# New Life Community Church

Oshkosh, Wisconsin

















### Structural Glued Laminated Timber

### Andreas J. Rhude

President Sentinel Structures, Inc. Peshtigo, Wisconsin





#### Structural Glued Laminated Timber

• Assembly of dimension lumber bonded with adhesives to form a cohesive member.

• Grain of laminations is oriented in the same direction.



















RF generator for curing adhesive in glued finger joints





Blue-Green dye sprayed on joint after successfully passing thru Proof Loader















## Full sized PATTERN on top of billet









### Max Hanisch, Sr. 1882 - 1950



#### Otto Karl Friedrich Hetzer

#### 1846 - 1911

Hanisch receives commission to design new gymnasium – auditorium for Peshtigo School in early 1934.

Wants to utilize glued laminated timber arches.....but where can they be obtained?


## Ted Thompson, Sr.

(upper right) School Board Member

Partner Thompson Bros. Boat Mfg. Co.



Max Hanisch, Sr. and his two sons Max, Jr. and Herbert

along with

Peter, Christ, and Ted Thompson (brothers)

Form partnership and a new corporation to design and manufacture **glued laminated** arches and beams in July 1934



## Unit Structures, Inc. is the FIRST manufacturer of structural glued laminated timber in North America













## Peshtigo School Gym – Auditorium

## 4 spans of three-hinged arches

64 feet clear span











EXTERIOR VIEW of the same building showing test load (150% overload) consisting of 315 sandbags weighing 31,500 pounds placed above a UNIT arch for a period of 18 months.



Full scale destruction tests of arches at the FPL. Arches made in Peshtigo





The FIRST technical guide for glued laminated timber in the world.

Published by Forest Products Lab in 1939

Cooperative research between FPL and Unit Structures, Inc. is credited



Florence Town Hall - designed by Max Hanisch, Sr. Built 1936 - 1937

### **Florence Town Hall**

Designed by Max Hanisch, Sr.

Built 1936 - 1937

Glued laminated timber arches made by Unit Structures, Inc. of Peshtigo, WI





#### MANUFACTURERS OF MODERN WOOD ROOF CONSTRUCTIONS

December 1, 1936

Wis. Industrial Commission State Office Bldg., Madison, Wis.

> Re: Plans for Community Building for the Village of Florence, Wisconsin. Plan File: 30-B-74

Gentlemen:

Under separate cover we are sending you two sets of shop drawings and stress analysis for this project, and we are enclosing the specifications.

Very truly yours,

"UNIT" STRUGTURES INC. BY Striedman

ASF:0 Enc.-Specifications Unit Structures letter to state of Wisconsin seeking approval of arch shop drawings

December 1, 1936



Village Hall Donnelly, MN



## Beardsley, MN Built 1936

## Browns Valley, MN Built 1936









#### A Departure From Conventional Design In Church Architecture

For those with a greater appreciation of modern design, the history of St. Austin's Church and Parish House in Minneapolis, Minnesota, should prove interesting because St. Austin's is a modern church! St. Austin's represents the first church of its type in America!

One day Father James J. A. Troy was called by His Excellency, John Gregory Murray, Archbishop of St. Paul, only to be told that he had been appointed the first pastor of the newly formed St. Austin's parish. The map of Minneapolis was soon spread between the two, and the Archbishop indicated the boundaries of the new parish. It was then Father Troy's job to select a site, decide on the design and construction of the new church.

While on his travels abroad, Father Troy had been very much impressed with a number of modern churches with parabolic vaulting. He had seen these in Germany, France and Holland. In his extensive travels through the Orient, especially in India, he had developed a liking for Oriental forms of architecture.

After consultation with the architects, Bard and Vanderbilt, Minneapolis, the design of the church was determined upon . . . and that design has since been transferred from plans and sketches, into the St. Austin's church we see here.

### World War II

Great Lakes Navy Base





### World War II

## US Army DRILL HALL

### Aircraft Hanger

### Hagerstown, Maryland

### World War II



The Fairchild hangar contains many innovations in construction plus some new uses of pre-war building practices. The bottoms of the arches are joined by 1" rods. Strips of 1" x 8" yellow pine, laminated and glued, form huge arches. Each arch has 48 of these strips, which were built up as a unit from the inside radius to the outside in large jigs. Each arch consists of four sections which are butt-joined and held in place by four metal splice plates 5/16" thick. The maximum height of the arches is 48 feet along the center of the building. Arches are placed 10 feet apart and are covered with 2-inch tongue-and-groove lumber, which in turn is surfaced with asphalted sheets, gravel-finished for protection.

Wood studs, size 2" x 6", frame the sides of the building, are covered with vapor-sealed insulation board. Asbestos sheets,  $\chi''$  thick, butted along vertical joints and lapped horizontally, form the outside surface of the sides.

Horizontal wind and racking loads are taken up by a large truss built into the foremost bay of the hangar. To the bottom of this truss at the front are attached the door guides. The doors, designed by Fairchild engineers, are each 17' x 27' and are made of a series of  $\frac{3}{2}$ " x 5 $\frac{5}{2}$ " vertical and horizontal members, covered by  $\frac{3}{2}$ " by plwood, glued and nailed to both sides of the frames. Doors operate on rollers over tracks embedded in the concrete floor and are manually opened and closed. When open, the eight doors are in "pockets" at either side of the front of the building. Ten red obstruction lights are placed along the roof and on the top sides of the hangar.

A concrete apron in front of the building,  $170' \times 130'$ , is used as a storage and service location. It has steel tiedown rings embedded in cement and outlets for electric current.

This type of construction uses less material in the roof support and permits a greater span.

Photos on facing page: top, completed hangar; bottom, structure nearly complete. This page: top, erecting the laminated wood arches in four sections each; center, roofing of 2-in. tongued-and-grooved lumber being placed on the arches; bottom, rigid truss in front bay to take wind and racking loads.



172 feet clear spanBomber Modification CenterSt. Paul, MNBuilt 1942















100 feet clear span three-hinged arches Columbus High School - Marshfield, WI



Formation of AITC in 1952

Max Hanisch, Jr. is third from left





# Beam test


Left: Tom Jones of Unadilla Right: Bob Eby of Rilco **Research and** development via AITC



Glued laminated timber hardwoods for use in ship construction

Minesweepers







Eagle River Bridge Keweenaw Peninsula, Michigan

#### 90 feet arch span















## MASS TIMBER

## is just a rebranding

# of Engineered Timber



1,000 year old MASS TIMBER

## Borgund Stav Kirke Norway





## Maihaugen Open Air Museum

### Lillehammer, Norway





## Cross Laminated Timber (CLT)







Mjostarnet - Brumendal 18 story timber framed building



The next chapter

Proposed "Ascent" Milwaukee Tall Timber Structure

21 story - approved by Milwaukee City Council

#### STRUCTURAL GLUED LAMINATED TIMBER: HISTORY OF ITS ORIGINS AND DEVELOPMENT

A MAJOR PAPER SUBMITTED TO THE FACULTY OF THE HISTORY DEPARTMENT OF THE UNIVERSITY OF MINNESOTA

BY

ANDREAS JORDAHL RHUDE

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

WINTER 1995

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