

PHYSICAL AND MECHANICAL PROPERTIES OF THERMALLY MODIFIED KAUAYAN-TINIK (*Bambusa blumeana* Schltes f.)

R.A Natividad and J.P. Jimenez Jr.

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Introduction

What is Thermal Modification (TM) of lignocellulosic material (LM)?

- a process of subjecting solid LM to temperature between 150 to 240°C for several hours in an atmosphere with low oxygen content

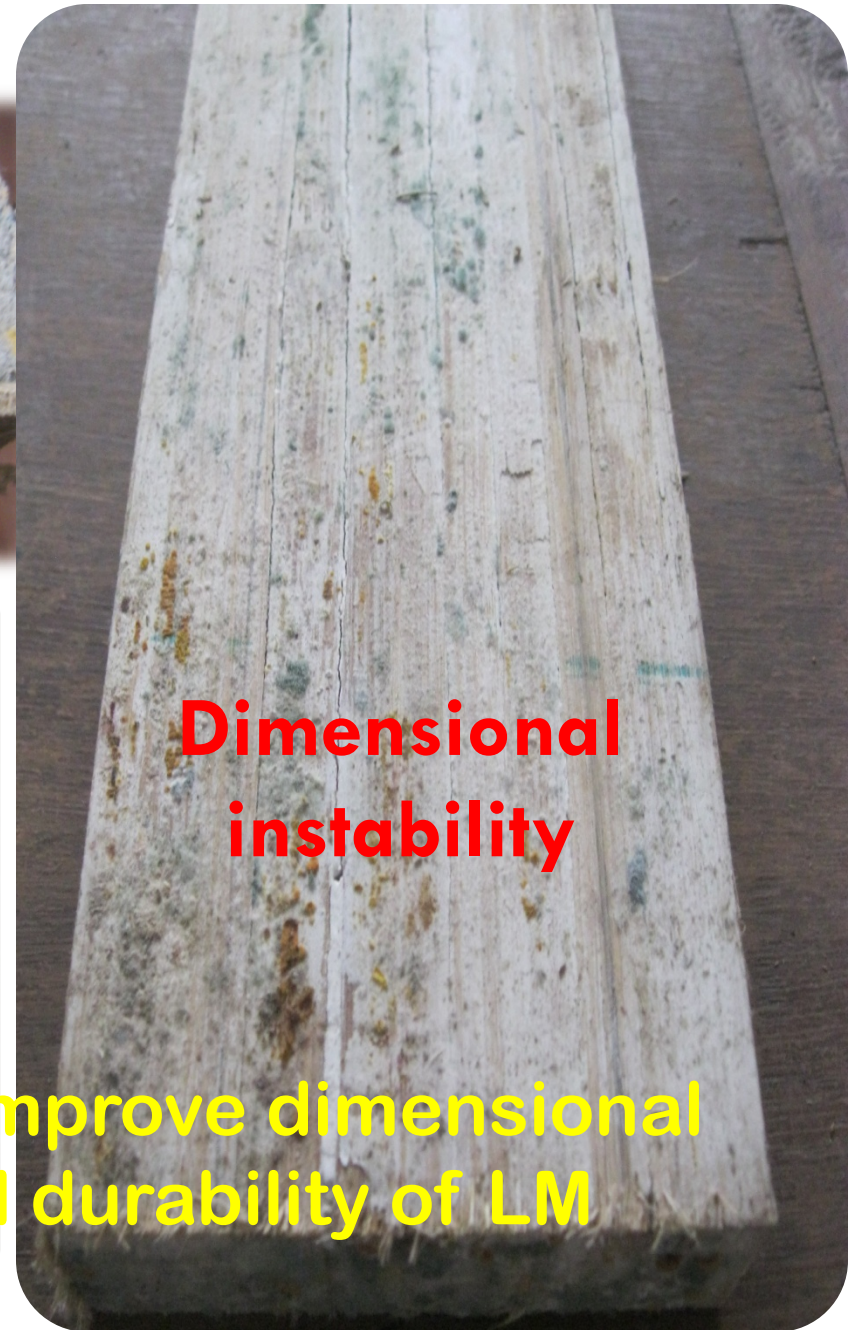
Decay



Insect attack

- basic aim of TM is to improve dimensional stability and biological durability of LM

