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# Furniture Highlights

**From THE FURNITURE RESEARCH UNIT  
MISSISSIPPI STATE UNIVERSITY**

## Mississippi Legislature Provides \$ 3 Million for New Furniture Building at Forest Products Laboratory

*Cynthia West*

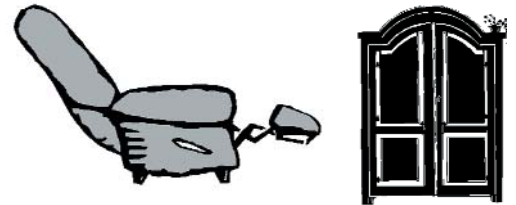
Construction is expected to begin in the Spring, 2002 on The Franklin Center for Furniture Manufacturing and Management at the Forest Products Laboratory, Forest and Wildlife Research Center, Mississippi State University. Funding for this state-of-the-art 30,000 + square foot facility includes a \$1 million gift from Hassell Franklin of Franklin Corporation, Houston, Mississippi, a \$3 million award from the State of Mississippi, and other donations solicited by the MSU Development Foundation.

This facility will help expand the fundamental and applied knowledge of furniture production and management and help transfer new knowledge and information to the furniture industry through technical assistance and continuing education. Research conducted at this facility will enhance the long-term competitiveness and prosperity of furniture and related industries in this region.

The building will include state-of-the-art research laboratories including a Quality Testing Lab, Machineability Lab, Product Design Lab, and an Engineering & Automation Lab; con-

ference facilities including an auditorium with interactive electronic classroom equipment and lap-top connections, and two other smaller conference rooms; and classrooms for up to 80 students, a computer teaching lab and graduate student office space.

Space is included in the plan for faculty and staff offices and a 3000 sq. ft. lobby to house a special collection to showcase the Mississippi Furniture Industry.



***Furniture Highlights is a new quarterly newsletter that is being published by the Forest Products Laboratory. This publication will not take the place of the Furniture Forum but will be an additional outlet with the purpose of getting pertinent information to the furniture industry in a timely manner. Furniture Highlights will provide updates on ongoing research projects, student and alumni activities, the availability of new publications and software, and the progress of the new Franklin Center for Furniture Manufacturing and Management Building. We welcome your comments about this issue and suggestions for improvements.***

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## FURNITURE RESEARCH

### Wood Machining

*Harold A. Stewart*

Wood Machining research at the FPL was expanded to improve the machining of wood and wood products for the forest products and furniture industries. The research is directed toward optimiz- ing machining parameters and/or workpiece properties. These studies include tool geometry, machining methods, tool materials, and tool wear. The studies can be directed toward the tool or machine as well as the workpiece.

Current studies include examination of the electrical discharge that occurs when forming a fresh sur- face when machining wood or a wooden workpiece such as medium- density fiberboard(MDF). The dis- charge characteristics have been related to tool wear or length of cut. The possibility of reducing tool wear due to electrical discharge may exist.

Tooth geometry for industrial band- saws has been examined for wood and wood products. Generally, industrial bandsaws for furniture parts are primarily left over from the metal working industry. Wood products require higher rake (hook) angles and lower clearance angles. The results need to be summarized and published.

Proprietary tests have also com- pared the tool forces (tool wear) among various types of wood com- posites. Tool forces have been related to edge recession with a straight line. These same turning type tests have also compared tool materials, and adhesive formula- tions, which in turn improved tool life. Studies are continuing in all of these areas independently and for individual clients.

Studies have shown that high tem- perature oxidation and corrosion are a major cause of tool wear

when machining dry wood and wood products. Refrigerated air to reduce tool wear when machining MDF will be tested in the near future. Refrigerated air should reduce the knife edge temperature for an interrupted cut such as saw- ing or routing.

Graduate students and student workers have been and will be uti- lized for the current and future wood machining research. Three electrical engineering graduate stu- dents have worked with the electri- cal discharge. More students will be utilized in the omprehensive wood machining program at the FPL.



