

LASER TREATMENT OF WOOD IN THE SKI INDUSTRY - A PARAMETER STUDY

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Powered by Atomic Austria cooperation

- AMER SPORTS /ATOMIC AUSTRIA CORPRATION
- Background
- Introduction
- Materials and Methods
- Results
- Discussion

STRUCTURE



ATOMIC



- sporting goods company
- founded: 1950
- headquarters: Helsinki, Finland
- United States, Germany, France, Japan, Canada and Austria

AMER SPORTS CORPORATION



- 2011 : 1.9 billion Euros (US\$ 2.44 billion)
- 7,061 employees
- business segments:
 - winter and outdoor
 - ball sports
 - fitness

AMER SPORTS CORPORATION





- subsidiary of Amer Sports
- 400 employees
- revenues: 195.40 million Euros (US\$ 251 million)

ATOMIC AUSTRIA CORPORATION

- **Why treat wooden cores with laser beam?**
- **reasons for production of wooden cores:**
 - customer awareness
 - ecological issues
 - increasing raw material costs for plastic

BACKGROUND:

- **wood species used:**

- beech

- ash

- lime

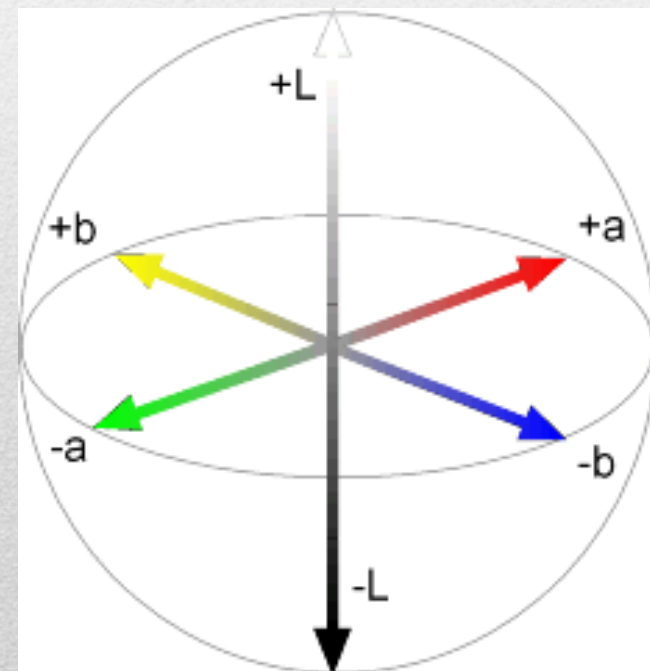
- spruce

- poplar

- **evaluation with**

- CIE $L^*a^*b^*$ (CIELAB)**

BACKGROUND:



- **main objective: visual appearance**

- the color changes of different wood species by laser treatment

- different laser parameters

- different surface treatments

INTRODUCTION:

- diffuse porous hardwood
- good mechanical properties
- low price

hardness	modulus of elasticity	modulus of rupture	density
33 N/mm ²	14.000 N/mm ²	120 N/mm ²	690 kg/m ³

BEECH (Fagus sylvatica)

- diffuse porous hardwood
- processed easily
- reduced weight of ski

hardness	modulus of elasticity	modulus of rupture	dry-density
16 N/mm ²	9.000 N/mm ²	98 N/mm ²	530 kg/m ³

LIME (Tilia platyphyllos)

- ring porous hardwood
- typical wood species for ski core production

hardness	modulus of elasticity	modulus of rupture	dry-density
38 N/mm ²	13.400 N/mm ²	120 N/mm ²	690 kg/m ³

ASH (Fraxinus excelsior)

- coniferous wood species
- usually not used in ski production
- importance for Austrian wood industry

hardness	modulus of elasticity	modulus of rupture	dry-density
12 N/mm ²	12.000 N/mm ²	95 N/mm ²	430 kg/m ³

SPRUCE (Picea abies)

- diffuse porous hardwood
- low price

hardness	modulus of elasticity	modulus of rupture	dry-density
10 N/mm ²	8.800 N/mm ²	60 N/mm ²	450 kg/m ³

poplar (populus nigra)

- 15 samples:
 - length 200 mm
 - cross section: 20mm x 20mm
- CO₂ Laser Speedy 500

max. power

120 watt

METHODS:



- **laser parameters:**
 - laser beam intensity
 - number of laser points
 - coatings of the wood
- rectangular field of 10 mm x 10 mm

METHODS:

- In our study the following parameter combinations were chosen:

	Intensity	Laser points per inch
1	No laser treatment	
2	40 Watts (low)	333
3	40 Watts(low)	1000
4	120 Watts (high)	333
5	120 Watts (high)	1000

METHODS: LASER TREATMENT

- After the laser treatment the samples were finished with three different types of surface treatment.