Dimensional instability

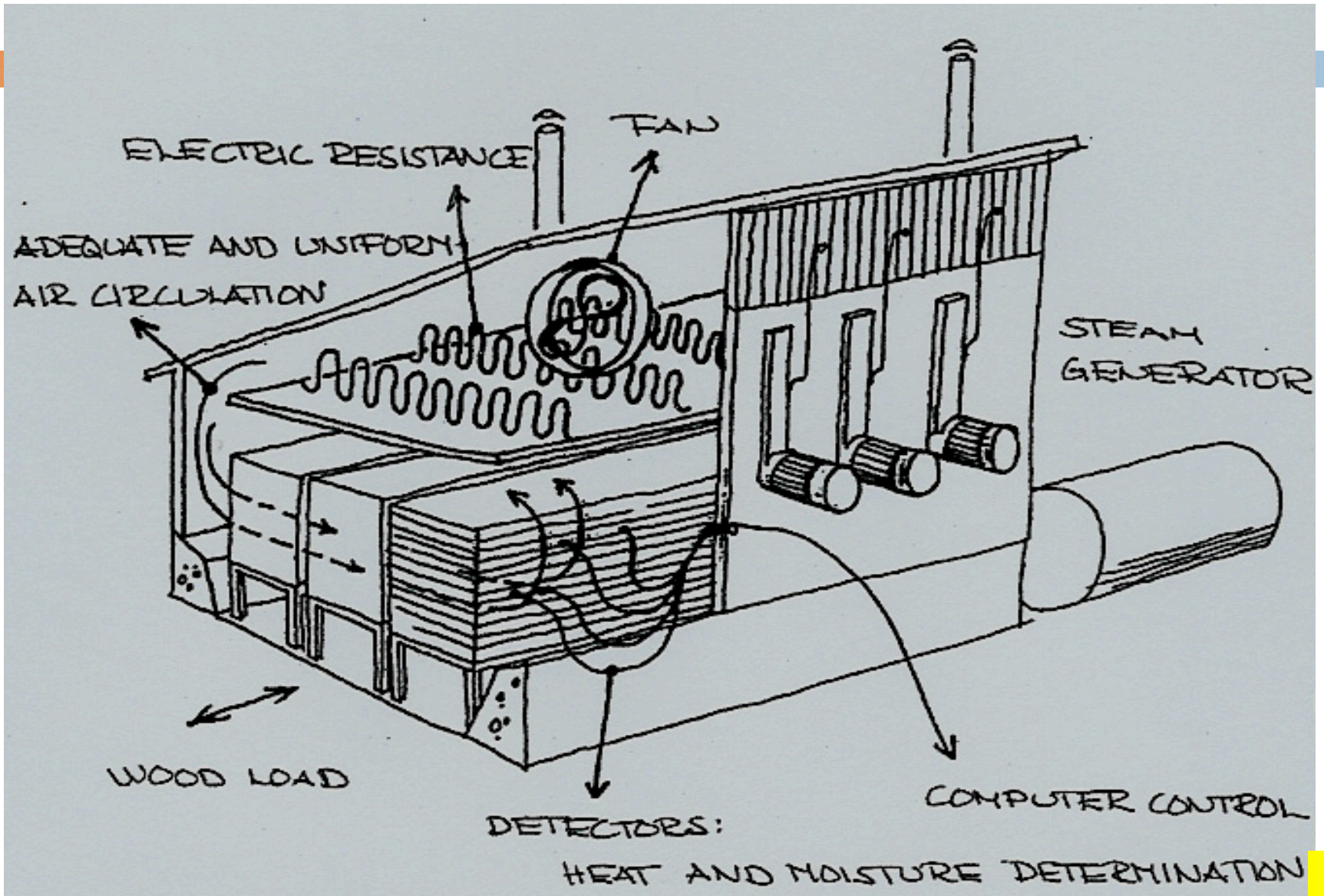


COMMERCIAL PRODUCTION OF TM WOOD

- **Started in Late 1990s in Europe**
- **Some popular TM processes**

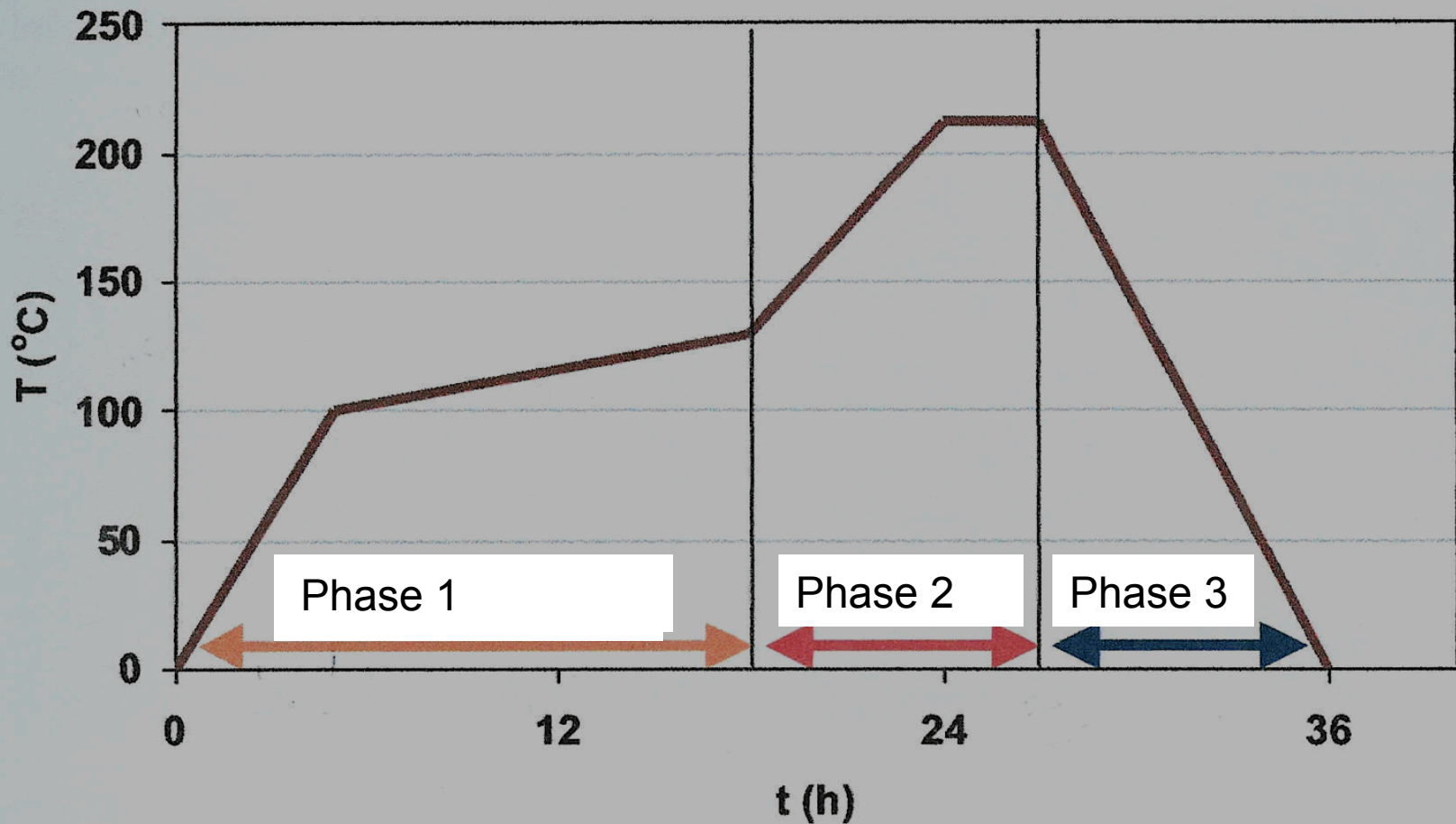
ThermoWood	- - - - -	Finland
PlatoWood	- - - - -	Netherlands
RetifiedWood	- - - - -	France
Menz Holz (oil-heat treated)	- - - - -	Germany
Stellac Wood	- - - - -	Malaysia (from Finland)
Ecology Dry System (EDS)	- - - - -	Japan

