THERMOWOOD TECHNOLOGY

Jartek Invest Oy

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JARTEK INVEST OY

- Family owned company, founded 1957
- Three business divisions
  - Log and lumber sorting lines for sawmills
  - Conventional drying kilns
  - Thermowood technology
- Main office in Lahti, Finland
- Sales to more than 20 countries

JARTEK THERMOWOOD TECHNOLOGY DELIVERIES

JARTEK

Research/pilot chamber

Industrial chamber

WOOD MODIFICATION INDUSTRY

WOOD MODIFICATION

ACETYLATION	**FURFURYLATION**	**THERMAL MODIFICATION**	**OTHER MODIFICATION METHODS**
ACCOYA	KEBONY	THERMOWOOD OTHER METHODS	

TERMINOLOGY

- ITWA = International Thermowood Association
- Thermowood = registered trademark, in use of members of International Thermowood Association
- Thermowood technology = a method to produce thermally modified wood
- TMT = Thermally Modified Timber

THERMOWOOD TRADEMARK

ThermoWood®
thermowood.fi

All ThermoWood is TMT; all TMT is not ThermoWood

Thermowood trademark is available only for ITWA members, who have audited quality control system in place

STRUCTURE OF TMT INDUSTRY OUTSIDE CHINA

TOTAL PRODUCTION OF TMT WORLDWIDE EXCL CHINA

OTHER TECHNOLOGIES **15-20** PROVIDERS AND SOME SELFMADE	**THERMOWOOD TECHNOLOGY** **1 (2)** PROVIDERS AND SOME SELFMADE
Appr **90** chambers	Appr **90** chambers
TMT based to several technologies	TMT based to ThermoWood technology
160 000 – 180 000 m³ 2018	**90 000 – 100 000 m³ 2018**

THERMOWOOD® ITWA MEMBERS
209 000 m³ 2018

Production statistics are availabe only from ITWA, other figures are estimates, which are based to interviews and to information available from public sources

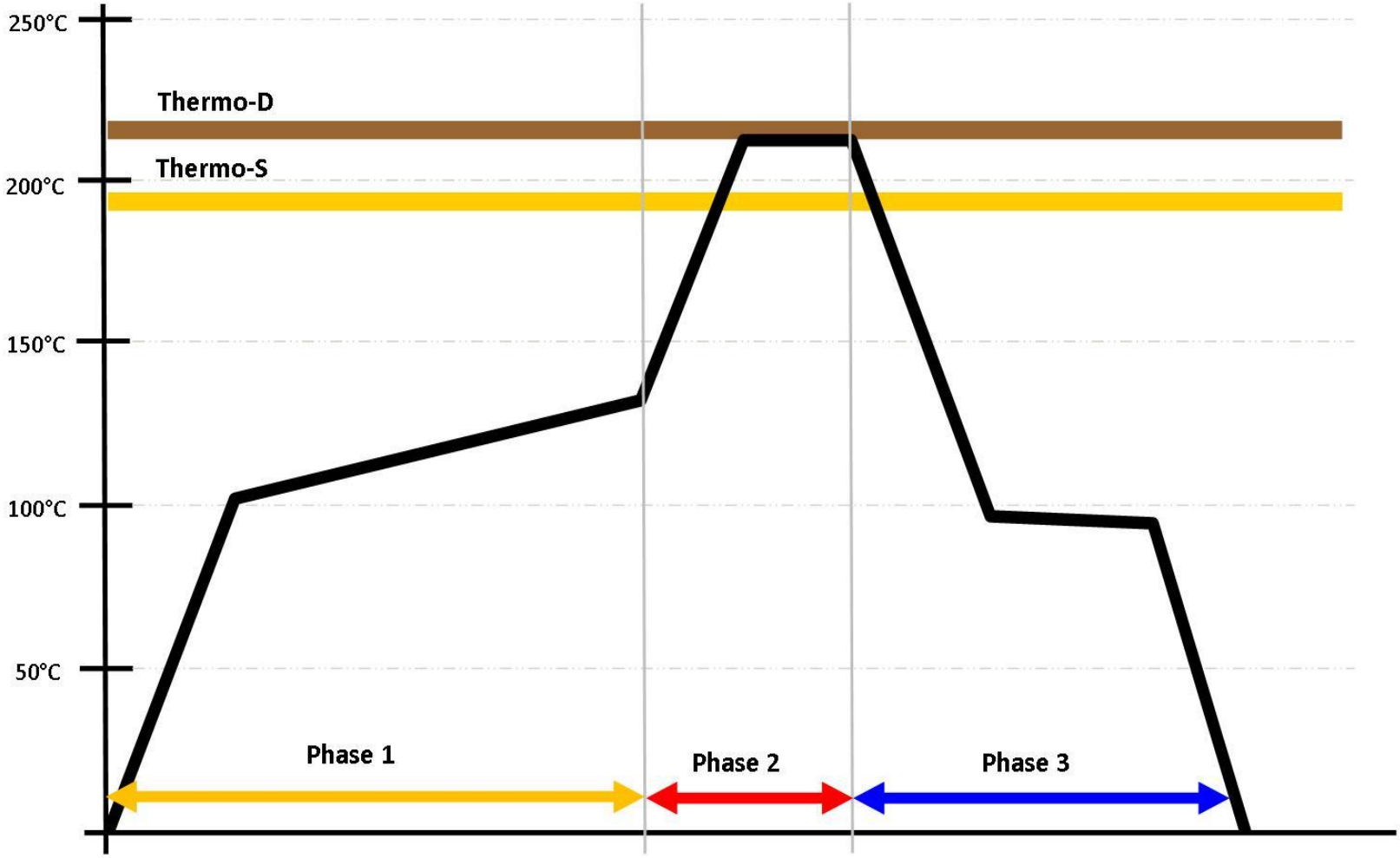
THERMOWOOD TECHNOLOGY

- Thermowood process is open process
  - › Inside chamber is more or less atmospheric pressure
  - › During process process gases will flow out from the chamber
  - › Only heat, steam and water is used during process

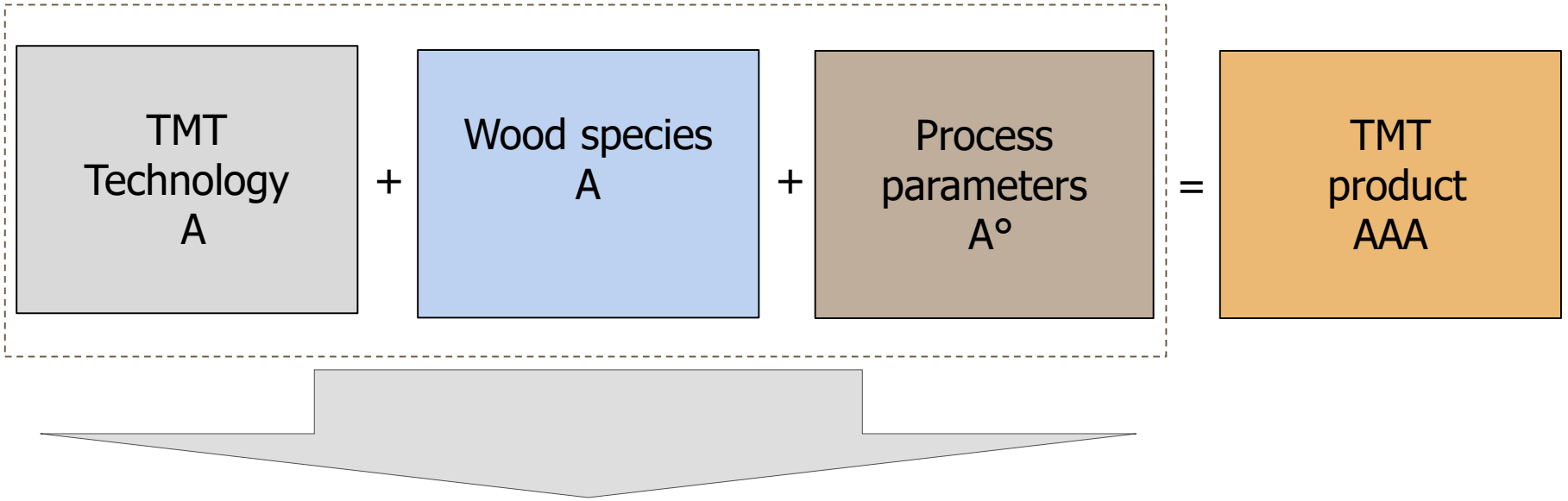
- Other option for process is closed process
  - › In closed process elevated pressure will be utilized

- Regardless from type of process, similar changed properties of wood can be achieved.

