department is organized at the scope of industry-university collaboration. In this sense, the director of a mid-sized furniture firm is invited as a tutor for one semester. The subject of the class is determined as a typical problem from industry, reuse of residual materials of production. These materials are converted into design artifacts. The output of this study is discussed in this paper. This discussion includes evaluation of the collaboration through qualitative and quantitative data of student reports, surveys and partner interpretations.

Keywords: Reuse, university - industry collaboration, furniture design education



SITUATION OF THE FURNITURE INDUSTRY PRODUCT GROUPS IN TURKEY AND THE WORLD

İbrahim YILDIRIM^{a*}

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: ibrahim@ktu.edu.tr

It is certain that Small and Medium Enterprises (SMEs) will have an important contribution in cross-country competition, which is increasingly intensified by the globalization process and based on the knowledge economy. Although SMEs constitute the majority of enterprises across countries, they have a more flexible and dynamic structure than large enterprises. SMEs act as dynamo in all developed countries. In this study, the last four years they have made concerning the export and import of products of Turkey's furniture industry group, was carried out within the scope of the grouping. Moreover, Turkey's furniture industry in the field of exports and imports in terms of value that other countries have done in the last five years in terms of the data was performed grouping. Similarly, countries are divided into groups in terms of export and import values of all countries. Progressive Hierarchical Clustering Analysis and Discriminant Analysis statistical methods were used in order to reveal how the furniture sector, which is the lower branch of the forest products industry, which has an important position in the manufacturing industry structure, is compared to other countries. Furniture industry made 80 of its exports to 27 countries. 90 of imports were from 21 countries.

Keywords: Turkey, furniture industry, hierarchical cluster analysis, discriminant analysis



SOME TECHNOLOGICAL PROPERTIES OF WALNUT (JUGLANS REGIA) TIMBER DRIED WITH HIGH FREQUENCY VACUUM DRYING (HF-V) TECHNIQUE

Cengiz GÜLER^{a*}, Öner ÜNSAL^b, Burak DİLEK^a

^aDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

^bDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: cengizguler@duzce.edu.tr

In conventional drying ovens, the drying of especially thick timber is insufficient in terms of quality and drying time. Therefore, it is important to dry thick and high density wood species which cannot be dried by conventional methods or which are difficult to dry by high frequency vacuum method. This scope of study, drying experiments have been performed by applying high frequency-vacuum (Hf+V) drying method at wavelength of approximately 15 cm at 27.12 MHZ frequency that this technic implemented first time in Turkey. In this study, selected from local sources and walnut (*Juglans regia*) were used as experimental material. Walnut lumber 78 mm thick was dried by high frequency vacuum drying (Hf-V) method. These materials were technologically examined by drying the timber in a short time in a fully automated, high frequency vacuum drying oven. Some physical and mechanical properties of walnut were compared natural drying and HF+V drying. As a result of the high-frequency-vacuum drying process, it was observed that the physical properties; no significant change. However, when the mechanical properties were examined, it was determined that there was a 6 decrease in bending strength, 7 in elasticity module, 7 in compression strength and 17 in impact bending strength. According to these results for non-overloaded areas such as rifle stock can be using high frequency vacuum (Hf +V) drying is preferred in the conventional dry drying wood types method.

Keywords: Walnut, drying, high frequency-vacuum drying, technological properties



TEXTILE USAGE IN OPEN SPACE FURNITURE OF NAUTICAL VEHICLES

Candan AYLA^{a*}, Müge ERTEMLİ^b

^aDepartment of Interior Architecture and Environmental Design, Istanbul Gedik University, İstanbul, Turkey.

^bDepartment of Nautical Design, Maltepe University, İstanbul, Turkey.

*Corresponding author: candan.ayla@gedik.edu.tr

In the design of the nautical vehicle, besides the purpose of the vehicles usage and user profile, it is given particular importance to the functionality in the criteria for the formation of space. It is important to ensure that the furniture, which is one of the important elements of the space, is designed for purpose and need, as well as being resistant to sea and climate conditions and their aesthetic appearances are satisfactorily high.

Especially the evaluation of the recreational craft in the yacht class as the status symbol and when looking at the furniture from past to present, the privilege of being a priority in determining the status has caused these two important elements to be used as complementary to each other.

In general, furniture used in nautical vehicles, in open spaces and interiors should have different technical features than terrestrial spaces, in addition to its aesthetic properties, it should have technical characteristics different from terrestrial spaces in terms of durability and should be designed in accordance with harsh living conditions with the effects of sea, moisture and sunlight. In addition to its functionality, the aesthetic aspect is important in nautical vehicles. The right design and the right material selection will enable the desired style and design to be created easily, both in styling and space / furniture formation.

In addition to its aesthetic properties in textiles to be used in these furnitures, due to its technical performance and functional properties, besides nautical and land vehicles, technical textiles are used, which have an important place in the fields such as medicine, sports equipment and construction. These are important elements that make the nautical vehicle unique and luxurious.

