



UNIVERSITY OF THESSALY

Department of Forestry, Wood Sciences & Design

LABORATORY OF WOOD SCIENCE & TECHNOLOGY

Head: Professor Dr. George I. Mantanis, FIAWS, PhD

Griva str. 11, GR-43100, Karditsa, Greece | tel. +30 6947 300585, e-mail: mantanis@uth.gr

Skype: g.mantanis | URL: https://www.researchgate.net/profile/George_Mantanis

Karditsa, 11-02-2022

To: **EUROCO S.A.**, Thessaloniki, Greece

Report

Upon your request, I visited your facilities at your production company EUROCO S.A. - which is based in the Industrial Area of Thessaloniki, Greece - and personally I carried out a thorough inspection of the overall production units therein.

My visit was realised on Thursday, 10th of February 2022. On that day, I was provided with documents, according to the EN 14080, and I also collected all data to write this report, which contains specific technical information regarding the facilities, equipment and quality system at EUROCO S.A. Noticeably, the company in year 2014 (specifically on 18th Aug. 2014) had been accredited with a quality certification from **MPA – Stuttgart** (certification Nr. 0672-CPR-0352), which verifies that operates according to the requirements of the European standards.

Verifying the present report,

Prof. Dr. George I. Mantanis

Wood scientist · University of Thessaly (Greece)

Elected Fellow · International Academy of Wood Science (IAWS)

Google Scholar® citations: >1,920 · h-index: 21

URL: <https://scholar.google.com/citations?user=rFT6H-wAAAAJ&hl=en>

Academic website: <http://mantanis.users.uth.gr>

Report

of the inspection in the production facilities of EUROCO S.A. (Thessaloniki, Greece) which produces glue laminated timber (glulam)

1 Introduction

The current report contains technical information of the production unit at EUROCO S.A., a reliable Greek glulam manufacturer for more than 30 years, which since the year 2014 holds the accreditation (MPA – Stuttgart) for the standard EN 14080, for the factory production control. The purpose of the report was to record the production parameters applied today (as recorded in the date of the visit; 10th Feb. 2022). As in the past 30 years, the company EUROCO S.A. itself ensures that the on-brought to market products (Glulam) do match the specified performance characteristics according to the European standards.

2 Organisation of the company

As shown in the Appendix, the company has a reliable organizational structure. This was shown to me, and in the listed Table 1, all the responsibilities and authorities of the working staff, responsible for the production parameters, is fully exhibited.

Also, in the Appendix, a site plan of the buildings and facilities of the company EUROCO S.A. is shown.

3 Machinery and equipment

As shown in the Appendix, the company is **fully equipped** with modern machinery and production equipment. These include all the necessary machinery needed for the production of high-quality glulam products (as it can be seen in the Appendix).

4 Wood and adhesives

Wood species

EUROCO S.A. manufactures glulam from untreated wooden beams originating mostly from the following wood species: i) spruce/fir and ii) pine. The company, as inspected, acquires raw material necessary for the production of laminated wood beams from the following European countries: Austria, Romania & Czech Republic.

Wood drying

As seen, in the case of a delivery of slightly 'higher-moisture' boards (wood moisture on the average >13%), the boards are pulled off and dried in the artificial way (e.g., in the kiln drier).

Wood moisture

In the manufacture of glulam, the moisture content of each untreated lamella is typically low, as it should be. According to my check, with a portable moisture meter *Gahn*, the moisture was recorded to be at the range: 11-12%. This is very positive.

Storage of dry wood

The dry wood is stored in the glulam hall where the minimum temperature is 18°C. It was noticed that the temperature is continuously monitored using a climate data logger.

Sorting of boards

According to the company, the boards seemed to be in accordance with DIN 4074-1. They typically are **visually graded** according to the criteria of grades S10 and S13 and sorted according to EN 1912. Typically the company, as claimed by EUROCO, produces glulam products with strength class C24 or higher than this.

Adhesives used

The orientation of annual rings of lamellae of the glulam seemed to correspond to EN 386.

The adhesive application normally takes place with a coating machine, whose manufacturer is the company *Leimmaschine*. The adhesive used by the company EUROCO, is *Dynea Prefere 4535* and the hardener is *Dynea Prefere 5046*, both are laid on separately. Both the adhesive and the hardener used have the needed qualities and meet the requirements of the standards.

The minimum temperature in the production was at around 18-20°C, and the air relative humidity recorded was less than 65% (i.e., within the standard requirements).

5 Production

Climatic conditions

The minimum temperature in the production hall was 20°C, the relative humidity was at least 50-60%, surely less than 75%. The climate conditions (temperature and relative humidity) are recorded continuously in EUROCO S.A.