High Temperature Kiln/ TM Chamber

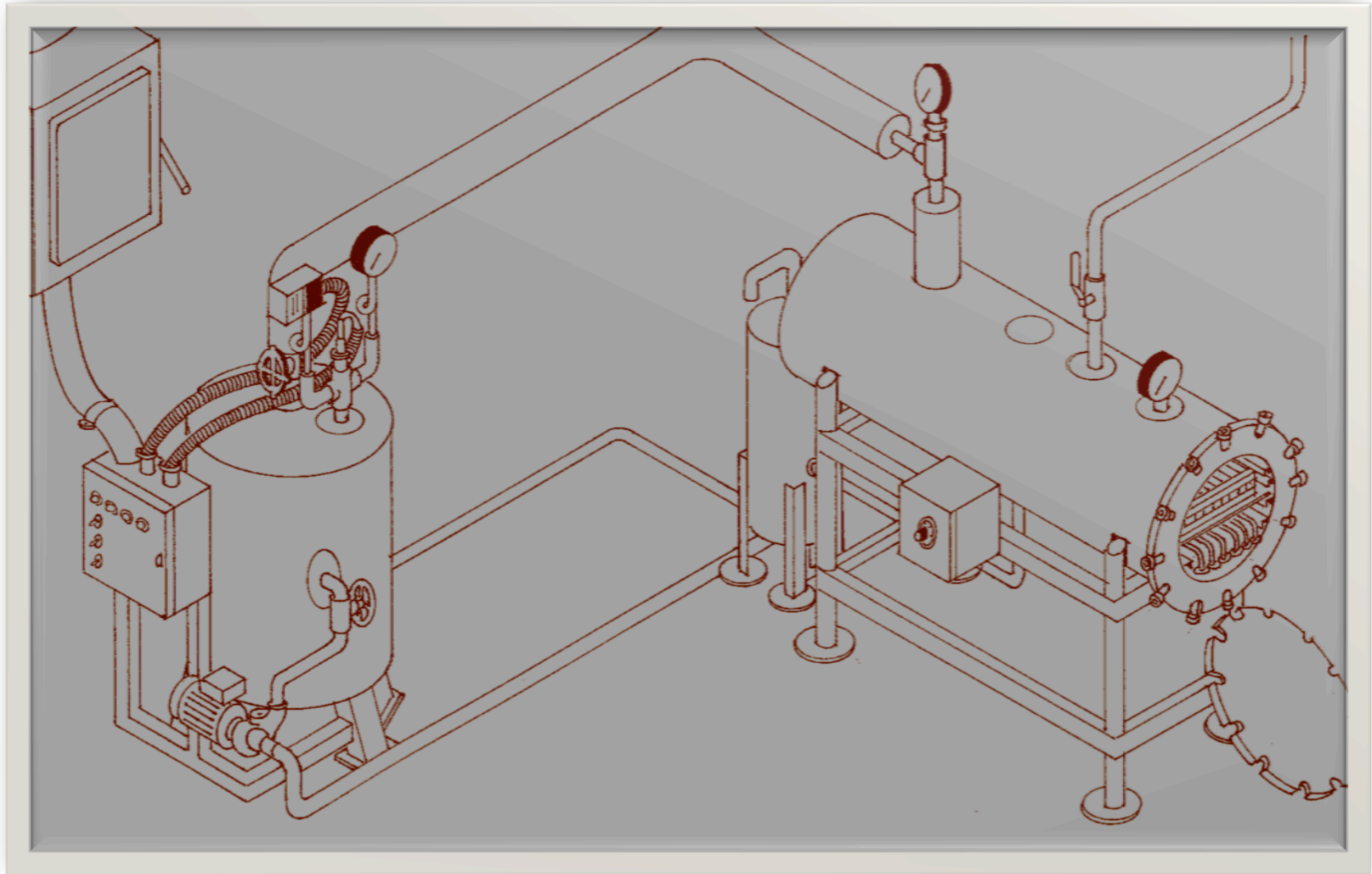


ThermoWood Processes

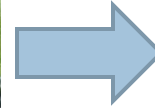
ThermoWood® process



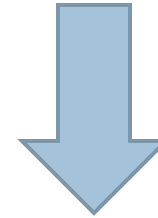
METHODOLOGY



Methodology

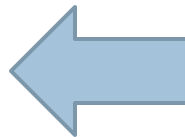


**Butt & Middle portion
of the culm**



**Air Drying of
2 ft length**

**Quarter splitting
of culm**



Methodology

Thermal Modification



Methodology

Experimental Design – Simple CRD analysis for the control VS treated
- 2-factor factorial among the treated samples