### VISIT OUR WEBSITE FOR RECENT INFOR- MATION ON RESEARCH, PUBLICA- TIONS, AND STUDENTS

Department of Forest Products Information:  
<http://www.cfr.msstate.edu/forestp/fphome.htm>

Forest and Wildlife Research Center Information:  
<http://www.cfr.msstate.edu/fwrc/fwrc/htm>

Research Advances:  
<http://www.cfr.msstate.edu/fwrc/publications/advances/forestp.htm>

Publications:  
<http://www.cfr.msstate.edu/databases/abstract/search.asp>

Theses and Dissertations:  
<http://www.cfr.msstate.edu/fwrc/publications/theses/forestp.htm>

Student Resumes:  
<http://www.cfr.msstate.edu/forestp/undergrad.htm>

# FREE CHOICEFRAME™ FURNITURE DESIGN SOFTWARE AVAILABLE

Bob Tackett


CHOICEFRAME™ Furniture Design Software is intended to be a joint-by-joint frame strength tool. It allows the user to highlight joints of interest, pick a joint style, change fasteners, materials, and dimensions and to get an approximate joint strength. The premise is that the FNAE-80-214A tests stress primary joints for each test. Designing joints to withstand this stress should help the manufacturer create a frame that will most probably pass the test, reducing product development time.

The software was developed by Bob Tackett at the Forest Products Laboratory, Mississippi State University in conjunction with Weyerhaeuser Company. The software is available at no charge. Three free training seminars have been held recently to demonstrate how this program can work for you. To learn more about how to obtain this software, please contact Amy Garrard at (662) 325-8453.



Dr. Jilei Zhang consults with attendees at a ChoiceFrame™ Furniture Frame Design Seminar.

**Latest Numbers**  
MISSISSIPPI  
*From Miss. Employment Security Commission, Mississippi Labor Market*



**AVG WEEKLY EARNINGS - FURN & FIXTURES:**  
\$489.24 - December, 2000

**MS NUMBER OF EMPLOYEES FURN & FIXTURES:** 30,700 - December, 2000.

NATIONAL  
*From U.S. Depart. of Labor, Bureau of Labor Statistics, December 15, 2000*

**CPI:** + 0.2% in December 2000

**UNEMPLOYMENT RATE:** 4.0% in December, 2000, Unchanged

**PAYROLL EMPLOYMENT:**  
+ 105,000 in December, 2000

**AVERAGE HOURLY EARNINGS:**  
+ \$0.05 in December, 2000

**PPI:** +0.1% in November, 2000, Unchanged in December, 2000

**PRODUCTIVITY:**  
+3.3% in 3rd Qtr of 2000

**U.S. IMPORT PRICE INDEX:**  
-0.5% in December, 2000

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DO YOU KNOW SOMEONE WHO WOULD LIKE TO RECEIVE THIS NEWSLETTER?  
LET US KNOW!

DO YOU HAVE INFORMATION OR COMMENTS THAT YOU WOULD LIKE ADDED TO OUR NEXT ISSUE?  
LET US KNOW!

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## Recent Publications

Borazjani H, SV Diehl, HA Stewart. 2000. Composting of furniture manufacturing wood wastes and phenolic-bonded softwood plywood sawdust. In: Proc., XXI IUFRO World Congress. Kuala Lumpur, Malaysia. August 7-12, 2000. 19 pp.

Borazjani H, SV Diehl, HA Stewart. 2000. Composting of Wood Wastes: Plywood and Sawmill Residue. Forest and Wildlife Research Center, Research Advances 5(1). 4 pp.

Bumgardner, MS, RJ Bush, CD West. 2000. Beyond yield improvement: Selected marketing aspects of character-marked furniture. Forest Products Journal 50(9):51-58.

Seale, RD, AW Garrard, D Motsenbocker, 2000. Mississippi Furniture Export Study, Research Report.

Steele PH, L Kumar, R Shmulsky. 2000. Differentiation of knots, distorted grain, and clear wood by radio-frequency scanning. Forest Products Journal 50(3):58-62.

Steele PH, MD Patton. 2000. A thermal recognition system to identify knots in wood. In: Proc., American Society of Non-Destructive Testing. Birmingham, AL. March 27-31, 2000. P. 75.

Steele PH, JE Cooper. 2000. Creating a value-added product by finger jointing green wood waste. In: Proc., Wood Technology Clinic and Show Conference. Charlotte, NC. September 14-16, 2000. 8 pp.

Steele PH, C Boden, PA Araman. 2000. ECHO: Machine Feasibility Program. In: Proc., 28th Annual Hardwood Symposium. May 11-13, 2000. Davis, W. V. National Hardwood Lumber Association. Memphis, TN. Pp 53-57.