Finger joints

The finger joints are perpendicular to the wide side of the lamellae. The jointing profile typically used is 25 mm long (see fig. 2b), has a pitch of 3.8 mm and a zinc base width of 0.42 mm. The adhesive is applied to the milled finger jointing on both ends of the adherents.

Pressing

According to the manufacturer, the laminations coated with adhesive are carried within the open time of the adhesive for stacking before the press. The lamellae are stacked manually. The time between the application of the adhesive on the first lamination and the application of the final compression pressure does not exceed the specified time.

Typically, as claimed, the company uses the following pressures:

- 0.7 N/mm² for lamellae with a thickness of up to 35 mm
- 0.8 N/mm² with lamellae thickness from 35 to 45 mm (with the relief groove)
- 1.0 N/mm² in lamellae thickness of 35 to 45 mm (without relief groove)

Storage after pressing

The beams are not exposed to low temperatures, i.e., below than 15°C.

Planing of the beams

The bonded beams are planed after the final curing of the adhesive. The cross-sectional dimensions are controlled with a caliper or the length with a measuring tape.

6 Quality control

The company has all the quality-control facilities and equipment. It seems that since it is fully equipped, it carries out quality tests for constantly checking the adhesive strength of the finger joints to ensure the adhesive joint quality.

Overall Evaluation

After the technical visit to the facilities of EUROCO S.A., a Greek manufacturer of glulam products for 30 years, I do have the technical opinion that:

-The company, being fully equipped and having the working experience and know-how of >30 years, still **produces high-quality glulam products** according to the European standards.

APPENDIX

Table 1. Responsibilities and authorities of those persons responsible for the production parameters according to the previous certification held (by MPA – Stuttgart)

Operation	Name	Task (according to EN 14080)	Responsibilities (according to EN 14080)
Sorting	Mr. Tzaravas	-Notification of the shift leader for non-acceptance -Notification of the shift leader if some fault in the system	-Incorrect wood species -Too small dimensions of the raw material -Larger deviation of the moisture content Lower wood temperature
Finger jointing	Mr. Polatidis	-Notification of the shift leader in case of failure or stopping the system - Notification of the shift leader if in doubt about jointing strength	-Irregularities to the machine or lamellae
Planning of lamellae	Mr. Teliouis	-Notification of the shift leader in case of failure -Notification of the shift leader when broken laminations	-Irregularities to the machine or lamellae
Adhesive application on lamellae	Mr. Teliouis	-Notification of the shift leader in case of failure -Notification of the shift leader for batch blocking	-Irregularities to the machine or lamellae -Batch blocking in case of doubt of adhesive joints strength
Pressing	Mr. Polatidis	-Notification of the shift leader in case of failure -Notification of the shift leader for batch blocking	-Batch blocking in case of doubt of adhesive joints strength
Post storage	Mr. Mpliev	-Notification of the shift leader in case of failure or stop -Notification of the shift leader for batch blocking	-Irregularities from the machine -Batch blocking in case of doubt of adhesive joints strength
Planning of beams	Mr. Mpliev	-Notification of the shift leader in case of failure or stop of the system	-Irregularities to the machine or beams

		-Notification of the shift leader for batch blocking	
Cutting in final dimensions	Mr. Mpliev	-Notification of the shift leader for batch blocking	-Beam blocking in case of doubt of strength, or bearing capacity of the connection
Labelling	Mr. Kemmenetsidis	-Notification of the shift leader in case of deviations between running and task cards	

Plant management · Shift Leader · Quality manager

Manager	Mr. Ginis (replacement by Mrs. Tousina)	Internal quality system and its implementation	-Refusal of raw material -Batch blocking -Changes in the QS system
Shift leader	Mr. Tsavdaris	Decisions on blocked batches or beams	-Refusal of raw material -Stopping the system due to irregularities on machines or lamellae -Batch blocking
Quality manager	Mr. Tsavdaris	Notification of the shift leader for batch blocking	-Stopping the system due to irregularities in test results -Batch blocking