Marine textiles, which initially had a limited amount and usage area such as ropes and sail cloths, are used today in open and closed spaces the upholsteries, cushions, backfilling materials and accessories of fixed and movable furnitures located in nautical vehicles.

Keywords: Furniture, nautical vehicle, textile



TEXTURE, COLOR, LIGHT AND MATERIAL IN INTERIOR PERCEPTION: CHILDRENS ROOM FURNITURE

Burcu ÜLKER^{a*}, Gökben PALA AZSÖZ^a

^aDepartment of of Architecture, Kırklareli University, Kırklareli, Turkey

*Corresponding author: bu.bulker@gmail.com

Space is a limitation that all living creatures make in line with their needs. It also shapes our relationship with the outside world in a concrete sense. In order to create a sense of interior space, the design should be planned accordingly, considering all the equipment elements, as well as basic design elements, texture, color, light and material. Texture is the quality of a surface due to its three-dimensional structure. The correct use of textures in the interior significantly emphasizes the form and increases the effect. Color is the sensation created by light as a result of reflection on objects. The color that creates the desired effect in the atmosphere of space at the same time defines the form of the space and characterizes the material. It is not possible to realize the desired visual effect in the interior design without lighting elements (light). The identity of the space gains form and meaning thanks to lighting. Material is everything that people use to make the products they need and create a work by processing them. The choice and use of materials in the interior design is endless; however, the effect will not be sufficient if proper selection and correct use are not made. In this study, the basic design elements mentioned above are scrutinized one by one. As a material, a cot, bedside table, dresser, desk, bookcase and wardrobe were selected as special furniture for the children, and the concepts of texture, color and light were discussed on this subject. As a material, a cot, bedside table, dresser, desk, bookcase and wardrobe were selected as special furniture for the children, and the concepts of texture, color and light were discussed on this subject.

Keywords: Interior, texture, color, light, material, children room furniture



THE ADVENTURE OF INTRODUCTION AND CHANGE OF THE “CLOCK” IN THE OTTOMAN WORLD

Gamze AKBAŞ^{a*}

^aDepartment of Interior Architecture and Environmental Design, Istanbul Kültür University, Istanbul, Turkey.

*Corresponding author: g.akbas@iku.edu.tr

The appearance of Western cultural objects in the Ottoman period caused cultural changes to occur. In this context, the subject of the adventure of introduction and change of clock in the Ottoman has an important place in the literature studies on furniture purchased from the West. From this point of view, by keeping the story of the “clock” as the focal point of this study, the issues of both the meanings attributed to “clock” in the Ottoman world, and how the cultural data in question has gained a different quality are discussed. The analysis of the transformation process of the cultural object transferred from one society to another is the main subject of this study. In this study, the cultural dilemma that occurred in the process starting from the 15th century and continuing to Modernism is examined over the clock. Within the scope of the study, the subject is discussed over the texts according to chronological order, in this context, the transformation process of the clock into a different culture and usage style is analyzed in detail. With the study of previous studies on the subject, the use of the clock in a different culture is handled from a different perspective through visual materials.

Keywords: Clock, culture, furniture



THE CHANGES OF FIBERBOARD PROPERTIES WITH ADDITION OF PALM BARK FIBER

Derya USTAÖMER^{a*}, Elif TOPALOĞLU^b

^aDepartment of Forest Industry Engineering, Karadeniz Technical University, Trabzon, Turkey.

^bDepartment of Architecture and Urban Planning, Giresun University, Giresun, Turkey.

*Corresponding author: uderya@ktu.edu.tr

In this study, palm tree bark fibers were used in fiberboard production by adding to fibers. And, some physical properties such as water absorption and thickness swelling; some mechanical properties such as modulus of rupture and modulus of elasticity of these produced fiberboards were determined and the results of these properties were evaluated. Before the panel production, palm barks were made into fiber pieces and the bark fibers by taking three different ratios (5, 10, 15) were mixed into to beech fibers. The fibers were bonded using at the rate of 12 urea formaldehyde (UF) resin. Following, prepared panel mats were pressed (170 °C- 7 min.) and panel productions were carried out. As a result of the physical and mechanical tests, it was determined that the values of the experimental parameters changed with the increase of the additional ratio of palm bark fiber. In particular, it was determined that the water absorption and thickness swelling values for 24 hours of the panel samples decreased depending on the increase in the ratio of bark fiber, and these values improved compared to those of control samples for 24 hours. The modulus of rupture and modulus of elasticity values of the panel samples showed no distinctly decrease tendency compared to those of the control samples. The produced fiberboards can be used for decorative surfaces as well as for the production of furniture that can be used indoors.

Keywords: Palm bark fiber, fiberboard, physical properties, mechanical properties



THE EFFECT OF ACCELERATED WEATHERING ON COLOR AND SURFACE ROUGHNESS IN THERMOWOOD WILD CHERRY WOOD

Ayhan AYTİN^{a*}, Süleyman KORKUT^a

^aDepartment of Forest Industry Engineering, Düzce University, Düzce, Turkey.