Variable Factors: **Temperature : (150, 175 and 200°C)**
Duration : (30 and 60 min)

Test Parameters:

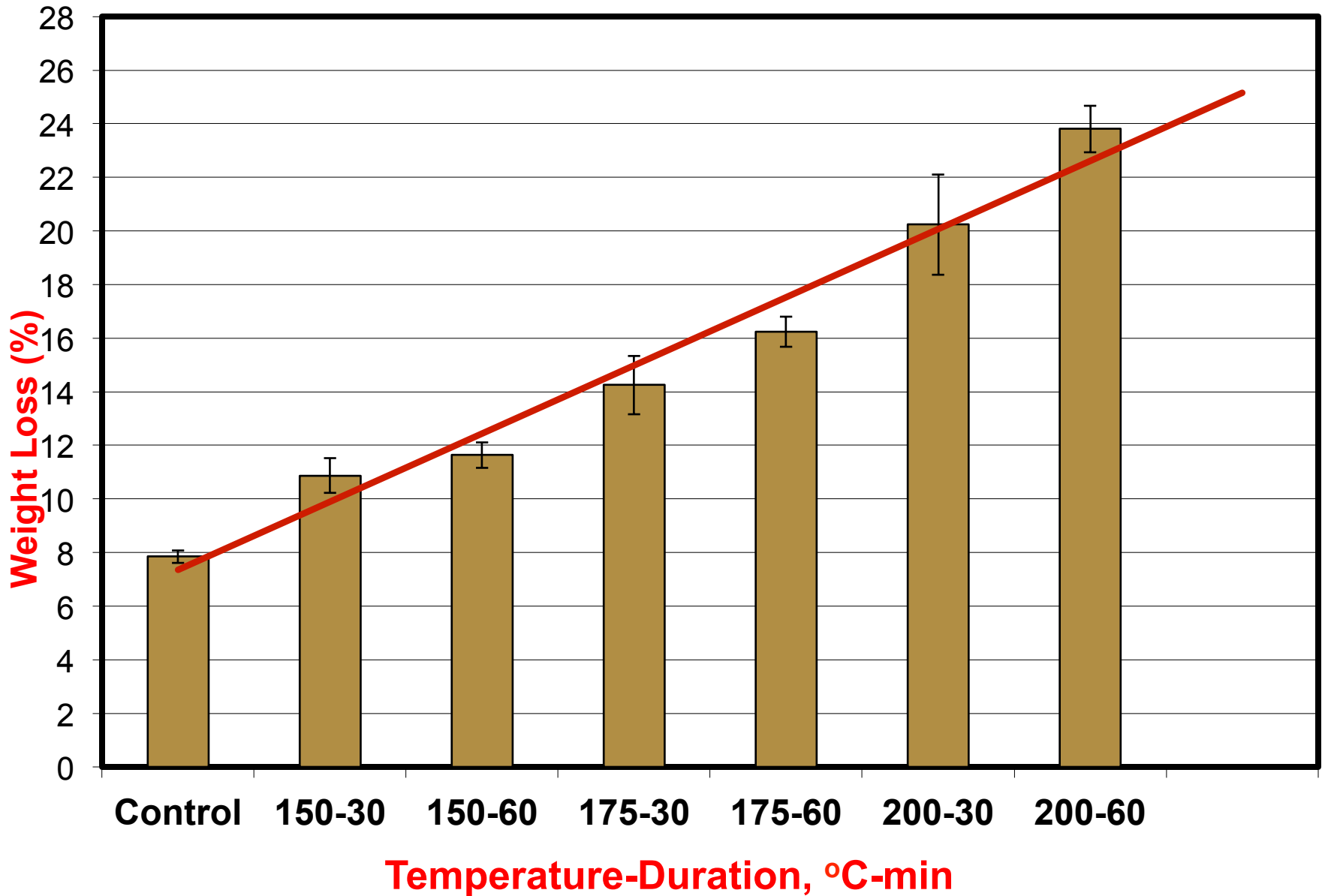
1. Weight loss
2. Moisture Content (MC)
3. Relative Density
4. Water Absorption (WA)
5. Thickness and Width Swelling (TS and WS)
6. Modulus of Rupture (MOR) and Modulus of Elasticity (MOE)