THERMOWOOD PROCESS



COMBINATION OF TECHNOLOGIES AND WOOD SPECIES



Change in any of these inputs will influence to end results

SOME EXAMPLES

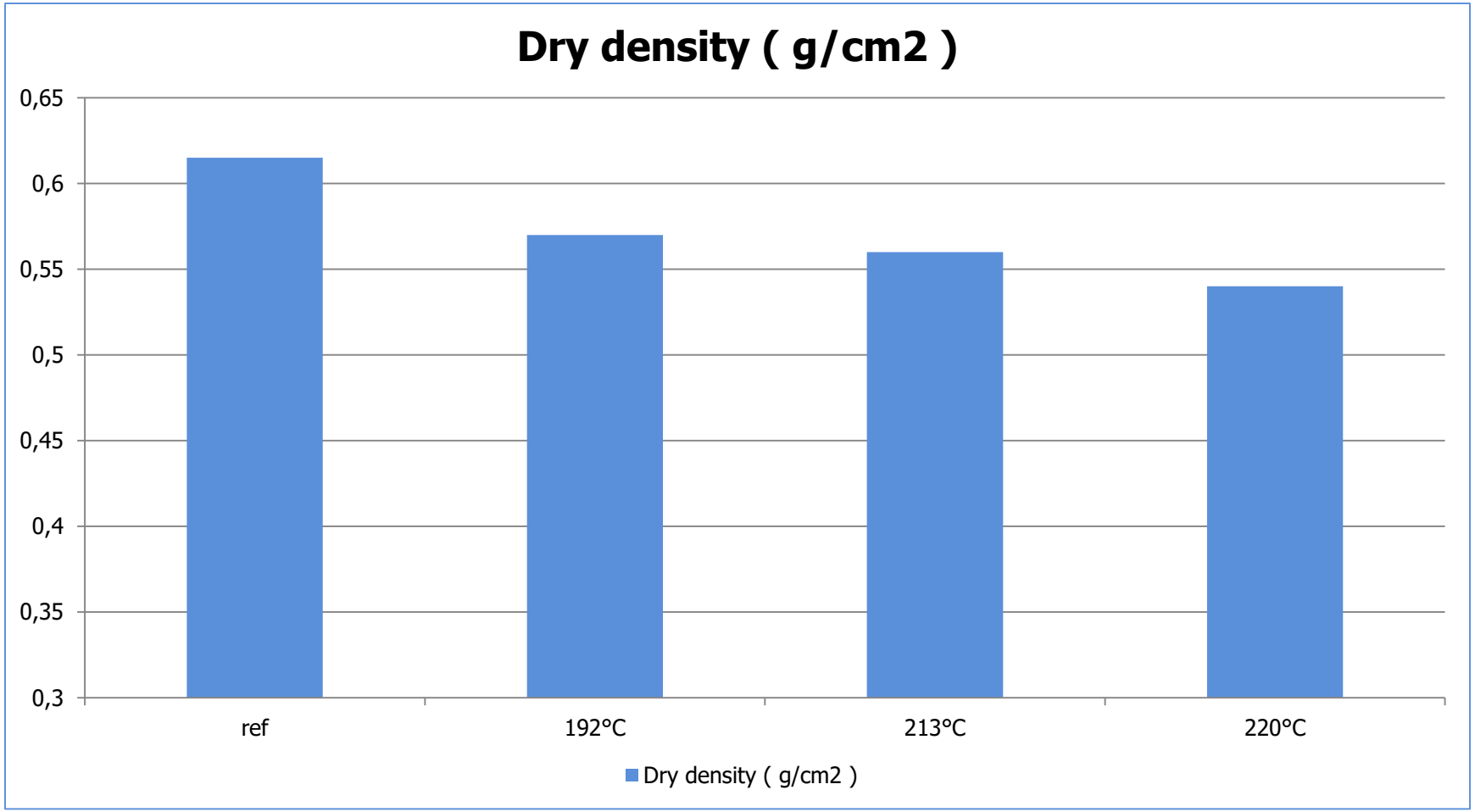
ASH

- Ash is the most popular hardwood species in thermal modification and has a good market position
- Availability of Ash is fairly good and wood comes from sustainable resource
- As natural Ash has very poor biological durability
- ITWA has performed comprehensive research on Ash properties together with GAUG

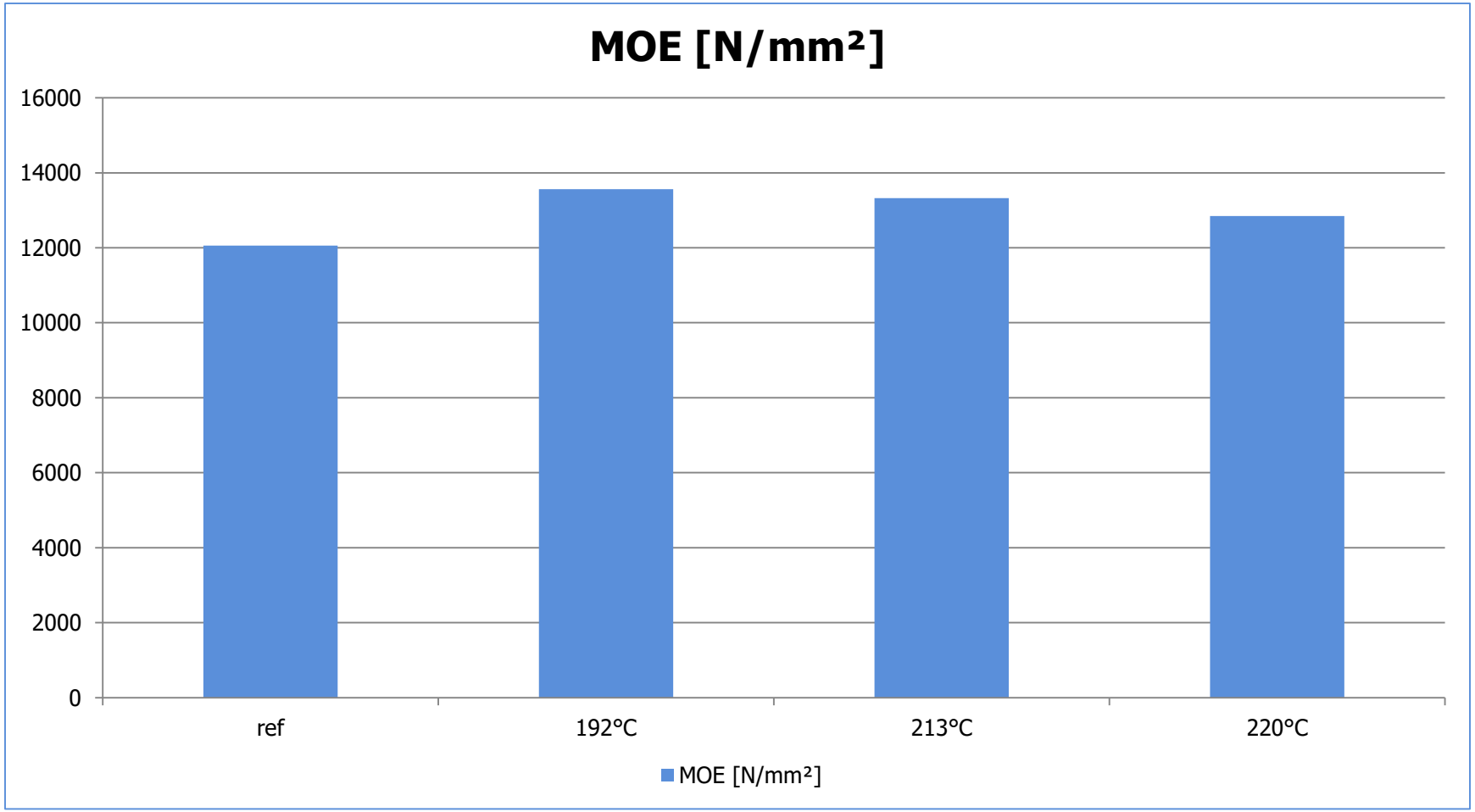
HOW THERMAL MODIFICATION WILL CHANGE ASH?