	Surface Treatment
1	samples without final treatment
2	samples with an oil finish
3	samples with a lacquer finish

METHODS: SURFACE TREATMENT

- Spectrophotometer
- measure the shade



METHODS: MERCURY 2000

a.) without finish

b.) oil finish

c.) lacquered

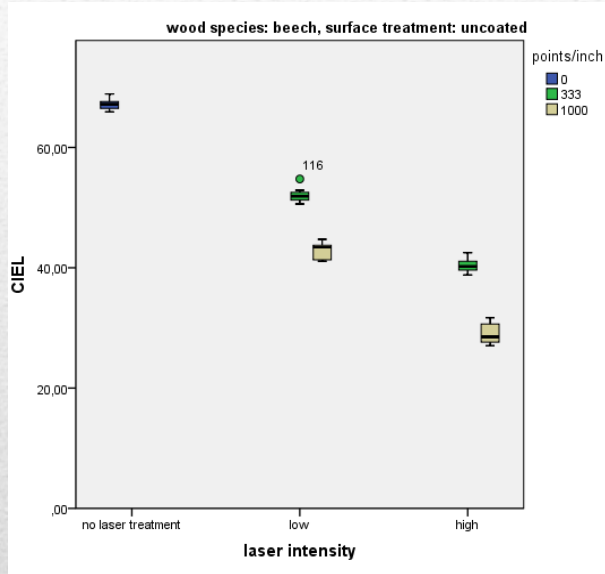


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2 3 4 5

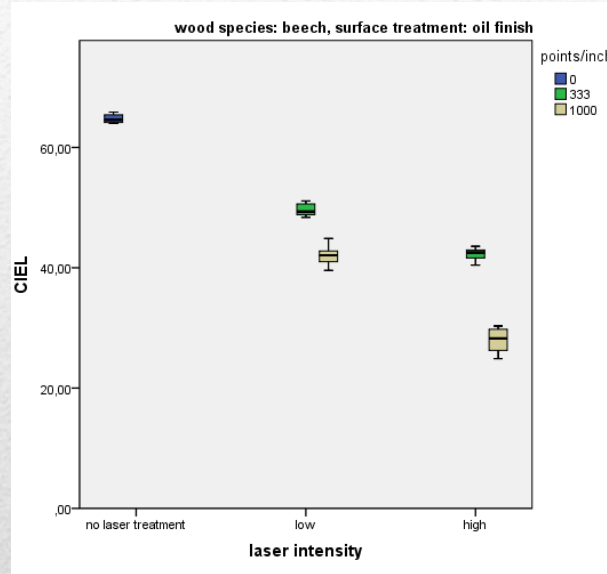
	intensity	laser points per inch
1	No laser treatment	
2	40 Watt (low)	333
3	40 Watt (low)	1000
4	120 Watt (high)	333
5	120 Watt (high)	1000