RESULTS

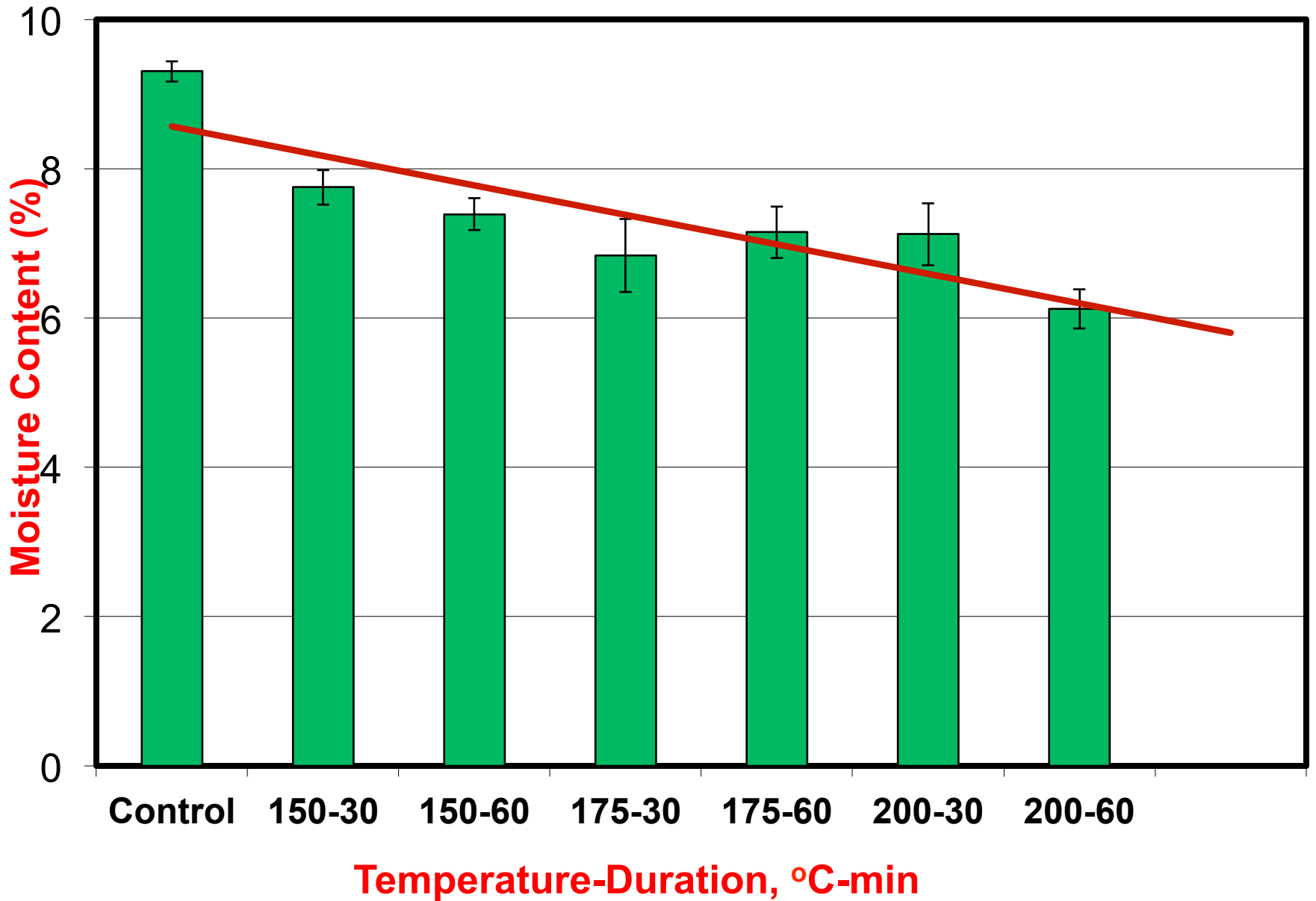
Color Change



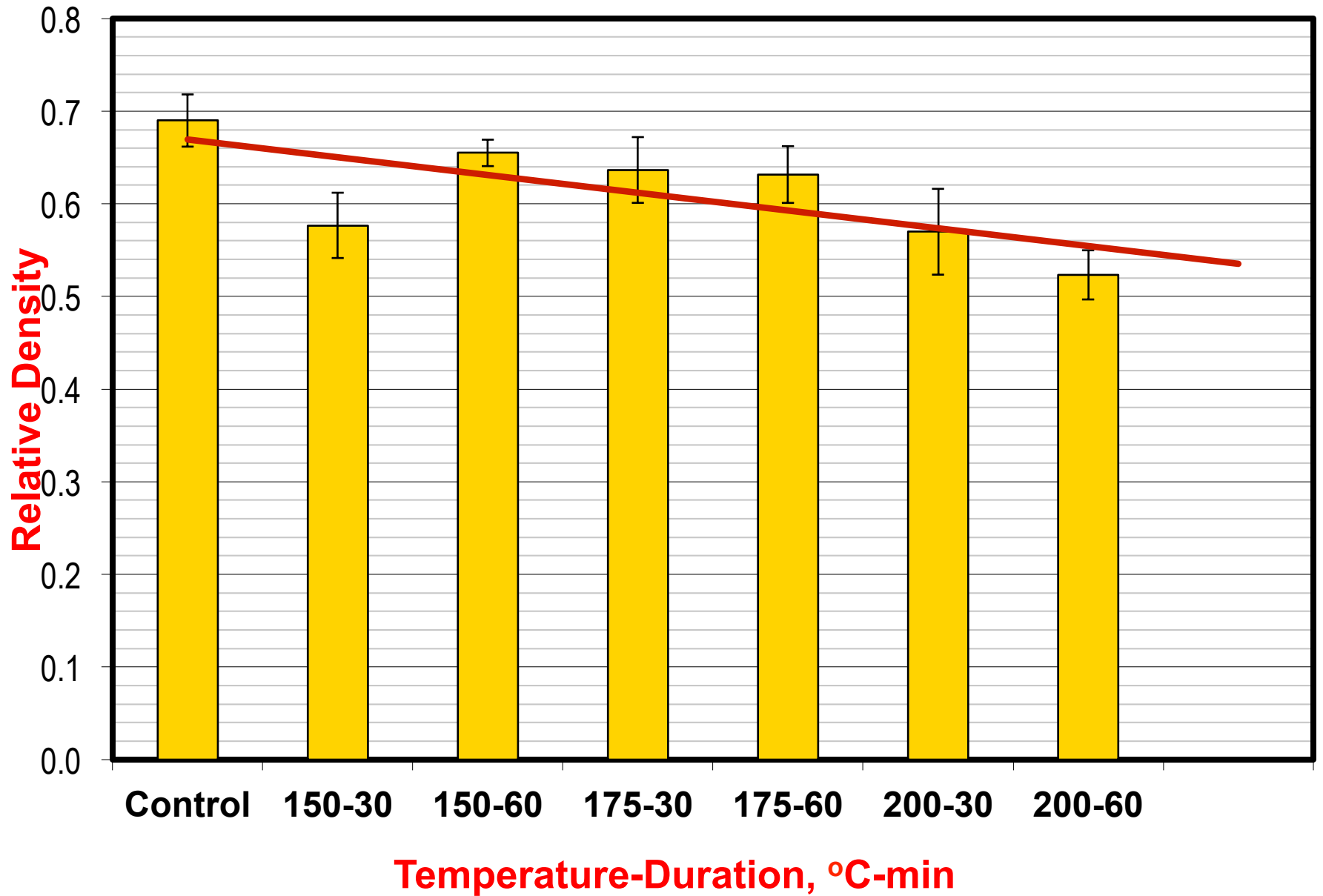
RESULTS



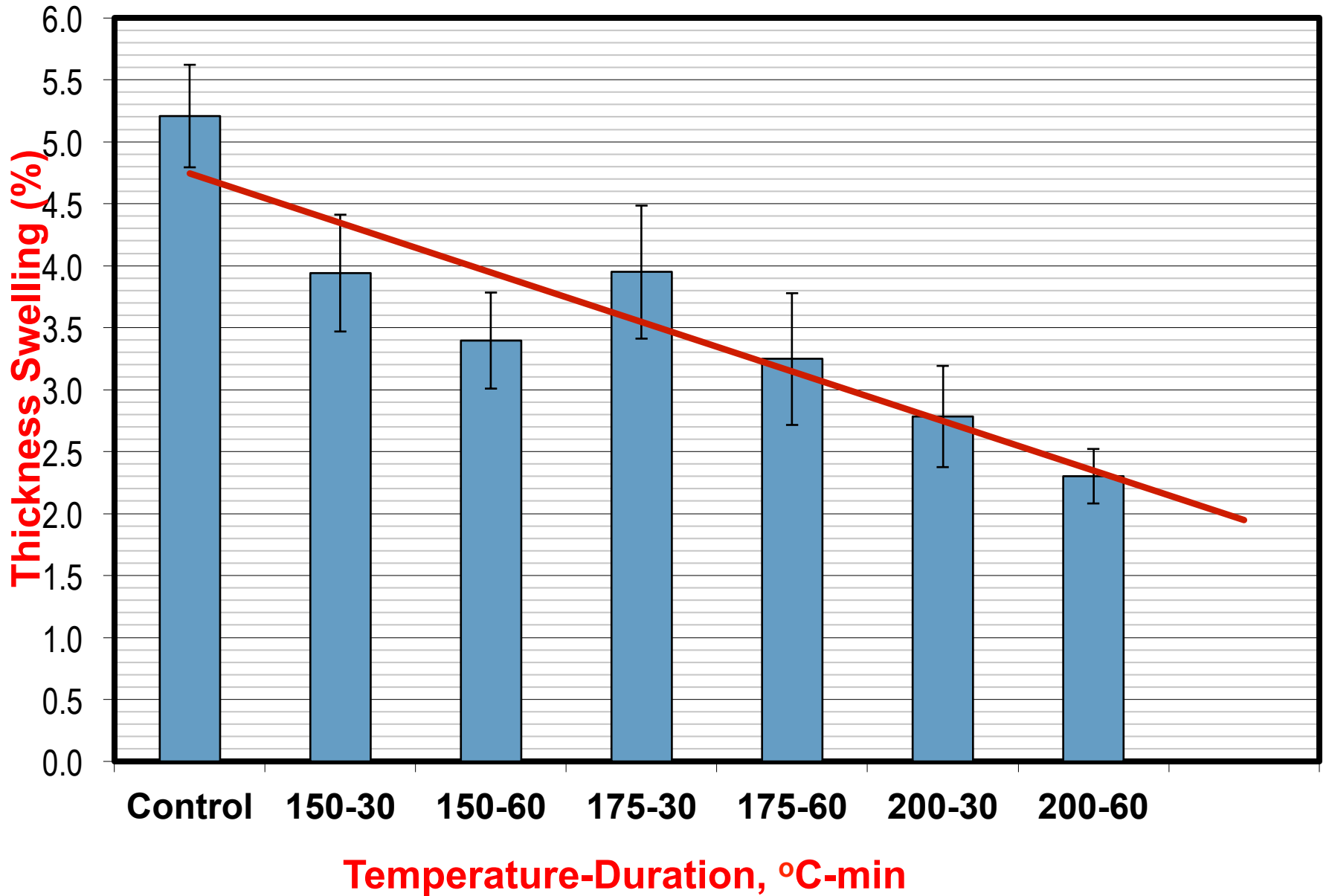
RESULTS



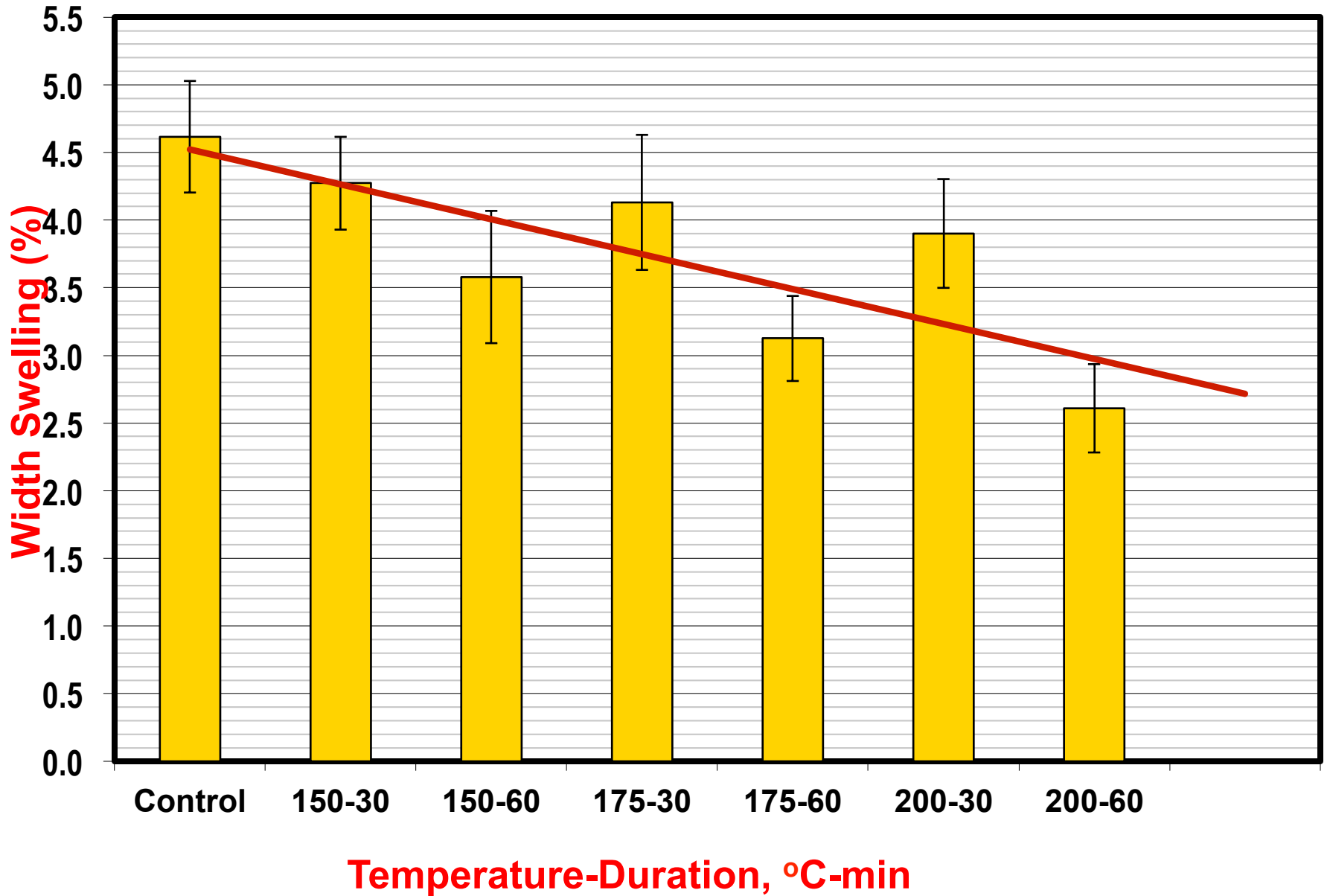
RESULTS



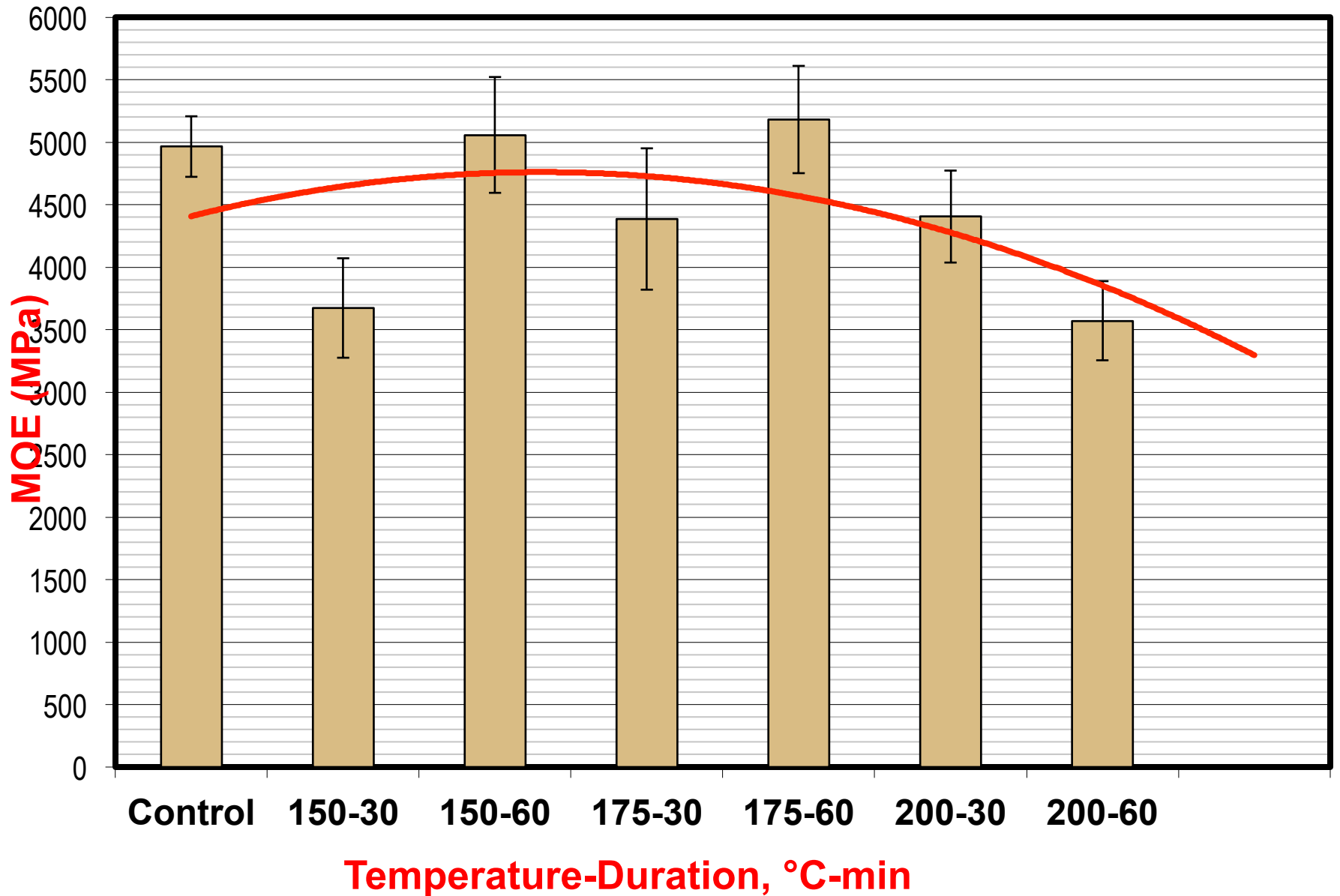
RESULTS



