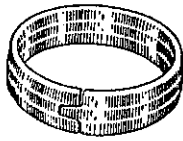


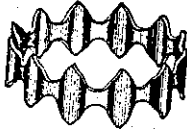
A BRIEF HISTORY OF THE TIMBER ENGINEERING COMPANY

The Timber Engineering Company is a research affiliate of the National Lumber Manufacturers Association. Some description of the Association is necessary to understand the development of the Timber Engineering Company. It is a federation of regional or species lumber manufacturing associations. Since its organization in 1902 it has been concerned with problems and services universal in the lumber industry.

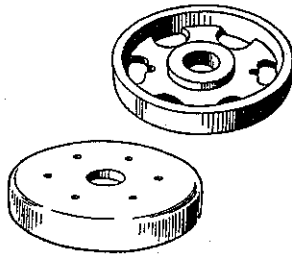
During the late 1920's an increasing interest in trade promotion was evident in the activities of NLMA. This activity was finally identified as American Forest Products Industries, Inc. Subsequently AFPI was established as a subsidiary corporation. AFPI was organized to carry on promotion work that related to all forest product industries rather than being limited to lumber. However, in the field of promoting lumber sales, one of the first efforts was the establishment of the Timber Engineering Company. TECO was to encourage the use of lumber in engineered construction, primarily through the development and sale of improved timber connectors. The Timber Engineering Company was incorporated in 1933 and purchased the patents for the split ring connector. Since then TECO has built up a whole family of special timber connectors, Figure 1.



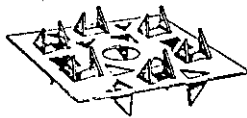
Split Ring



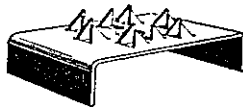
Toothed Ring



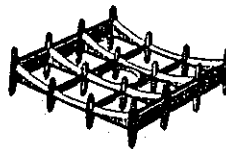
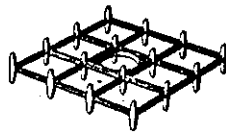
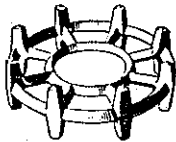
Shear Plates



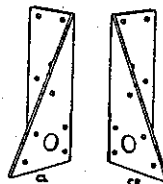
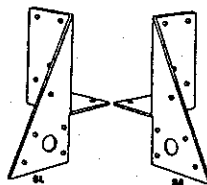
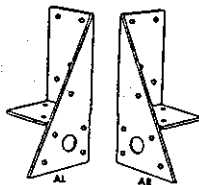
Clamping Plate



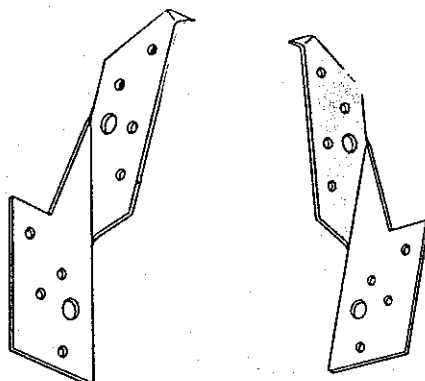
Bridge Tie Spacer



Spike Grids



Trip-L-Grips



Dual-Clips

Figure 1. TECO Connectors

In 1942, AFPI undertook the establishment of a separately financed public relations program designed to correct public misapprehensions concerning the nation's timber supply and related matters. This program was so successful that, in 1945, it was decided to transfer all other AFPI programs, including TECO, to NLMA and separate the two organizations in order that AFPI might have a freer hand in further development.

In November 1942, the NLMA Board of Directors asked the staff to develop a plan for more comprehensive activity in the field of product research and development. A list of more than 400 specific research projects that had been suggested through the years by associations, lumber companies, and individuals, was compiled. In March, 1943, a program of research and development was initiated. The Timber Engineering Company was to establish a laboratory in or near Washington. The location was specific so that the lumber industry could provide services for the federal government agencies to work out methods for the satisfactory use of wood. Initial activities financed by the Timber Engineering Company were to follow the lines of the work that had been done in the preceding decade, such as, new methods for connecting wood, glues, laminating, and developing engineered timber designs for construction. The program included, in addition, study of wood sugar production, pulp and paper manufacture and fundamental research on lignin. In 1944, the laboratory was operating on this basis.