*Corresponding author: ayhanaytin@duzce.edu.tr

In this study, changes in some physical properties after accelerated weathering of Thermowood Wild Cherry (*Cerasus avium* (L.) Monench) wood were investigated. Firstly, Wild Cherry (*Cerasus avium* (L.) Monench) planks were heat treated by Thermowood method and Thermowood Wild Cherry was obtained. Afterwards, the trial samples prepared were periodically accelerated with 144, 248, 576 and 864 hours of UVB lamps, and color values (L, a, b and ΔE) and average surface roughness (Ra) values were determined at the end of each period. The results were analyzed by multiple comparison techniques with SPSS and Duncan test was applied to see if there were $p < 0.05$ statistical differences. The results of the study showed that the average surface roughness values were better in Thermowood samples than the control samples. On the other hand, it has been determined that the samples darkening with heat treatment have started to gray on the surfaces with aging, and the degree of graying increases due to the prolongation of the aging period.

Keywords: Wild cherry, thermowood, weathering, color, surface roughness

THE EFFECT OF SOME FIRE RETARDANT CHEMICALS ON WOOD TO MASS REDUCTION

Kubulay ÇAĞATAY^{a*}, Hacı İsmail KESİK^b, Mehmet Ali AKSU^b

^aDepartment of Interior Architecture and Environmental Design, Nuh Naci Yazgan University, Kayseri, Turkey.

^bDepartment of Forestry Industrial Engineering, Kastamonu University, Kastamonu, Turkey.

*Corresponding author: kcagatay@nny.edu.tr

Rescue from fires is the most important factor, especially in places where public life is maintained (dormitories, kindergartens, old houses, etc.) without sensitivity and loss of life to fire safety. Wood material is a flammable raw material. In case of a fire in a closed place, it is of great importance to extend the ignition and burning time of the wood and to decrease the flammability feature.

In this study, the resistance of wood materials and their weight loss properties after burning were determined by applying some fire retardant natural impregnants and water based varnish modified with these natural impregnations.

For this purpose; Five species of trees were used: *Pinus sylvestris* L., oak (*Quercus petraea* L.), sapland (*Entandrophragma cylindricum*), ash (*Fraxinus excelsior* L.) and rose (*Dalbergia latifolia* R.). The burning properties of the impregnant materials in the fire retardant property and the wood-based varnish modified with these impregnants have been determined. Water based varnish applications were made according to the standards of the impregnation and burning tests according to the manufacturers recommendations. According to the loss of weight due to combustion the lowest weight loss in tree types is in yellow pine, lowest weight loss in impregnancies in K5 (limestone water), the lowest weight loss in impregnated method, and the lowest in varnish application weight loss was detected in experimental samples with D17 (water based varnish) varnish applied. Considering that natural impregnants and water-based varnishes are more positive in terms of environment and human health, it may be recommended to use in different environmental conditions. .

Keywords: Wood material, fire retardant chemical, natural impregnation materials, water based varnish, mass reduction



THE EFFECT OF THE AGING FACTOR ON THE SURFACE ROUGHNESS OF THE SANDED SCOTS PINE

Cevdet SÖĞÜTLÜ^a, Ramazan BÜLBÜL^{a*}, Murat UZEL^c

^aDepartment of Forest Industry Engineering, Gazi University, Ankara, Turkey.

^bDepartment of Landscape Architecture, Karadeniz Technical University, Trabzon, Turkey.

^cDepartment of Hacettepe University Hacettepe Ankara Chamber of Industry 1st OIZ Vocational School, Hacettepe University, Ankara, Turkey.

*Corresponding author: ramazanbulbul@gazi.edu.tr

In this study, it is aimed to determine the effect of the aging factor on the surface roughness of the Scots pine which is applied to the sanding process. For this purpose, the samples sized in 10x100x700 mm were produced from the radial and tangential sections of both the naturally aged and the recent Scots pine wooden materials. The sanding treatment was performed with a contact sanding machine equipped with 80 and 180 grit sanding belts, at the feed speed of 7 m/minute, according to ASTM-D 1666-87. The surface roughness values of the samples were determined with the stylus-type surface roughness measuring instrument, according to TS6956 EN ISO 4287. As a result, the surface roughness values on the tangential section were found as 4.372 μm for the naturally aged Scots pine and 5.059 μm for recently Scots pine. Moreover, the surface roughness values on the radial section were determined as 4.113 μm for the naturally aged Scots pine and 5.600 μm for recently Scots pine. It is observed that the surface roughness values for the recent Scots pine were higher on the radial section (5.600 μm) than the tangential section (5.059 μm).

Keywords: Wooden material, sanding, surface roughness, aging



THE EFFECT OF TRADITIONAL AND LASER CUTTING ON WOOD MATERIAL SURFACE ROUGHNESS USED IN FURNITURE INDUSTRY

Cebrail AÇIK^{a*}, Ahmet TUTUŞ^a

^aDepartment of Forest Industry Engineering, Kahramanmaraş Sütçü İmam University, Kahramanmaraş, Turkey.

