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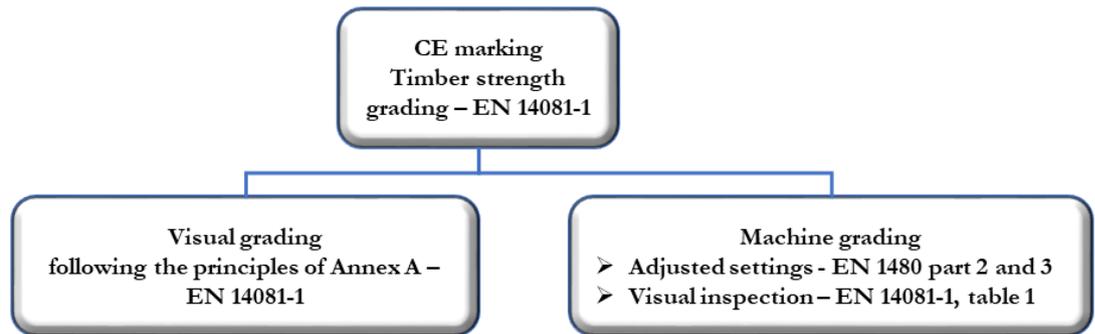
TECH4TIMBER - PROJECT N°38357

Application of machine strength grading to maritime pine timber

<https://www.serq.pt/atividades/investigacao/projetos-em-curso/tech4timber/>

Solid timber—Strength grading options

The use of structural timber with rectangular cross section in the European Market requires CE marking under EN 14081 parts 1 to 3. This standard includes two different strength grading approaches (visual or machine grading).



Until 1995 CE marking of home-grown maritime pine timber was only possible by application of visual strength grading standard NP 4305. The application of this standard only provided two grades C30 and C18, being only the C18 grade approved at the European Technical Committee (CEN/TC124).

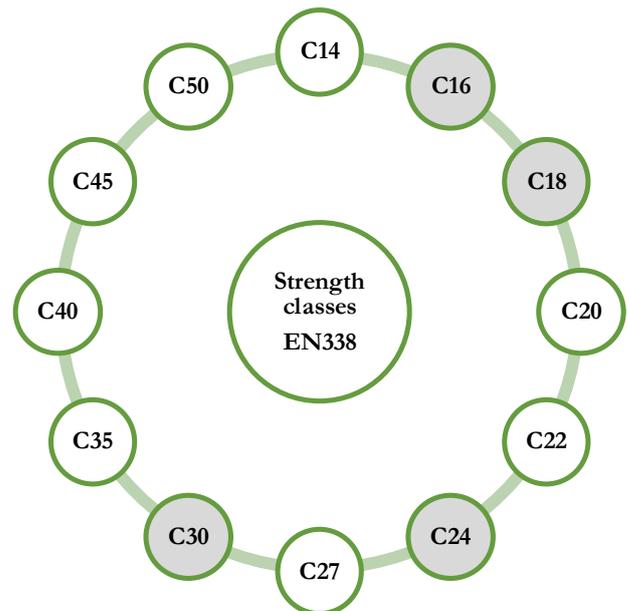
In 2015 a study conducted by SerQ and the University of Coimbra made possible by approval of CEN/TC124 the application of machine machine strength grading technology to maritime pine timber produced in Portugal. This technology allows by changing the machine settings to choose between three outputs (groups of strength classes).

Project aim

The objective of the project is to transfer to the timber industry, CarmoWood, the knowledge and technology developed at the University of Coimbra and SerQ related to timber strength grading and in this way:

- ⇒ demonstrate to the Portuguese construction and retail industry the advantages that the adoption of MTG strength grading can bring,
- ⇒ namely in terms of promoting a more optimize use of the full capacity of timber strength capacity and,
- ⇒ also its ability to be more flexible having in mind the desires of the client (Three different outcomes).

The project is composed of two demonstrators that will be use in events with the intention to show the advantages of this technology. Moreover advance numerical models to support optimize structural design project will also be disclosed.



Grey circles – Strength classes more common

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Portuguese maritime pine timber—advantages of MTG grading

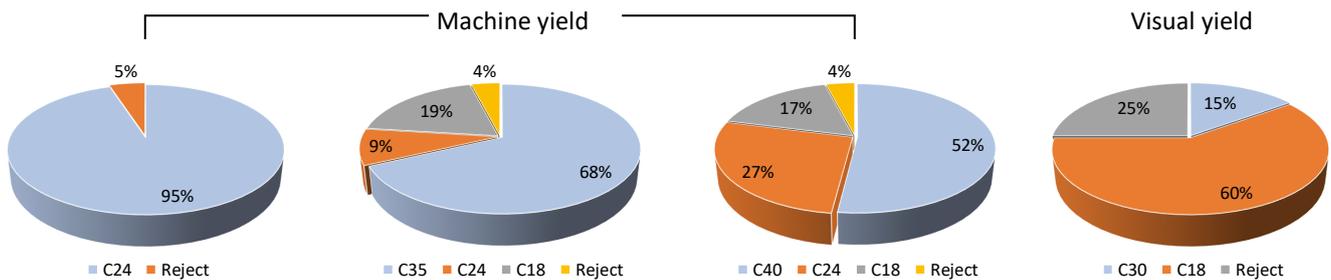
The use of MTG allows to adjust the machine output to the customer's demand. A request of a particular strength class is followed by the choice on the machine settings that could provide the maximum yield.

For maritime pine timber three options can be taken. If for instance the desired is to obtain C24 then is possible to choose the optimal settings which can provide a target of 95% C24 and only 5% of rejections. If this result is compared to the application of visual grading it can be perceived that C24 is not possible and in either case the rate of rejection is higher (15%).

Maritime pine scenario (*Pinus pinaster* Aiton)

Grading option	Grading standard	OUTPUTS (Strength classes)
Visual	NP 4305	visual grade E → C18
		Visual grade EE*
Machine	EN 14081 parts 1 a 3	C24/Reject
		C35/C24/C18/Reject
		C40/C24/C18/Reject

- Since the link between visual grade and strength class system was not submitted to CEN/TC124, mention to C30 is not allowed by EN 14081-1



Application of machine grading using MTG

MTG can be applied online for continuous production of strength grading timber or and handheld equipment can be used for grading at a batch-by-batch basis which is the more adjustable procedure given the still low demand for strength graded maritime pine timber.



MTG is applied to timber with rectangular cross-sections shaped by sawing, planing or other methods and with cross-sectional dimensions complying with EN 336. Usually the dimension's guidelines are: width 36 – 110 mm; height 63 – 242 mm and length 1500 – 8000 mm.

The test is performed by placing the timber member on two supports making sure that no further vibrations apart from the impact induced by MTG are transferred to the element. Also the end of the member shall have a perpendicular cut and not too rough.