The first industry sponsored program at the TECO Laboratory was inaugurated in 1944. The hardwood industry identified eight specific projects within the Hardwood Research Program. A governing committee was established and funds provided by the various hardwood associations. The program was continued for about twelve years and some of the outstanding results were:

Military Truck Bodies were designed and constructed to meet all requirements of the Department of Defense. They were constructed entirely of wood and utilized metal only for fastenings.

Fersolin was a soil conditioner intended to use sawdust as raw material. It is made by a practical chemical process now in pilot plant production and undergoing extensive field tests by the licensee.

Fiberboard manufactured of hardwood pulp was a development which included a unique pulping process and a process for making a wood jell which was highly efficient as a fortifier or binder in the fiberboard.

Milpak was a hardwood grade of re-work lumber which might be described as semi-dimension. Briefly the process is one of removing the portions of hardwood lumber which are objectionable for furniture use and sorting and bundling the relatively clear useable portions of the lumber. Milpak is now a grade recognized by the National Hardwood Lumber Association.

Beautyguard was a system of furniture top construction incorporating an aluminum foil under the face veneer with special varnishes to make the surface resistant to deterioration by cigarette burns, alcohol, nail polish and other usual household chemicals and solvents. The process is now being promoted by the Fine Hardwoods Association.

In 1945, a joint committee of lumbermen and railroad people established a program for improving the service life of railroad crossties. Investigations included tie coatings to reduce the effect of weathering, systems of toughening the tie plate area, the deterioration of wood in the presence of iron, and the practicality of manufacturing laminated railroad ties. This program is still underway on a modest scale. One outstanding development was a process for accomplishing seasoning of green railroad ties in combination with preservative treating process. An experimental production of these ties are now being tested in service by a Class 1 railroad.

From this beginning the volume of work at the TECO Laboratory gradually increased. Referring to the Graph, Figure 2, you will notice TECO felt the impact of the Korean War as did the rest of the economy.

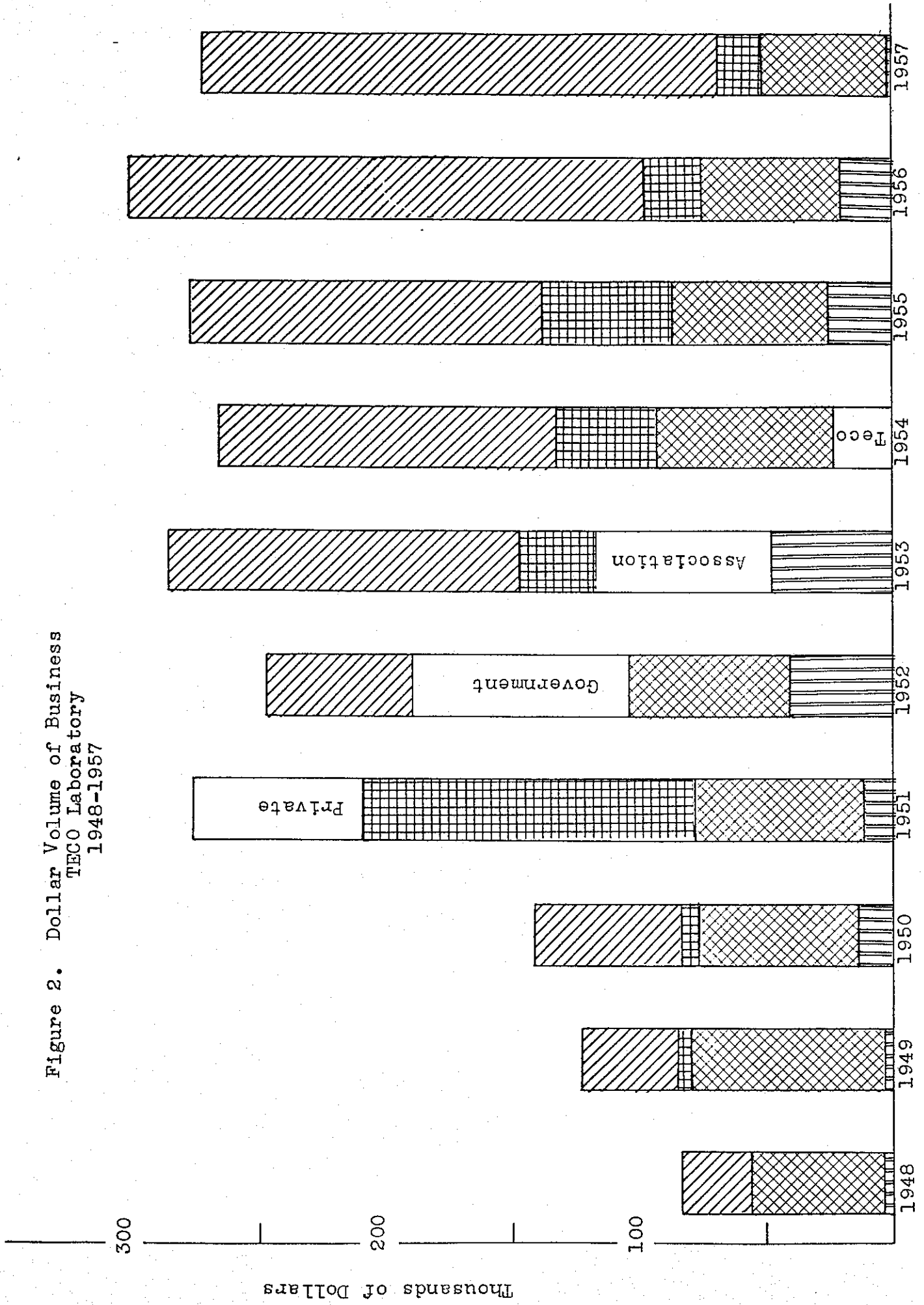
In 1951, the Army Corps of Engineers placed a very large contract to study means of storing lumber and wood products for emergency use and review of military specifications for the practicality of requirements for wood.