- Chemical changes in Ash, especially in high temperatures, are remarkable
- Drop in dry density is higher than 10 %
- Impact bending strength is decreasing
- Dimensional stability highly increasing and EMC decreasing

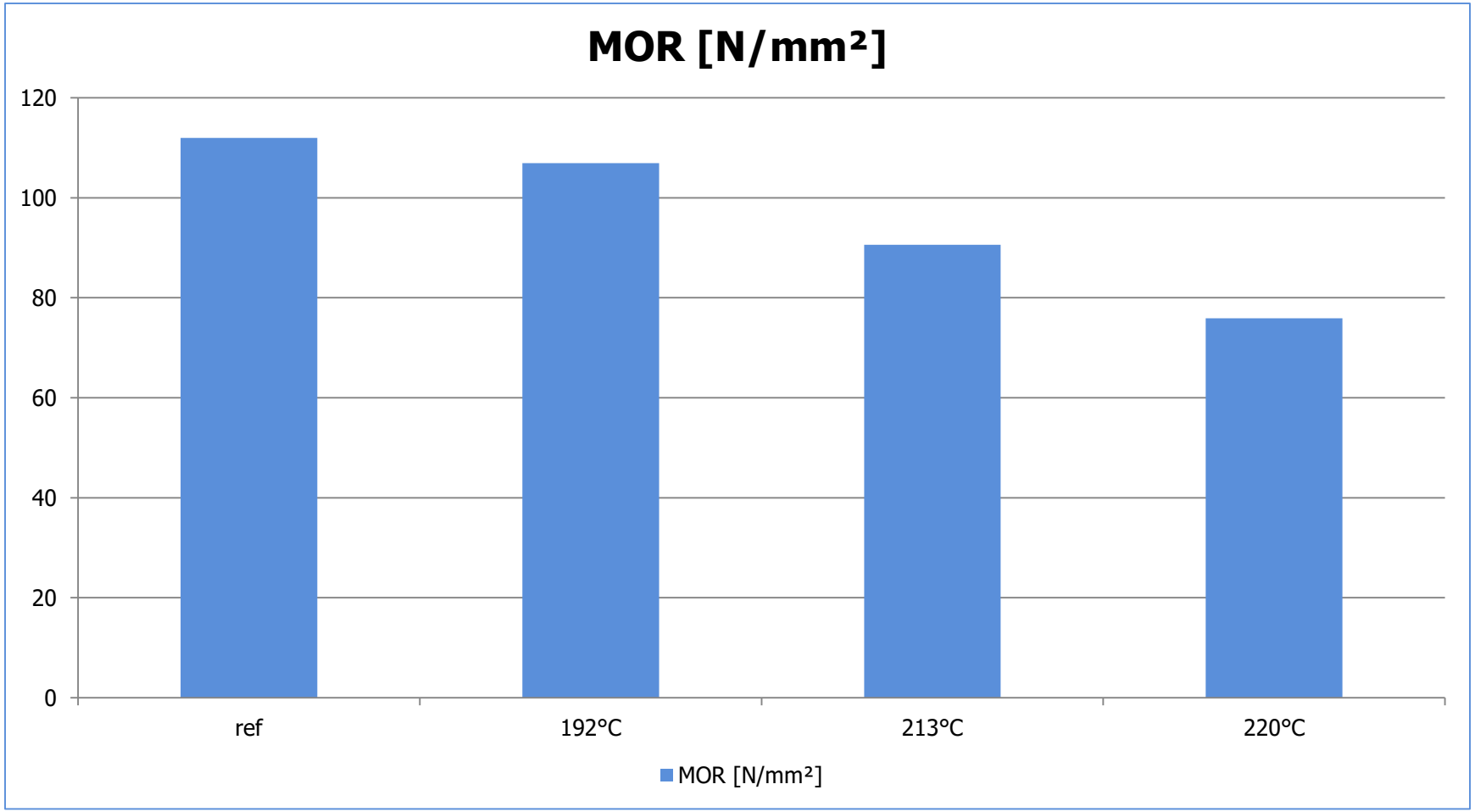
ASH, DRY DENSITY



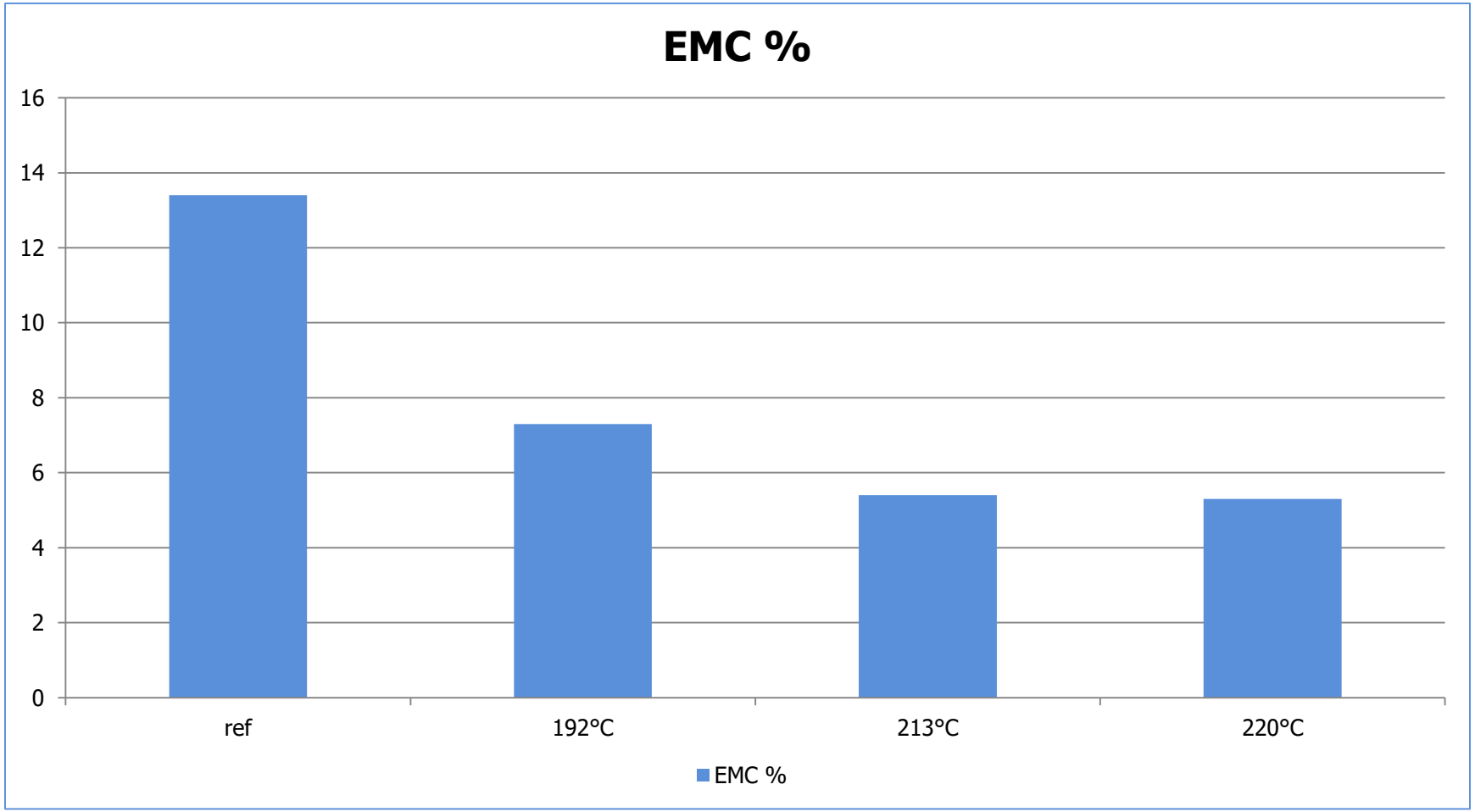