RESULTS: BEECH SAMPLES

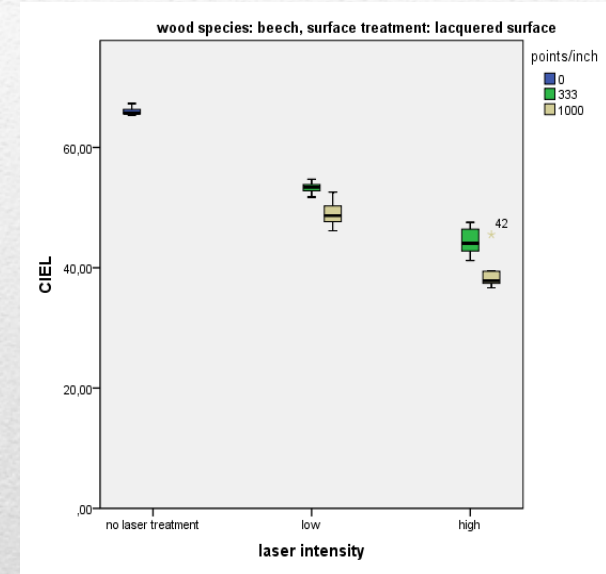
a.) without finish



b.) oil finish

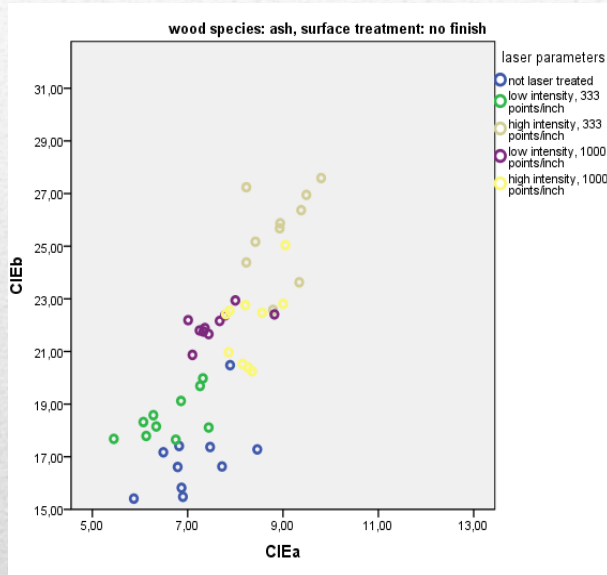


c.) laquered

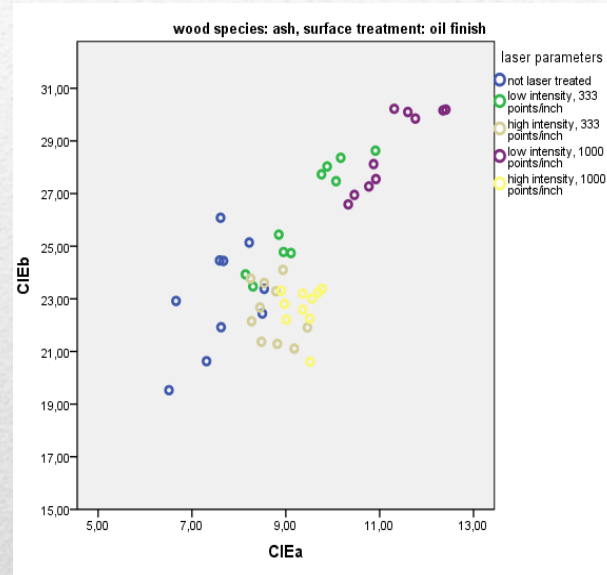


RESULTS: BEECH SAMPLES

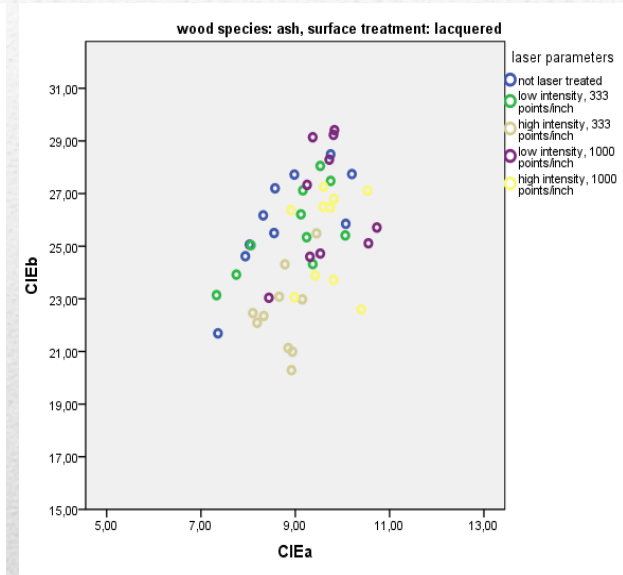
a.) without finish



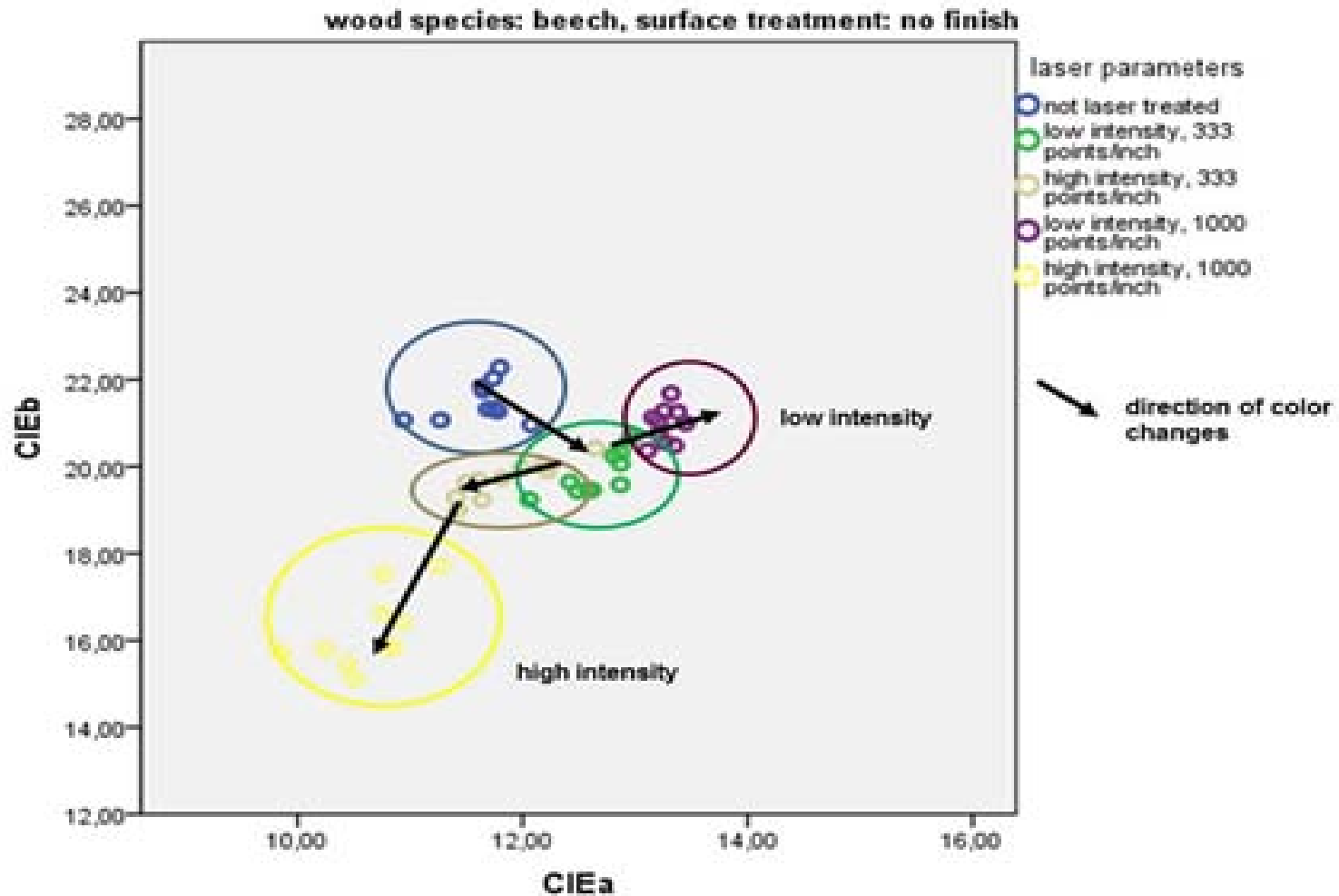
b.) oil finish



c.) lacquered



RESULTS: BEECH SAMPLES



RESULTS: BEECH SAMPLES



Beech veneer: without finish



Bamboo veneer: oil finish

FURTHER TESTING: VENEER



Poplar core: without finish



Poplar/ash core: wax finish



Poplar/beech core: oil finish

FURTHER TESTING: CORES

- Different colors depend on:
 - type of wood
 - intensity of the beam
 - points per inch
- Further testing is necessary

CONCLUSION:



THANK YOU FOR YOUR ATTENTION