*Corresponding author: cebrail46@hotmail.com

One of the most important problems in the use of solid wood in the furniture industry is the surface roughness of the furniture elements depending on the cutting conditions. The processes required and the effort to be spent in order to obtain a smooth surface are too much, and besides the loss of time and raw materials in the production line, there are great costs in the creation of the machine park.

In this study, the surface roughness of the materials obtained from some wood species processed by CNC laser and circular saw machine was investigated. Poplar (*populus canatesis*), scotch pine (*Pinus Sylvestris*) and fir (*Abies concolor*) samples were used in the study. The cuts are planned parallel and perpendicular to the fibers. In the CNC laser machine, two different speeds of 130 watt constant power, 10 mm / s and 20 mm / s are used. In the circular saw machine, the rotation speed was taken as 4300 rpm without loading and the roughness rates of the traditional circular saw cutting and CNC laser cut surfaces were compared.

Keywords: CNC, laser cutting, surface roughness, wood material

THE EFFECTS OF THE RUBBER USED AS REINFORCEMENT MATERIAL ON THE BENDING STRENGTH OF THE LAMINATED SCOTCH PINE WOOD

Murat UZEL^{a*}, Pascal NZOKOU^b, Cevdet SÖĞÜTLÜ^c

^aDepartment of Hacettepe University Hacettepe Ankara Chamber of Industry 1st OIZ Vocational School, Hacettepe University, Ankara, Turkey.

^bDepartment of Forestry, Michigan State University, Michigan, United States.

^cDepartment of Forest Industry Engineering, Gazi University, Ankara, Turkey.

*Corresponding author: muratu@hacettepe.edu.tr

In the furniture industry, the lamination technology is used widely on the bending members and the applications which are needed a higher load-carrying capacity. It is aimed to improve the mechanical properties, weight/strength ratio, and cost of the composite materials by researching the parameters as different wood species, types of adhesive, types of reinforcement material, and the placement of the layers for the lamination technology. In the scope of the experimental study, 90 mm x 90 mm x 1710 mm sized glued laminated wood consist of 3 and 5 Scotch pine (*Pinus sylvestris* L.) laminations were manufactured. In the lamination process, epoxy and polyurethane adhesives were used. Moreover, 3 mm thickness of rubber was used to improve the flexural properties at the lamination surface. The specimens are tested according to TS EN 408+A1 “Timber structures - Structural timber and glued laminated timber - Determination of some physical and mechanical properties” standard. Bending strengths were determined in perpendicular to the bonding line and parallel to the bonding line. The test results were compared with those of Scotch pine beams (SPB) and the non-reinforced glued laminated wood (NR-glulam) beams. It was observed that the bending strengths of NR-glulam beams were better than those of solid wooden beams. In addition to that the use of 3 mm thickness of rubber caused to decrease the bending strength significantly. The highest bending strengths were observed from the tests of glued laminated timber beams manufactured using five layers with polyurethane adhesive (5PN-glulam).

Keywords: Furniture, lamination, wooden construction, reinforcement



THE EVALUATION OF ROADSIDE BARRIERS AS URBAN STREET FURNITURE

Emre BİRİNCİ^{a*}, Hüseyin YÖRÜR^b, Halil İbrahim YUMRUTAŞ^c

^aDepartment of Forestry and Forest Products, Kastamonu University, Kastamonu, Turkey.

^bDepartment of Forest Industry Engineering, Karabük University, Karabük, Turkey.

^cDepartment of Civil Engineering, Karabük University, Karabük, Turkey

*Corresponding author: ebirinci@kastamonu.edu.tr

Urban street furniture is one of the important elements that determine the quality of the city. Therefore, urban furniture plays a major role in the formation of the identity, image and aesthetics of the cities. The importance of urban furniture is increasing in urban areas where the population is high.

Urban furniture is very important for cities to gain identity. Urban street furniture is a unique product designed and installed to meet the needs of individuals in all urban spaces with street, road, parking, stops and stations, observation terraces, green areas, pedestrian roads and squares, and to meet the needs of natural external influences such as rainfall, wind and sun rays together with transportation, sitting, shelter, protection, consultation, orientation, lighting, garbage collection, rest, recreation. Urban street furniture is of great importance for the city in terms of the functional and aesthetic values of the city, but also affects the quality and identity of the city. On the other hand, in addition to responding to various functions in line with the social, cultural, physical and psychological needs of individuals within the framework of urban and public open space, urban street furniture is qualified elements that define and complement space.

Passive safety structures, which are used as a barrier at the edges and middle parts of highways, are designed to protect vehicles coming out of the road for any reason by protecting them from outside road hazards. The main purpose of the barriers is to reduce the severity of the accident that occurs rather than preventing the accident and to minimize the accidental damage. The barriers absorb some of the energy that comes out during the crash, allowing the vehicles out of control to slow down and stay on the road. Roadside barriers are made of materials such as concrete, steel, plastic today. These types of barriers display an inappropriate image in terms of urban aesthetics, especially in historical and touristic areas. It will be important in terms of urban aesthetics to evaluate the roadside barriers that will be designed / produced using wood and wood based materials as urban street furniture.