ASH, MODULUS OF ELASTICITY



ASH, MODULUS OF RUPTURE



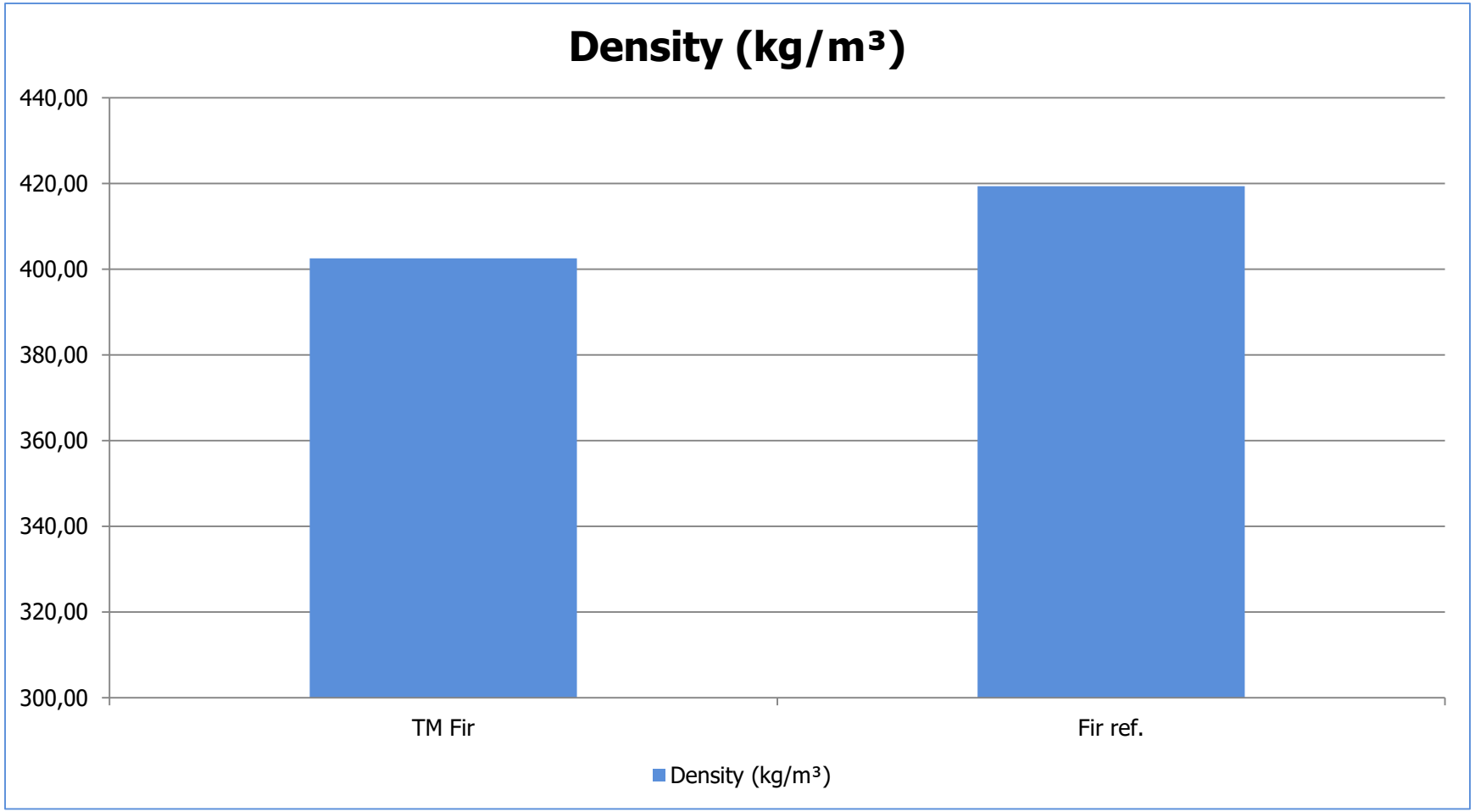
ASH, EMC %, 20°C/65%RH



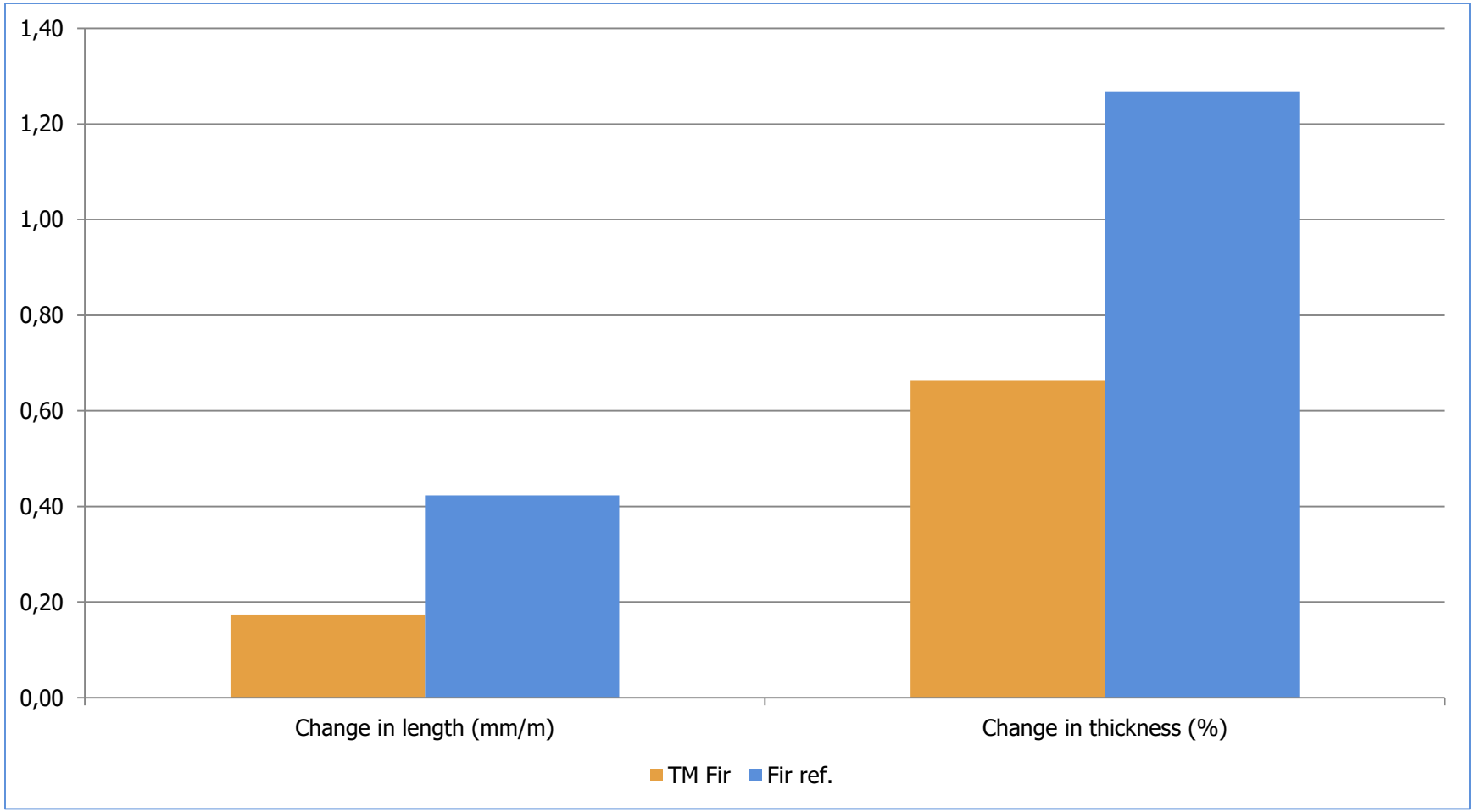
FIR

- So far European Fir has not commonly been used as raw material for thermally modified wood
- Thermal modification can extract resin from Fir and increase dimensional stability as well as provide lower EMC