LABORATORY OPERATIONS

(Fiscal years 1944 through 1950. Data does not include expense of 9/1 - 11/30/43 of \$19,484 against which there was no income.)

	<u>INCOME</u>	<u>EXPENSE</u>	<u>PROFIT OR LOSS</u>
1943	0	\$ 17,810.96	- \$ 17,810.96
1944	\$16,102.08	70,474.76	- 54,372.68
1945	45,724.37	69,927.22	- 24,202.85
1946	83,047.35	95,653.00	- 12,605.65
1947	96,060.76	99,803.86	- 3,743.10
1948	116,322.49	120,978.10	- 4,655.61
1949	137,832.89	135,558.86	+ 2,274.03
1950	<u>127,487.92</u>	<u>143,926.88</u>	- <u>16,438.96</u>
	\$622,577.86	\$754,133.64	- \$ 131,555.78
1951	<u>205,410.31</u>	<u>194,096.93</u>	+ <u>11,313.38</u>
	827,988.17	948,230.57	- 120,242.40
1952	<u>219,873.87</u>	<u>221,787.65</u>	- <u>1,913.78</u>
	1,047,862.04	1,170,018.22	- 122,156.18
1953	<u>249,774.56</u>	<u>250,586.58</u>	- <u>812.02</u>
	1,297,636.60	1,420,604.80	- 122,968.20
1954	<u>270,034.01</u>	<u>263,226.31</u>	+ <u>6,807.70</u>
	1,567,670.61	1,683,831.11	- 116,160.50

Figure 2. Dollar Volume of Business
TECO Laboratory
1948-1957



Simultaneously U. S. Navy fleet requirements stimulated a large mine sweeper design and construction program. Because it was non-magnetic, wood was a favored construction material. The MSO Class, for instance, was constructed of steel in World War II but converted to wood in 1950. A family of sweepers evolved which required extensive research and development in adhesives, preservatives and connectors.

These two programs practically doubled the laboratory activity and for the succeeding five years a comparable high level of business was maintained.

In that period the volume of combined business from the TECO Connector Department, association work and government contracts has declined. This decline has been offset by a gradual increase in business from individual companies or groups of companies. In 1955, a large proportion of business from private sources was secured by the first project surveying waste utilization processes. This was equally successful in 1956, principally because of the great interest in particle board manufacture. Early in 1957, the new particle board pilot plant was in operation and accounted for a large share of contracts with private business. In 1957, the laboratory began to feel the effects of the general business recession and these effects have continued into 1958.