Steele PH, MD Patton, JE Cooper. 2000. Factors influencing differential thermal response of knots and clear wood. In: Proc., 12th International Symposium on Nondestructive Testing of Wood. University of Western Hungary, Sopron, Hungary. September 13-15, 2000. Pp. 403-412.

Steele PH, JE Cooper. 2000. Estimating strength properties of lumber with radio frequency scanning. In: Proc., Fourth International Conference on Image Processing and Scanning of Wood. Mountain Lake, VA. August 21-23, 2000. Pp. 65-73.

Steele PH, M Patton, J Cooper. 2000. A thermal recognition system to identify knots in wood. In: Proc., Wood Technology Clinic and Show, Portland, OR. March 15-17, 2000. Pp. 255-266.

Steele PH, F Quin, Jr., JE Cooper. 2000. Infrared detection of knots in southern yellow pine lumber heated with radiant heat. In: Proc., Eleventh International Symposium on Nondestructive Testing of Wood, pp. 57-62.

Steele PH, JE Cooper. 2000. Estimating lumber strength with radio frequency scanning. In: Proc., 12th International Symposium on Nondestructive Testing of wood. University of Western Hungary, Sopron, Hungary. September 13-15, 2000. Pp. 343-348.

Wiltcher D., H Borazjani, SV Diehl, HA Stewart. 2000. Composting of phenolic-bonded softwood plywood waste. Forest Products Journal 50(10):82-85.

Zhang, J, FC Lin, C Eckelman, H Gibson. 2000. A structural design model for sofa seat frames equipped with sinusoidal-type springs. Forest Products Journal 50(3):49-57.



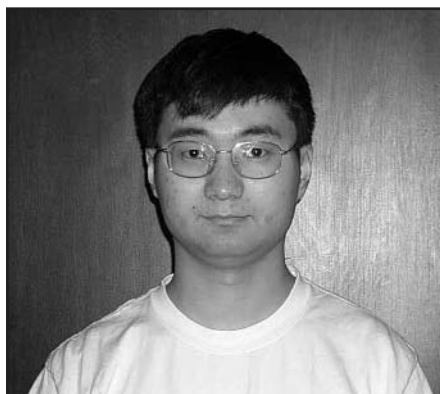
## A LOOK AT OUR STUDENTS

Each issue of Furniture Highlights will profile a graduate or undergraduate student at the Forest Products Laboratory. This feature will tell you about a student's background, research goals, and future plans.

This issue features Gan Li from Nanjing, China. In 1997, Gan Li received his B.S. degree in furniture design and manufacturing from Nanjing Forestry University in Nanjing, China. Gan has worked as a furniture designer and has been involved in consumer marketing surveys while working at Zhuhai Logic Enterprise Co., Ltd., in the Nanjing sales office. He is currently working on his Master of Science in Forest Products at the Forest Products Laboratory under the direction of Dr. Jilei Zhang.

Gan Li's research project is determining fatigue properties of dowel joints subjected to direct withdrawal and bending forces. At this time, testing of direct withdrawal strength of single-pin dowel joints has been completed, testing of static bending of two-pin dowel joints has been completed and half of the fatigue testing of two-pin dowel joints has been completed. Gan plans to complete his research by August, 2001. Gan has expertise in AutoCAD, SAS, office software, and C and C++. He is familiar with the business environment on both sides. His academic background and work experience in the furniture industry has prepared him for furniture trading business between the United States and China. He plans to work in this business after he graduates.

For more information on Gan Li and his research, please phone him at 662.325.3097 (office) or 662.324.0983 (home). His email address is g18@ra.msstate.edu.



Gan Li, Graduate Student  
Department of Forest Products,  
Mississippi State University

# FURNITURE RESEARCH

## Research On Fatigue Behavior of Upholstered Furniture Joints

*Jilei Zhang*

Current methods for designing upholstered furniture frames are slow and expensive. Computer-aided furniture frame engineering is still typically relegated to the drafting stage, and advanced design methods such as simulation and testing have not been incorporated into the furniture engineering design process because important information about design loads and frame component strength properties is lacking.

Fatigue strength is one area where information is especially needed for the proper design of joints in upholstered wooden furniture. This is especially pertinent now as more plywood and engineered composite products are being used for frame structural materials.