- Jartek has together with University of Applied Sciences in Lahti made some initial testing
- Samples were modified in 210°C

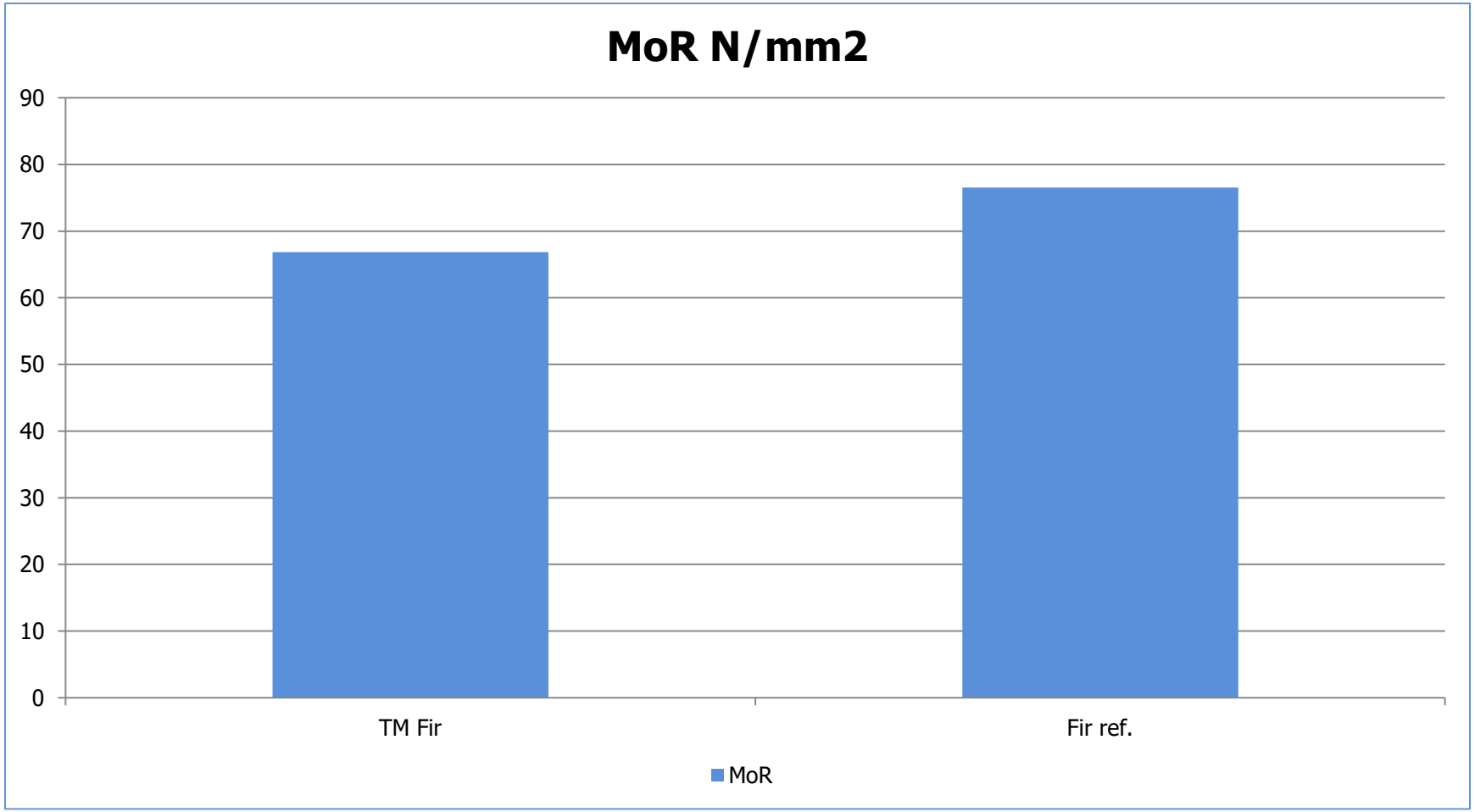
FIR, DENSITY


Density (kg/m³)
440,00
420,00
400,00
380,00
360,00
340,00
320,00
300,00
TM Fir
Fir ref.
Density (kg/m³)