Regarding the scope of technology involved in the foregoing business no patterns or trends have been observed. In reviewing the nature of the various projects since the laboratory started operation the following 44 categories was the minimum number that seemed appropriate for classification:

Adhesives	Paints
Adhesive Uses	Particle Board
Building Construction	Plywood
Chemistry	Preservatives
Construction Components	Preservative Processes
Containers	Quality Control Equipment
Dimensional Stabilization	Quality Control Methods
Doors	Residue Utilization
Electronics Processes	Sealers & Moisture Repellents
End and Edge Gluing	Seasoning
Fasteners	Special Inspection
Fiber Processing	Specifications and Grades
Finishes	Stains
Fire Retardants	Training Programs
Flooring	Timber Testing
Furniture	Ultrasonics and Non-
Impregnation & Coating	Destructive Tests
Processes	Utilization Surveys
Ladders	Vehicles
Laminated Wood	Vessels
Laminating	Windows
Market Studies	Wood Processing
Molded Products	Wood Properties

Picking one topic at random in the field of building construction, we found projects bearing the following titles:

Strength Tests of Prefabricated Construction
Testing Parts of Army Shelters
Inspection of Roof Trusses
Engineering Analysis of Lureco Truss Rafter
Evaluation of 24°, 4:12 Slope Truss
Evaluation of Pole Structures
Testing Built-up Wood Girders
Consultation on Condition of Wooden Building
Vertical Deformation Between Joists & Headers
Test of 3 in 12 Slope TECO Trussed Rafter
Testing of 1½ Story House Frames
Pilot Tests on Spaced Columns
TECO Arch Frame
Low Slope Trussed Rafter Test
Full Scale Truss Test
Construction of Model Home
Study of Effect of Air Conditioning on Condensation
 in Buildings
Engineering Analysis of Prefabricated House Segments
Modular Foundation of Wood Construction
Construction of a Model Multi-package Shelter
Construction on Dye House Roof
Low Slope Tied Rafter Tests

You will note that this list is limited to building construction and several other items, such as, fasteners, construction components, paints, timber testing, etc., have been separated.

Gradually our system of securing and executing laboratory contracts has evolved into the present system. Reaching the potential client is accomplished by four means - publicity, advertising, direct mail and personal contact.

Advertising is relatively modest, usually less than a full page appearing in approximately 5 trade journals. Publicity amounts to 30 to 40 news releases a year. Direct mail consists of a special mailing each month and in addition, about 6 issues of Wood Research which is a series of reprinted articles by the laboratory staff. Personal contact is currently being done principally by two full-time field representatives, one operating East of the Great Plains and the other on the West Coast. In addition, other staff members make personal contacts according to their specialties.

Where a company or organization indicates interest in research or development of any sort, it is classed as a prospect and a file is established to insure timely follow-up. In the course of following-up with a prospect we strive to identify the prospect's requirements as precisely as possible. In many cases the establishment of the project moves rather swiftly and a proposal is sent outlining as specifically as possible the objective, proposed procedure, expected accomplishments, and estimated time and costs. Shortly thereafter we press for a decision regarding the proposal. If a prospective client rejects the proposal usually

the file is closed and subsequent contact is only as it is convenient in conjunction with other work.

If the prospects accepts the proposal, either as written or modified according to his reconsideration, the project is established at the laboratory. The entire file on the project is turned over to the laboratory and the project is assigned to a technologist or staff member as Project Manager. He proceeds immediately to carry out the work described in the proposal as it was finally accepted. A Project Manager may work on one or as many as a dozen projects at any one time, interlocking the work in order to keep himself and other staff members fully employed on productive studies.

The laboratory organization is extremely flexible and technicians, assisting personnel and staff members are shifted from project to project in the interest of efficiency. Maximum use is made of skills and specialties in these assignments, although, usually a technologist has a considerable variety of experience by the time he has worked at the laboratory only a few months.

The end product of our effort is most commonly a report which is rendered to the client as promptly as possible after the completion of the work. Occasionally a letter suffices for this purpose but usually the client wishes an illustrated, multilithed report in numerous copies. Report preparation is a substantial portion of our laboratory work, usually amounting to about 20 percent of the total project effort. In some cases the laboratory work also calls for the delivery of proto-types, samples, specimens or other exhibits. Invariably these are in addition to the report.

July 22, 1958

TIMBER ENGINEERING COMPANY