Keywords: Guardrail, barrier, urban, street, furniture



THE FUTURE OF SMART FURNITURE WITH INDUSTRY 4.0: THE EXAMPLE OF THE SMART MANAGER CHAIR

Alper AYTEKİN^{a*}, Eda BEKTAŞ^a

^aDepartment of Management Information Systems, Bartın University, Bartın, Turkey.

*Corresponding author: aytekin@bartin.edu.tr

The world population and the needs of human beings, which have grown at the same rate, have made it imperative that technology is rapidly integrated into daily life. Industry 4.0, which aims to meet these needs easily and quickly by combining technology and industry, has also affected the furniture industry. Although the fact that the furniture in human life needs Industry 4.0 is too much to ignore, technology has not been able to prove on furniture sector, its effectiveness in other industries. The furniture sector, which cannot keep up with the technological developments, has been passive in alleviating the burden of human life. The emergence and spread of smart furniture will eliminate this passivity. But there are many misconceptions among people that are thought to be true about smart furniture. The fact that a table can be a bed does not take it further than modular furniture. In order for a furniture to be called smart, it must have artificial intelligence. In this study, the current furniture industry and smart furniture are discussed. The properties that furniture should have in order to be called smart are explained along with its reasons. For this purpose, what features an executive chair should have in order to be classified as smart, how technological features as well as how the data obtained are analyzed with artificial intelligence are explained in detail.

Keywords: Industry 4.0, smart furniture, smart manager chair



THE IMPORTANCE OF CUSTOMER SEGMENTATION FOR FURNITURE ENTERPRISES AND A SAMPLE APPLICATION

Emel ÖZTÜRK^{a*}, Küçük Hüseyin KOÇ^a, Merve Kaplan ŞAYAN^a

^aDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, Istanbul, Turkey.

*Corresponding author: emelozt@istanbul.edu.tr

Today's business world is shaped by concepts like globalization, digitalization, growing market, sociocultural diversity is faced with intensive data flow. Collecting, understanding, analyzing and interpreting this big data is critical. Success in the business world is directly proportional to customer satisfaction. The concept of customer segmentation, along with the personalization trend in individual consumption, which is becoming widespread all over the world, helps enterprises to catch up with customer trends and to reach their target customers with the right products, services, business models and strategies. Businesses struggling with customer segmentation under challenging conditions of competition both use their limited resources efficiently and turn into successful and preferred companies by offering values that meet the needs of their customers. In today's societies where change and transformation is very rapid, existing methods also require constant updating. Studies show that most businesses experience problems with proper customer experience management and appropriate segmentation. SME's are the majority of forest products and furniture industry in Turkey. The existence and applications of customer segmentation in the furniture industry is one of the priority issues. In this study, customer segmentation was performed in a furniture company operating in Istanbul. 3402 customers of the furniture company in 2017 and 2018 constitute the study universe. The web-based survey was shared with customers via e-mail. The responses of 199 customers who participated in the survey were evaluated. The study is limited with the dining table. In the study where demographic segmentation was carried out, customer orientations were interpreted and evaluated and recommendations for the sector were developed.

Keywords: Customer segmentation, furniture industry, Istanbul, forest products, marketing, CRM



THE PLACE OF GAN ALGORITHM IN DESIGN WITH ARTIFICIAL INTELLIGENCE

Gökhan DUYUR^{a*}

^aDepartment of Design, Istanbul Ayvansaray University, Istanbul, Turkey.

*Corresponding author: gokhanduyur@gmail.com

In this study, the uses of artificial intelligence-human collaboration in design areas were researched. Studies using the GAN algorithm have been compiled. In line with the data obtained, suggestions about the studies to be carried out in artificial intelligence-human cooperation in the field of furniture design are presented.

Studies using the GAN algorithm compiled as a result of the literature review; datasets, networks and generated visuals of these studies were compared. When the datasets are examined in architectural designs, it was seen that architect Calavatra's designs, Baroque, Victorian, Manhattan-style buildings and various architectural plans were used as data sets.

In the field of fashion design, Vintage-style clothes were used as a data set. GAN, which is an artificial intelligence algorithm, needs a data set in order to learn and create new images. In order to obtain the desired outputs, the data set must be prepared correctly. As can be seen in jewelry design, fashion design, and architectural design examples, when a certain variety of data sets are prepared, artificial intelligence can produce images in variations that are similar but not from them.

As a result of this study, it was proposed to prepare Louis XV furniture, which is a lot of data in the literature, early modern furniture and the data set of Thonet furniture. It has been concluded that the visuals produced by artificial intelligence can be used as a method in the education studies of that period, in understanding the production techniques of the period, in evaluating the approaches of the designers, in designing period furniture.