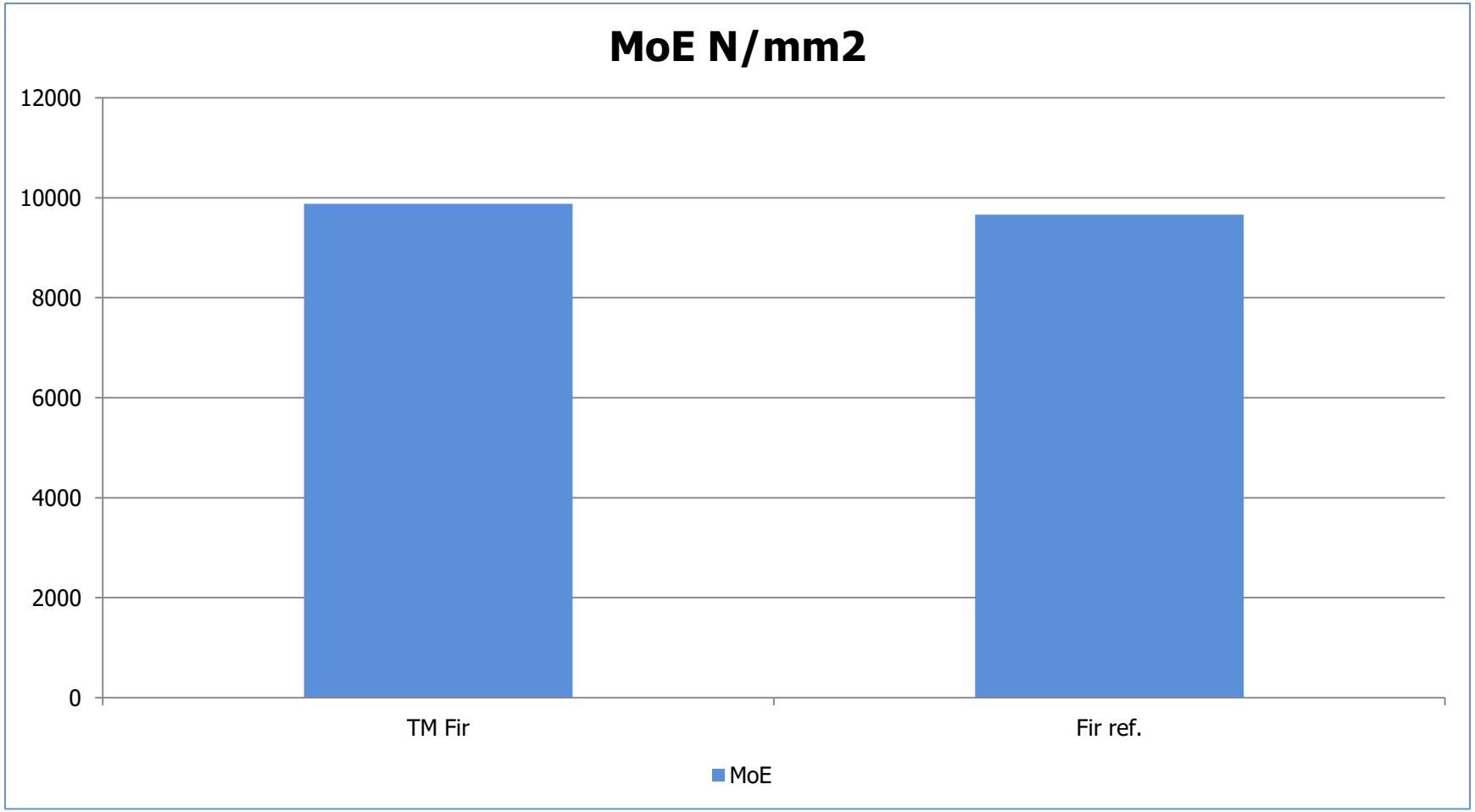
FIR, DIMENSIONAL STABILITY, EN-318



FIR, MODULUS OF RUPTURE, EN-310



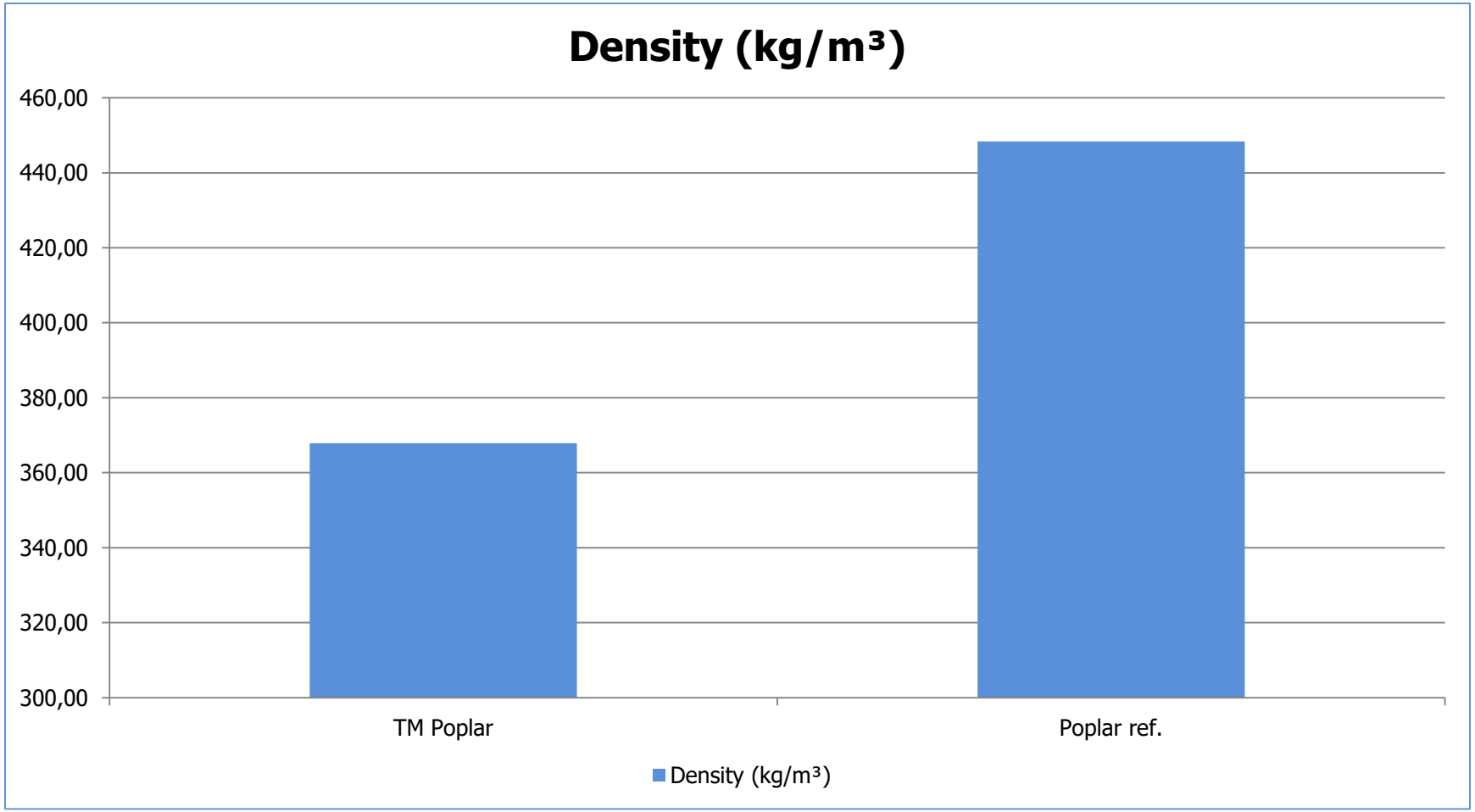
FIR, MODULUS OF ELASTICITY, EN-310



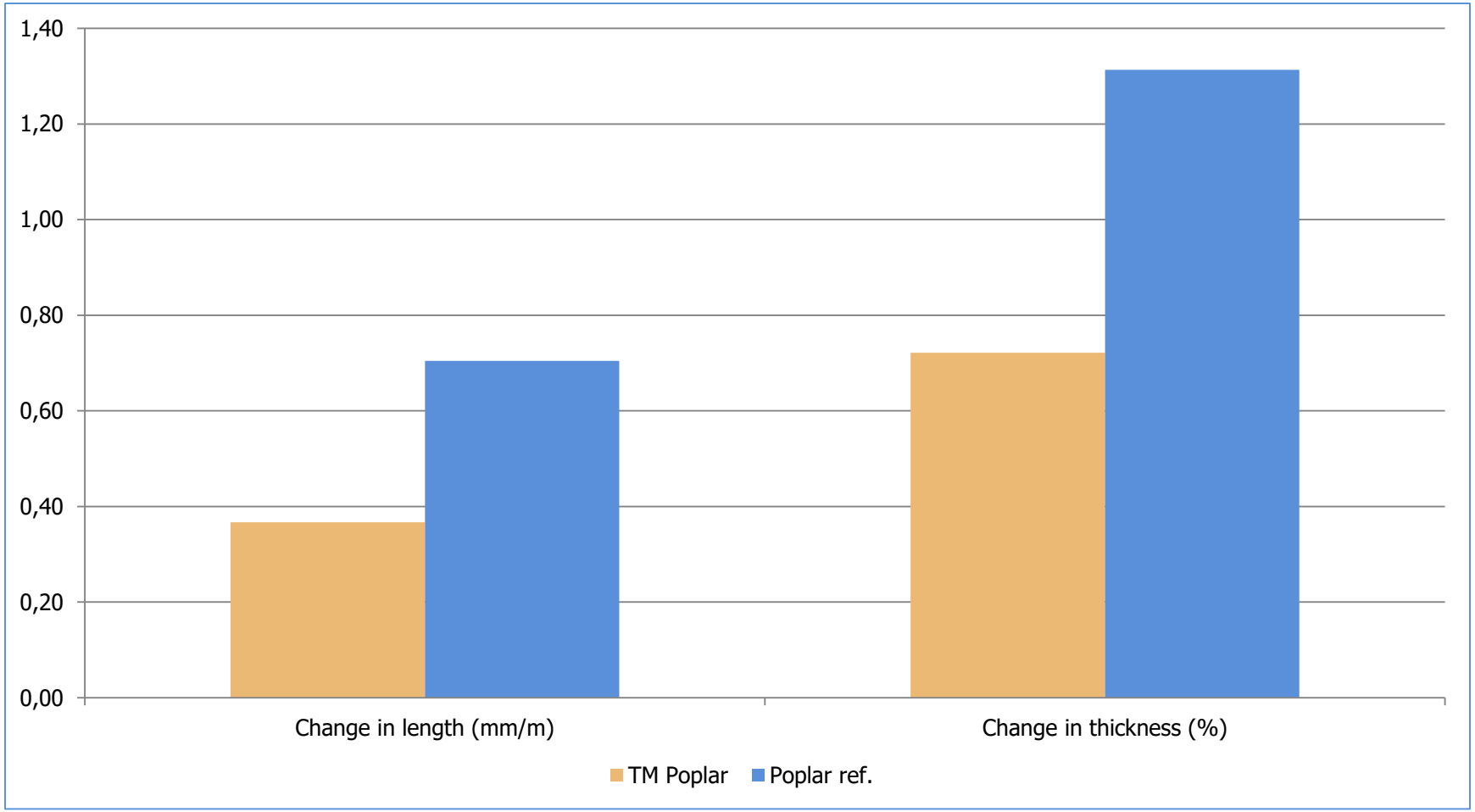
POPLAR

- Poplar has several hybrids
- Availability of raw material is good
- Can thermal modification change properties of Poplar and provide possibility to new end use applications?
- Jartek has together with University of Applied Sciences in Lahti made some initial testing
- Samples were modified in 215°C