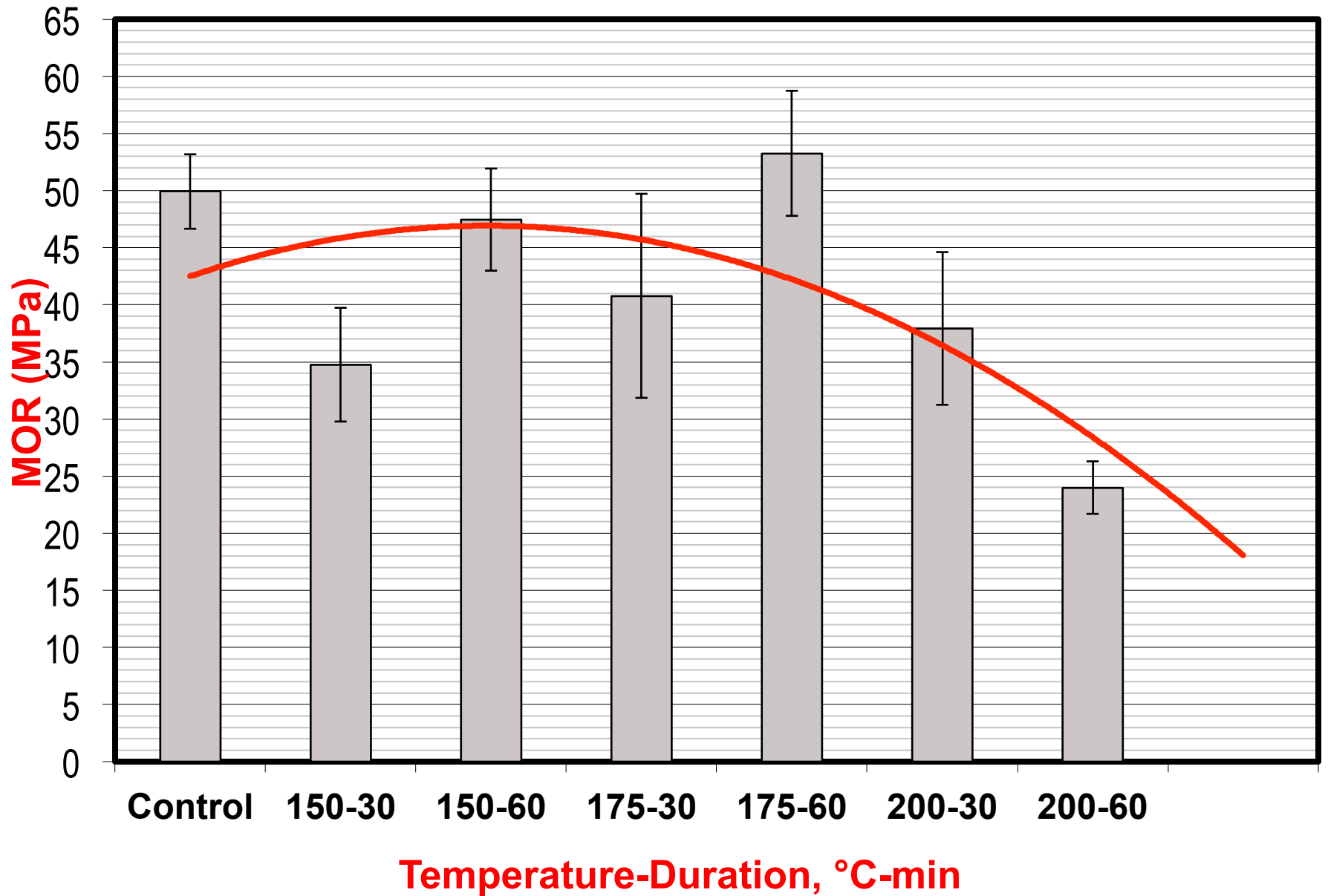
RESULTS



RESULTS



RESULTS



Summary & Conclusions



Thermal Modification

- Improves the dimensional stability as shown by the reduced TS & WS
- Apparently increases the MOE and MOR up to 175°C and decreases beyond this temperature
- Change in color after thermal modification could be used to create new product designs

PROTOTYPE PRODUCTS



Decorative Table Top



Laptop Holder

A large pile of cut bamboo poles is stacked outdoors. The poles are arranged in neat rows, extending from the foreground into the background. They are positioned next to a pond with greenish water. In the background, there are some buildings and trees. The text "THANK YOU AND GOOD DAY!!" is overlaid in the center of the image in a bright yellow, bold font with a white outline.

**THANK YOU
AND
GOOD DAY!!**