Keywords: Artificial intelligence, GAN, design, furniture



THE POSSIBILITIES OF USING THE PANELING TOOLS PLUG-IN FOR DESIGN EDUCATION AND FURNITURE DESIGN

Nazmiye Naz ÖZTÜRK^{a*}

^aDepartment of Interior Architecture, Iskenderun Technical University, Iskenderun, Turkey.

*Corresponding author: nazmiye.ozturk@iste.edu.tr

Computer programs in areas such as architecture, interior architecture and industrial design vary according to the needs of these disciplines. In Turkey, mostly in the area of architecture and interior design programs such as AutoCAD and 3DMax are used. In the field of industrial design, the use of Rhinoceros and Solidworks is more. When the Architecture and Interior Architecture education curricula in Europe are examined, it is seen that the Rhinoceros program is used in the form finding process with the Panellig Tools and Grasshopper plug-in. In the field of Computer Aided Design (CAD) there is a lack of research in Turkey. The aims of this research are to update CAD research in design education and to increase interdisciplinary CAD research. This study primarily conveys the experience of using the Paneling Tools program add-on working within the Rhinoceros program in design education. Afterwards, determinations regarding the potential of this program in its use in furniture design are included. CAD, Rhinoceros program, Paneling Tools program add-on, Design Training, Furniture Design

Keywords: CAD, rhinoceros program, paneling tools program add-on, design training, furniture design



THE RELATIONSHIP OF FURNITURE AND PHYSICAL COMFORT IN COMPUTER WORK ENVIRONMENTS

İsmail SARI^{a*}, Taner DİZEL^b

^aDepartment of Computer Technology, Denizli Vocational School of Technical Sciences, Denizli, Turkey.

^bDepartment of Design, Denizli Vocational School of Technical Sciences, Denizli, Turkey.

*Corresponding author: siirekin@gmail.com

Using computer, depending on the developments in information technologies; Social life is used effectively and efficiently in the service sector as well as production technologies. The physical properties and comfort designs of computer working environments should be done in an order in terms of ergonomics. The compatibility of the hardware elements used in computer working environments; it is as important as individuals knowledge, skills and abilities. The size of the working environment, the harmonious and functional arrangement of the technical equipment to be used will increase the efficiency of the individuals who will work in these environments for a long time. The comfortable design of the equipment in the workplace, the arrangement of the physical environment and accordingly, increase the importance of furniture designs in which technical equipment will be placed.

In this study, in terms of designing the physical environment, especially ergonomic features, organizing technical equipment in a functional way, increasing working efficiency; The physical conditions, comfort, design and functionality of the space will be determined by field research. The data obtained as a result of the research in computer working environments; Besides individuals knowledge, skills, and abilities, the importance of physical comfort and ergonomics of the workplace will be indicated. Physical comfort in the work area will increase the productivity of the employees.

Keywords: Computer, furniture, physical comfort, ergonomics



THE ROLE OF IN-HOUSE INDUSTRIAL DESIGNERS IN THE TURKISH FURNITURE INDUSTRY

Nimet Başar KESDİ^{a*}, Pınar KAYGAN^a

^aDepartment of Department of Industrial Design, Middle East Technical University, Ankara, Turkey.

*Corresponding author: nbkesdi@gmail.com

Furniture industry is a design-intensive low-tech industry due to the limited opportunities for technological product innovations, in which competition depends on product differentiation and marketing rather than technological change. Under these circumstances, design becomes an important competitive tool for furniture companies. In many official reports on the Turkish furniture industry, including government development plans, the power of design is identified as the key to success. Although there is a number of studies that argue for the importance of design for the furniture industry, we do not know much about the role that industrial designers play in the Turkish furniture industry. This paper aims to address this gap by exploring the situation from the perspectives of the designers. To this end, semi-structured interviews are conducted with 17 industrial designers who have at least two years of experience as an in-house industrial designer in large-scale furniture enterprises in Turkey. Drawing on these interviews, this paper presents (1) the roles and responsibilities of industrial designers, and (2) the organization of design function in the large-scale furniture enterprises. Doing this, the paper goes beyond merely presenting the current picture of the Turkish furniture industry, but also underlining the implications for design management.

Keywords: Furniture design; furniture industry, industrial designer, new product development



TIME STUDY AND AN EXAMPLE OF APPLICATION IN WOOD URBAN FURNITURE

Halil Erdem YÜCEL^{a*}, Tuncer DİLİK^b,

^aTurkuaz Park Wooden Structure Landscape Const. Ind. Trade Co. Ltd., İstanbul, Turkey.

^bDepartment of Forest Industry Engineering, Istanbul University-Cerrahpasa, İstanbul, Turkey.