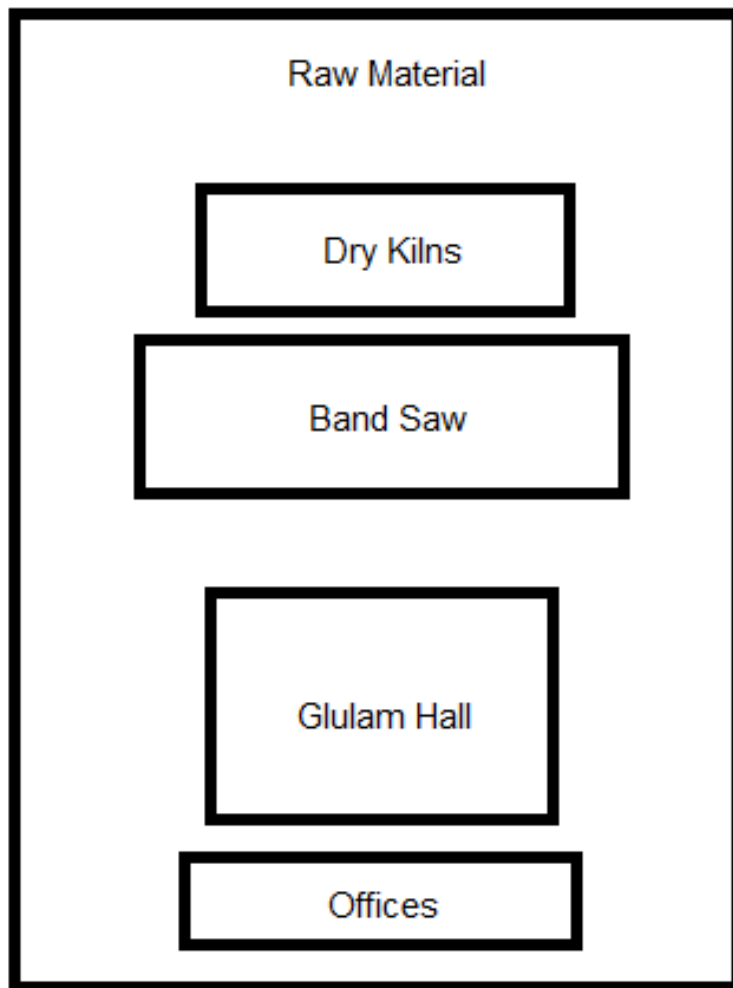


Figure 1. Map of the facilities of EUROCO S.A.



Figure 2a: Machine for making the finger joints.

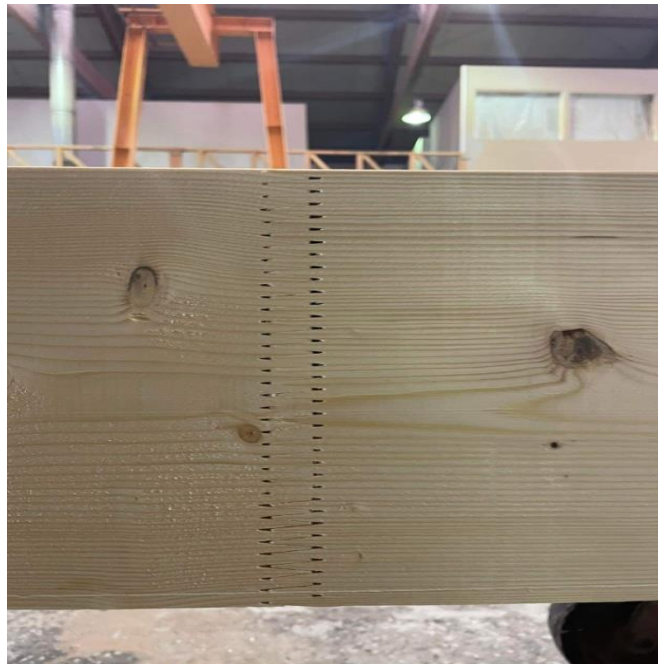


Figure 2b: View of the typical finger jointing between two wood elements.



Figure 3: Plane of the lamellae.



Figure 4: Plane for the finished glulams.



Figure 5a: Press of a length of 30 m.



Figure 5b: Another view of the press of a length of 30 m.



Figure 6: Cutter for the edges of the glulam.

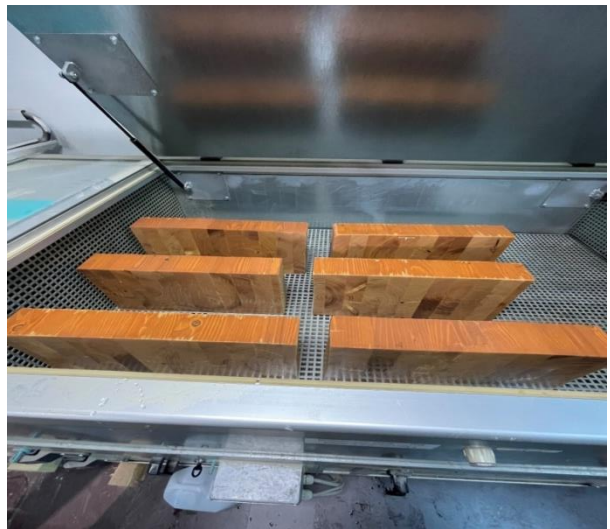


Figure 7: Small glulam samples for QC.



Figure 8: Delamination apparatus machine.



Figure 9: Testing QC machine for glulam samples.