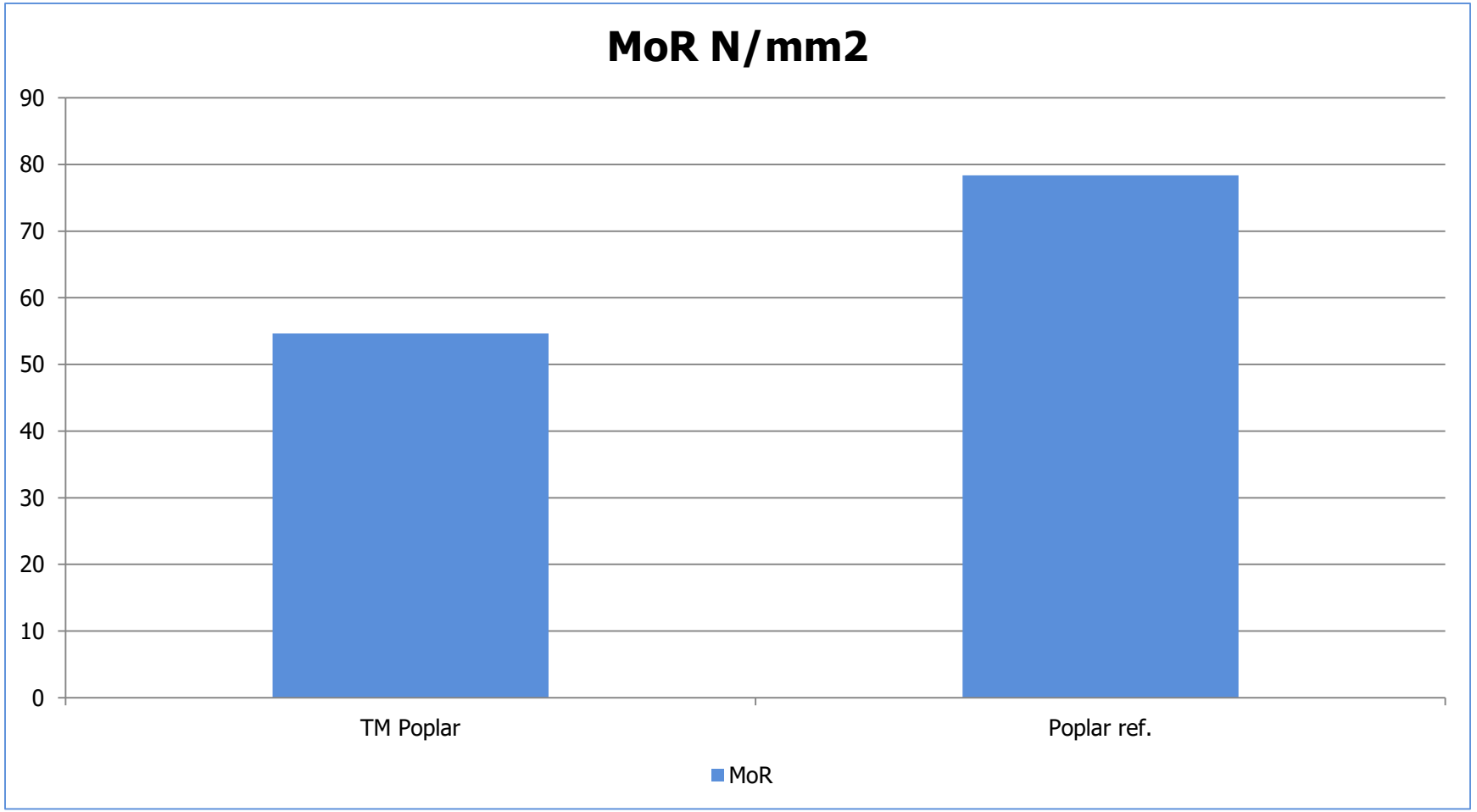
POPLAR, DENSITY



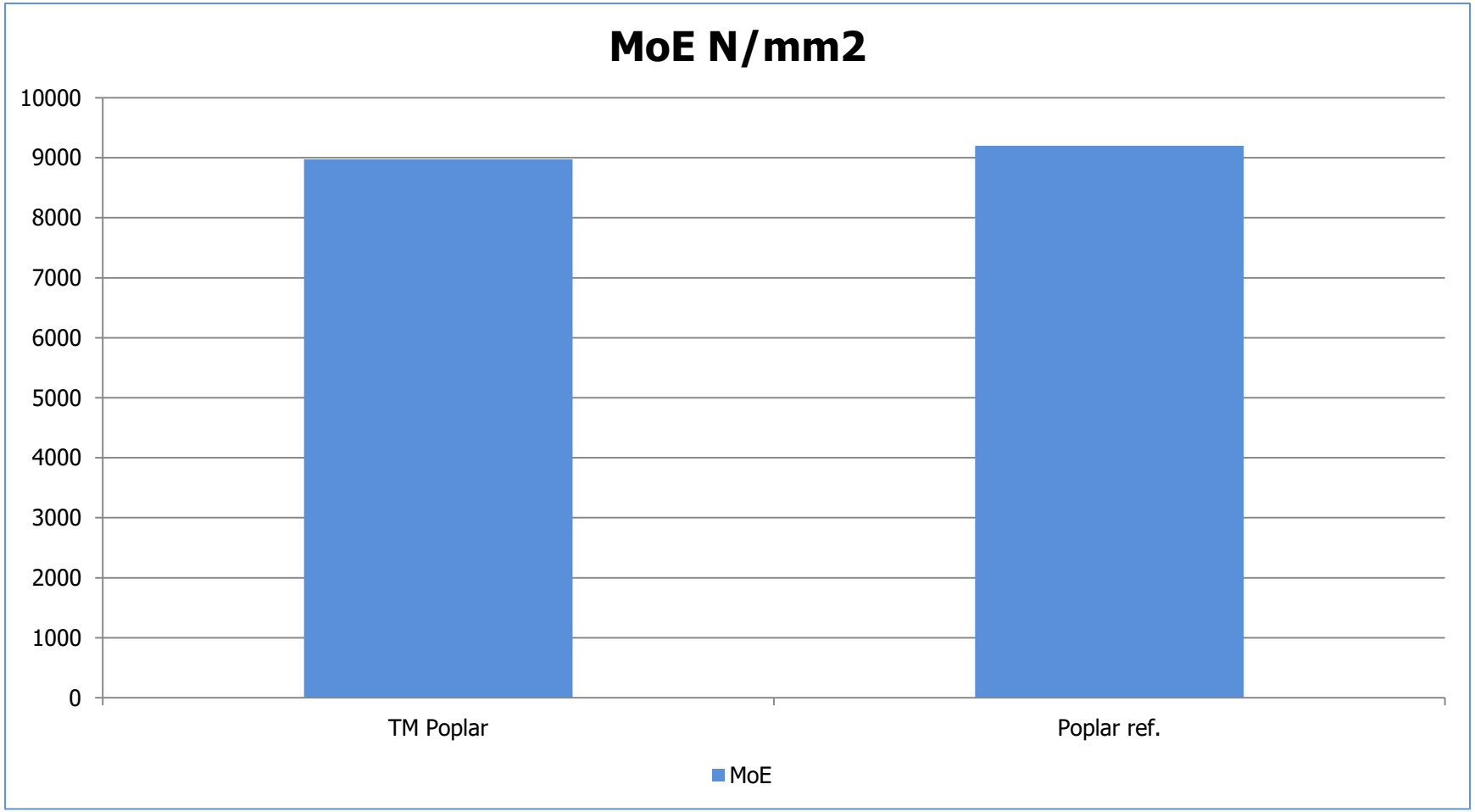
POPLAR, DIMENSIONAL STABILITY, EN-318



POPLAR, MODULUS OF RUPTURE, EN-310



POPLAR, MODULUS OF ELASTICITY, EN-310

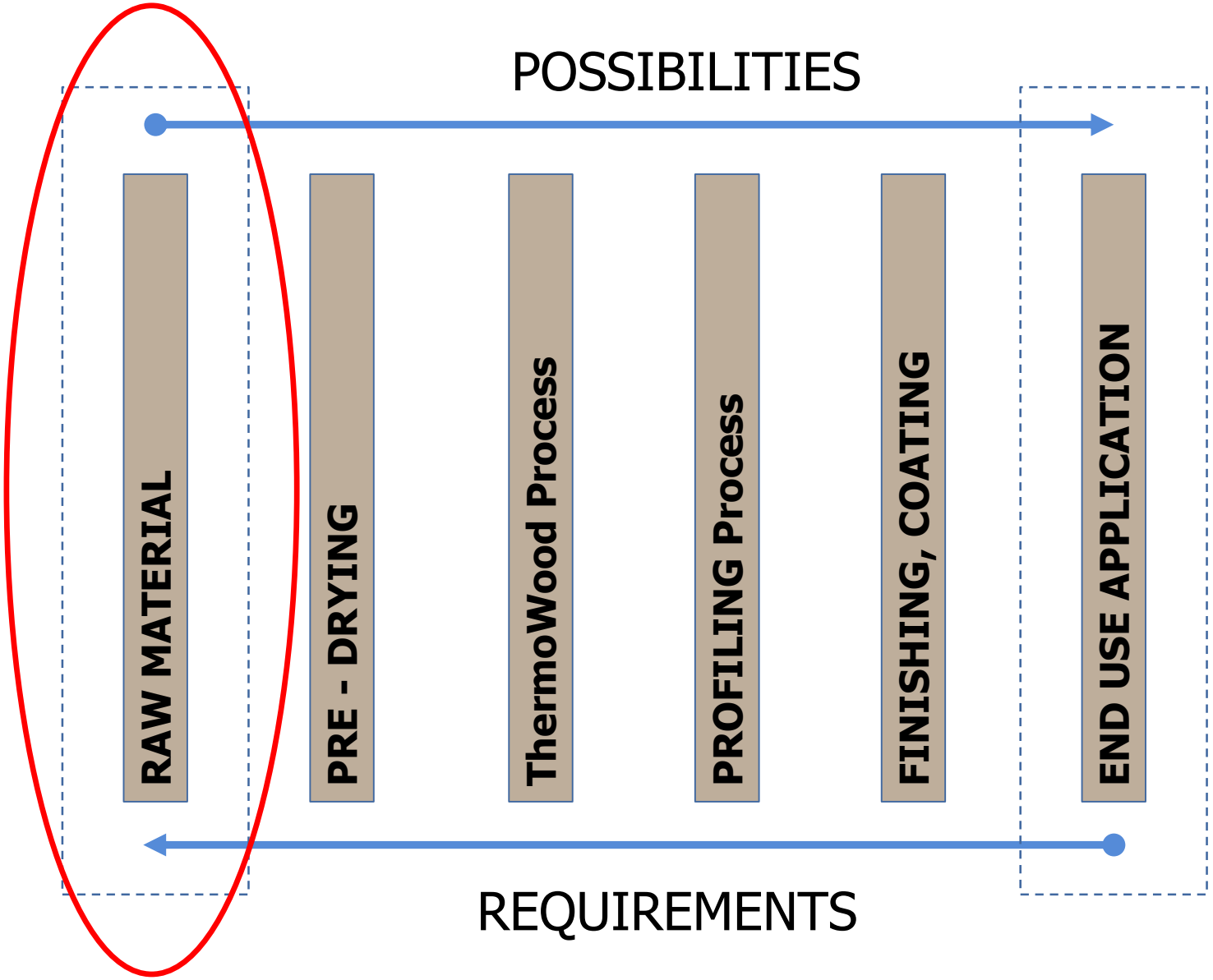


OPPORTUNITIES

- Thermal modification improves properties of natural wood
- Raw material is commonly local wood for producer
- Especially dimensional stability and resistance against weather and decay will be improved
- New possibilities for local wood species

CHALLENGIES AND DIFFICULTIES

- UV-radiation from sun will effect thermally modified wood as any other wood
- Sourcing raw material can be challenging for producers (right dimension, right amount, right quality and right price) (all this just on time - JOT)
- General knowledge of changed properties and product data availability is low.
- ” Too much marketing speech ”


POSSIBILITIES
RAW MATERIAL
PRE - DRYING
ThermoWood Process
PROFILING Process
FINISHING, COATING
END USE APPLICATION
REQUIREMENTS

RAW MATERIAL

- Raw material for thermally modified wood should represent high quality wood
- Part of the quality is pre-drying process before thermal modification
- Wood is natural raw material and there will be always some variation between two pieces already within one species of wood
- Mixture of different species will have opportunity to create big variation

SURFACE COATING

- UV-radiation from sun will effect all uncoated wood
- It is a process of degradation of lignin, which is one of the main components of wood
- Even though this effect is about less than 1 mm from the surface, this is the visual part, which we all can see
- Nature of thermally modified wood is hydrofobic
- Present and future coating products are mainly water borne

TECHNICAL SOLUTIONS IN THERMOWOOD PLANTS

- Welded stainless steel chamber construction
- Thermal oil heating
- Reliable components
- Boiler provides heat also for steam generation
- Boiler is cleaning process gases from chamber, other option is to install separate incinerator

TECHNICAL SOLUTIONS

THERMOWOOD PLANT EXAMPLES

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THERMOWOOD PLANT EXAMPLES

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THERMOWOOD IN USE

THERMOWOOD IN USE




Photos: Novawood

Thank you!