*Corresponding author: herdemyucel@gmail.com

In this statement, due to the fact that there is no sufficient application in the furniture industry and there are no scientific studies regarding the time study in this industry, a time study application was examined through the example of the production of wooden urban furniture. In this research, 10 preliminary studies were conducted. As a result of the preliminary study conducted in this context, at the three machines and one stage, 10 times measurements were made. Standard deviations have been calculated with 95 confidence and 5 margin of error. Time study has been applied for the determination of the standard time in the assembly stage of the picnic table and the bench, which are the products of an enterprise producing wooden urban furniture. When the evaluation is made over the basic time data obtained in this context, it has been determined that the standard time for the assembly of one picnic table is 11.58 minutes, and the bench assembly production standard time is 7.26 minutes. Accordingly, considering the process efficiency in the enterprise, it was determined that the full production capacity in the enterprise could not be reached. As a result, it has been determined that the enterprise studied with the time study application is operating well below its production capacity and it has been revealed that the enterprise can increase production quantity and efficiency by ensuring that the enterprise is primarily planned according to flexible production systems. In addition, it has been determined that the enterprises may have data infrastructure that may be a source for future investment and cost calculations by time study applications for wood urban furniture and similar production areas.

Keywords: Wooden urban furniture, time study, work study



TRADITIONAL TURKISH MOTIFS AS INTERIOR DECORATION ELEMENTS YAHYALI EXAMPLES

Harun DİLER^{a*}, Derya ÇAKMAK^b

^aDepartment of Materials and Materials Processing Technology, Akdeniz University, Antalya, Turkey.

^bDepartment of Interior Architecture, Karadeniz Technical University, Trabzon, Turkey.

*Corresponding author: harundiler@gmail.com

Woven carpets, one of the most important handicrafts of our country, have a language describing the region and weaver. Turkish hand-woven carpets with motifs of time, weavers feeling, culture, meticulousness, calmness, hastiness and so on. tells many emotions and subjects. This art has been replaced by machine carpets and has lost its value. The patterns are replaced by the patterns in the new design carpets and lose interest. In this study, how original carpet motifs can be used as a decoration element in interior designs is examined. The main element of the decoration is motifs, patterns and lines. We can also call them all at once. The elements may be used alone or in a composition. The elements may be abstract or concrete. Concrete elements are depictions of human, animal, plant or inanimate substances, or shapes inspired by such natural objects. Abstract elements are mostly geometric shapes or forms that do not identify. . In this study, the motifs on the Yahyalı carpet were examined and the designs were prepared by applying them in the interior architecture in order to keep the motifs on the rugs of ornamental art and handicrafts which are an important part of our cultural heritage. Geometric motifs and floral motifs are created on different surfaces and these works are intended to serve as an example to the contemporary architecture and decoration areas and vineyards blended with cultural works of our past.

Keywords: Carpet, decoration, motif, interior



TRANSFORMATION OF WASTE INTO ECO-FRIENDLY PRODUCT: SAMPLE OF WOOD BARKS

Yener TOP^{a*}

^aDepartment of Design, Gümüşhane Vocational School, Gümüşhane, Turkey.

*Corresponding author: yenertop@gumushane.edu.tr

People need a lot of things throughout their lives. Some of these are found as free in nature and no effort is required to supply them. However, things that are free can become scarce in progress of time and turn into an economic good. They are obtained by combining production factors and passing them through production procedures. At the end of these procedures, product and waste are generated. When wood supply was abundant, wood barks were seen as an undesired waste generated during the production process. Barks were mostly disposed of by being buried in the ground or burned in open areas. However, due to the decrease in wood supply and the increase in demand, the approach to wood barks has changed for a long time. In this study, the changing of wood barks from waste to an economic good was investigated. Engineered wood containing up to 30 percent barks are suitable for furniture manufacturing. It was revealed that the industrialization level of the country and awareness of environmental protection have an effect on the ways of utilizing the barks was one of the results.

Keywords: Free good, production, wood bark, environment, furniture



USE OF DESIGN RESEARCH METHODS IN THE TRANSFORMATION OF FURNITURE IN CARE HOMES

Mehmet Erçin OKURSOY^{a*}

^aDepartment of Industrial Design, Selçuk University, Konya, Turkey.

*Corresponding author: ercin.okursoy@gmail.com

Increasing share of vulnerable people in population has moved healthcare services beyond caregiving into nursing homes as well as other everyday environments by means of mobile technologies such as telemedicine and monitoring applications. Considering specialized health conditions require adjustments and customization for each individual's needs, mobile technologies can cope with this mass customization, while it is unfortunate that available furniture products which also claim to be specialized in medical purposes are not well suited to everyday environments and user needs in terms of both form and function. It is fair to say that most of these products are downgraded from hospital equipment into non-professional medical products. In this paper, possible design research methods which can be employed in the need elicitation and development phase of these medical furniture are explored. In addition, some suggestions as approaches that can be adopted during field studies are explained regarding their research aims, limitations and expected outcomes.

Keywords: Medical product design, design research methods



USE OF FINITE ELEMENT METHOD IN THE DESIGN OF POLYMERIC CARRIER & ACCESSORY LEGS FOR PANEL FURNITURE

Burak DEMİRTAŞ^{a*}, Abdülkadir ÖZÇELİK^a

^aR&D Product Development and Innovation Specialist, İstikbal Mobilya INC. CO., Kayseri, Turkey.