To assist manufacturers in designing durable upholstered furniture, research into the fatigue behavior of joints has been initiated at Mississippi State University's Furniture Research Unit. One set of trials is evaluating the fatigue behavior of the most frequently used upholstered furniture joints, and we intend to use the data to develop methods to evaluate and predict their fatigue life. The results of this research will help furniture manufacturers incorporate engineering design software into their product development cycles and allow them to take advantage of advanced design application features that can cut material costs and significantly shorten the product development cycle. In addition, the results will provide the scientific basis for the standardization of fur-

niture joint performance tests and help the furniture industry establish quality assurance programs and standards to improve product performance, quality and reliability.

## More Numbers...

### Housing Starts

Privately owned housing starts were virtually unchanged in December, 2000 from the revised November rate of 1,570,000 according to a report released January 18, 2001 by the U.S. Commerce Department's Bureau of the Census. Current housing starts are 11 percent below the December 1999 rate of 1,769,000.

Look for the Furniture Research Unit's Booth at the Tupelo Furniture Supply and Woodworking Show.  
 March 29-30, 2001  
 Booth Number F8

Tooling for the Secondary Wood Manufacturing Industry  
 April 20, 2001  
 North West Shoals Community College  
 Phil Campbell, AL 35581  
 Contact: Bruce Jackson  
 256.331.6389



## Lean Manufacturing Seminars

Duane Motsenbocker, Management Specialist, recently conducted lean manufacturing seminars for supervisors and managers at Ashley manufacturing facilities in Ecu and Ripley, Mississippi. According to Motsenbocker, Ashley is aggressively pursuing value added manufacturing processes including lean techniques. The seminars included an overview of lean manufacturing and examples of specific application in a furniture manufacturing environment.

The Ashley seminars were a continuation of the 2000 Lean Manufacturing Conference coordinated by Motsenbocker in September 2000. Other furniture manufacturers who are interested in learning more about lean techniques and future activities in this area should contact Motsenbocker at 662.325.2160 or e-mail at [duanem@ext.msstate.edu](mailto:duanem@ext.msstate.edu).

## Coming Soon ....

- ◆ Material Use in Upholstered Furniture Manufacturing in Mississippi
- ◆ RIP-X Software Applications
- ◆ Report on Students Trip to High Point Furniture Market

# Student Internships

*Martha J. Wilson*

Forest Products students are encouraged to work as interns with participating companies during the summer months to help students gain practical experience in their job field before graduating. In the last few years, this effort has resulted in a win-win situation for both students and sponsoring companies. Many of our students, both graduate and undergraduate, have completed summer internships with companies such as Packaging Corporation of America, Columbia Forest Products, Bassett Furniture, Champion International, Louisiana-Pacific Corporation, Georgia Pacific Corporation, ISK Biocides, McShan Lumber Company, and Williamette Industries. If you would like to offer a summer internship for a Forest Products student, please contact Martha J. Wilson at 662.325.3127 or [mwilson@cfr.msstate.edu](mailto:mwilson@cfr.msstate.edu).

*Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, disability or veteran status.*



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## STUDENT NEWS AND ACTIVITIES

The Forest Products Society is an international non-profit educational association founded in 1947 to provide a common forum for all segments of the forest products industry. The FPS encourages the development and application of new technology and provides a link for technical interchange between research and industry. The Student Chapter of the Forest Products Society at the Forest Products Laboratory is a very active chapter. Monthly meetings are held at the FPL and student and faculty members are invited to attend.

### Current FPS Student Chapter Officers:

Kimberly Tarlton - President  
David Hennington - Secretary

Randy Whitaker - Vice President  
Yawanna Nabors - Treasurer

### Recent Activities:

- Construction of Paper Making Kits for all teachers who attended the Wood Magic Science Fair™ (WMSF). Kits sponsored by the Sustainable Forestry Committee of the Mississippi Forestry Association.
- Responsible for the Soft Drink Trailers at the WMSF and worked at various events throughout the Fair.
- Participated in MSU Discovery Day.
- Fall Fling - annual fall pot-luck get-together for faculty, staff, students, and industry friends.

### Upcoming Activities:

- Trip to High Point Furniture Market, April 20-22. Jointly sponsored by the Department of Forest Products and the College of Business & Industry.
- Spring Fling Annual get-together.
- Participate in the Society of Wood Science and Technology Poster Competition, June 24, 2001, Baltimore, MD.
- Attend the International Annual Forest Products Society Meeting in Baltimore, MD, June 24-27, 2001.

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