*Corresponding author: burak.demirtas@istikbal.com.tr

Nowadays, living spaces are getting narrower and in contrary to this, the variety and number of items are increasing. The importance of the storage areas of furniture, which is an indispensable part of the houses, is increasingly becoming an indispensable element of living spaces. On the other hand, the effect of aesthetic satisfaction on furniture together with functional expectations gains a special importance for customers. These expectations are in the design of the furniture legs, which are visual and bearing elements; different angles, heights and different accessories have directly affected the strength and manufacturability of the feet. In this paper, the plastic accessory-carrier feet used in Indigo dining, bedroom and compact TV units in İstikbal Furniture Panel Group unit are discussed together with the concepts of strength, aesthetics, manufacturability and final product. In its design, using virtual finite elements method, virtual tests were made in accordance with quality tests, and it was tried to determine the most suitable and strongest model for plastic design before its manufacture, and after the results gave appropriate values for mass production, productions were carried out.

Keywords: Furniture, panel furniture, furniture accessory feet, finite elements method, aesthetics, polymer material



USE OF FURNITURE IN NARROW SPACES, MULTI-FUNCTIONAL FURNITURE

Hamide TEMEL^{a*}

^aDepartment of Interior Design, Maltepe University, Istanbul, Turkey.

*Corresponding author: hamidebilgen@maltepe.edu.tr

Each of the different societies in the world produced their own furniture according to their own culture. However, the development of technology and the increase in the use of the internet increased the communication of the cultures and reduced the difference between the cultures by selection. Especially the population density in the big cities brought about the lack of space; with the addition of factors such as changes in family structure, user needs, and socio-economic status, the concept of narrow-space housing has entered the literature. When designing a narrow-space house, it is very important that the architect and the interior designer have knowledge of user requirements and determine which needs should be minimized. In order to provide the living space, dining / eating area, sleeping area, working area and bathroom / wc areas within the restricted area, the furniture must be functional. In this study, the furniture in narrow-space dwellings will be analyzed within the context of functionality, with examples in the context of stability / mobility, modularity, addibility / dimensionality / storability.

Keywords: Furniture design, functionality, narrow space hours



WORKSHOP OUTCOMES: REINTERPRETATIONS OF VERNACULAR ARTIFACTS IN THE CONTEMPORARY FURNITURE DESIGN

Esra NASIR^{a*}

^aDepartment of Interior Architecture and Environmental Design, Izmir University of Economics, İzmir, Turkey.

*Corresponding author: esrabici@gmail.com

Traditional object system accommodates design qualities like mobility, multifunctionality, lightness, invisibility and stackability. Floor tables, built-in cabinets, floor beds and relevant units are the elements of a sustainable life style. After urbanization and industrialization, traditional artifacts have been removed from the agenda of mainstream furniture industry and stayed in an untouched region of design practice. Through two workshops that I conducted, I tried to answer the question that what kind of furniture would be designed if these artifacts inspired the modern nomadic condition, which required less units and gradually decreasing domestic spaces. In 2017, in the workshop in which I collaborated with Atölye Mil in Tasarım Atölyesi Kadıköy, the focus was mostly on the design qualities of vernacular floor table. In 2019, in the second workshop I conducted in the Good Design Izmir Days, I expected the participants to think and sketch about the modern essence of the vernacular furniture like minimalism, multi-functionality and stackability in the context of contemporary furniture design. These abstract design qualities made the transition from traditional paradigm to contemporary design thinking easy and effective. After the finalization of sketches, it was seen that modularity has been a prominent design quality responding this projection.

Keywords: Vernacular, mobility, modularity, furniture, design



CHALLENGES FOR FURNITURE DESIGN WITH THIN STRUCTURAL MATERIALS

Vassil JIVKOV^{a*}, Boryana PETROVA^a

^aUniversity of Forestry, Department Interior and Furniture Design, Sofia, Bulgaria

*Corresponding author: v_jivkov@ltu.bg

The use of thin structural materials made of wood and wood materials is a current issue and essential for modern furniture design. In the last few years, elegant and thinner furniture has become more and more popular. Furniture structural design from thin materials has both aesthetic and ecological aspects related to less raw material consumption. This, in turn, leads to a reduction of furniture weight, which is of great importance for transport and furniture operation. New rules related to the green economy also require design solutions that reduce the consumption of raw materials on the planet, solutions that allow a second life of the furniture, and reuse or recycle used materials.

In this study, a structural analysis of different applications of thin and ultra-thin materials for furniture design has been done. Different furniture groups are considered, including cupboards, modular storage furniture, tables, chairs, etc. An analysis of the thin materials used in furniture construction has been performed, including wood-based materials and non-wooden materials. Basic joints suitable for thin structural materials are defined and analysed.

3D printing technology has become widespread in research development for different industrial sectors. As it allows quick experiments with relatively low cost and prototyping of new products to optimise them before they go into production, some information about the 3D printing technology is given in this study.

Keywords: 3D printing, furniture design, furniture joints, thin structural materials, strength characteristics
