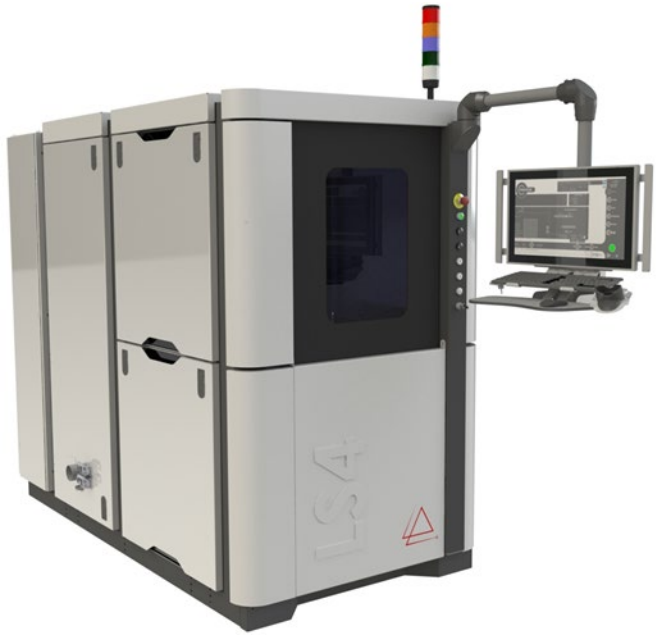
Micro-optics SUMMIT & EXPO

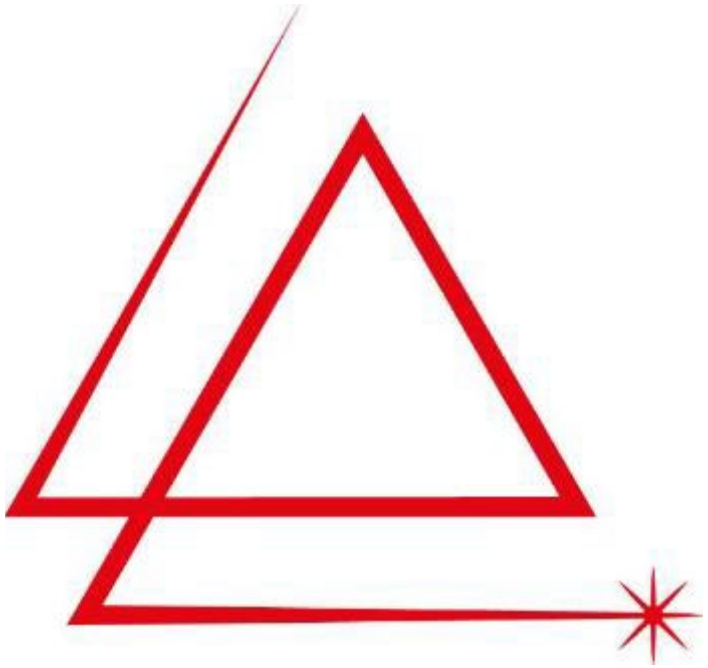
ENHANCING CONSUMER PRODUCT PERFORMANCE WITH ULTRAFAST LASER TECHNOLOGY

Céline Petit
Process Engineer, LASEA



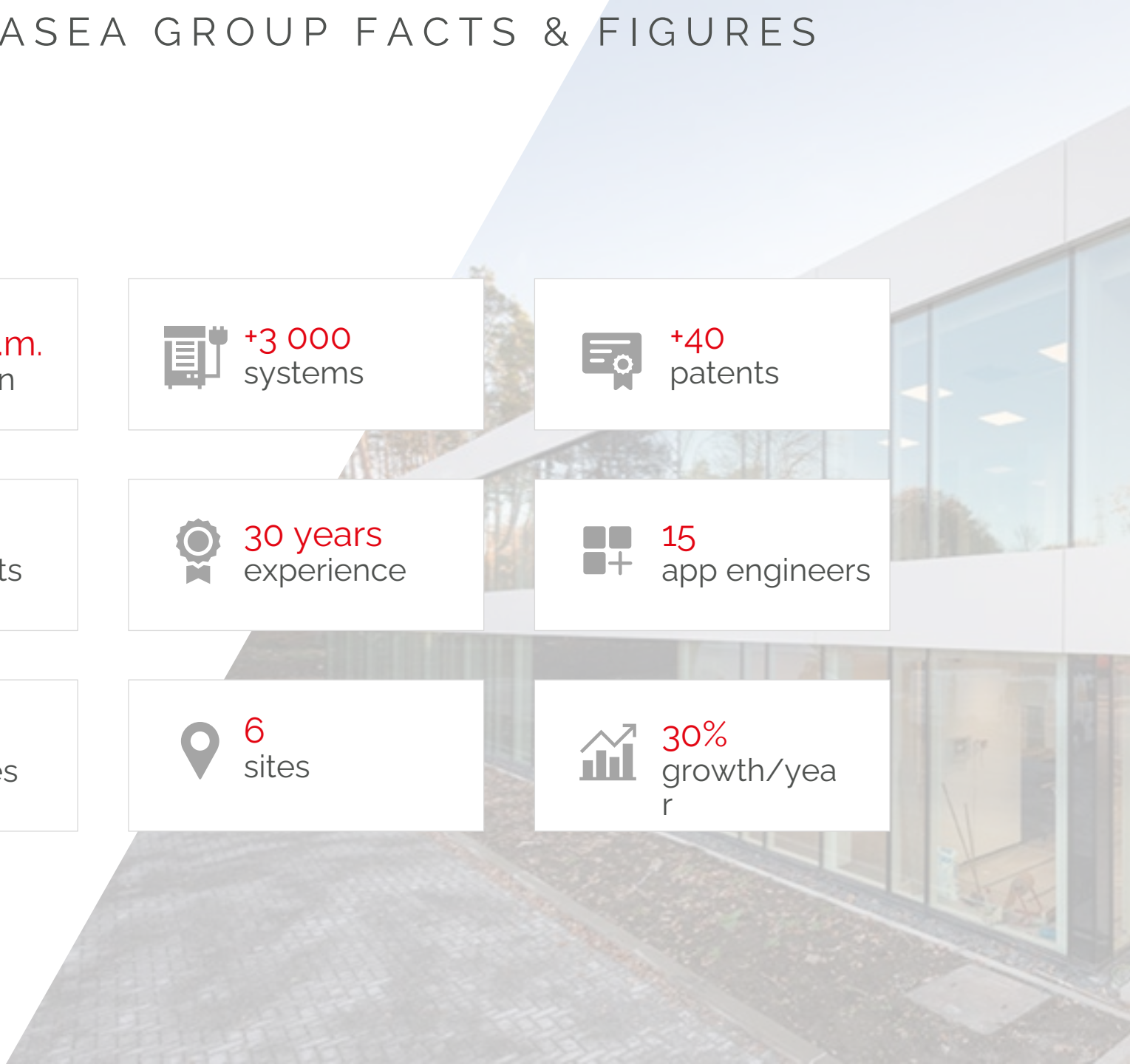
LASEA LASER SOLUTIONS

SUMMARY



1. Introduction: Lasea Group
2. Laser machines
3. Future: AI predictions
4. Conclusion

1.INTRODUCTION: LASEA GROUP FACTS & FIGURES



- 8 500 sq.m. production
- +3 000 systems
- +40 patents
- 5 continents
- 30 years experience
- 15 app engineers
- 180 employees
- 6 sites
- 30% growth/year

1.INTRODUCTION: LASEA GROUP

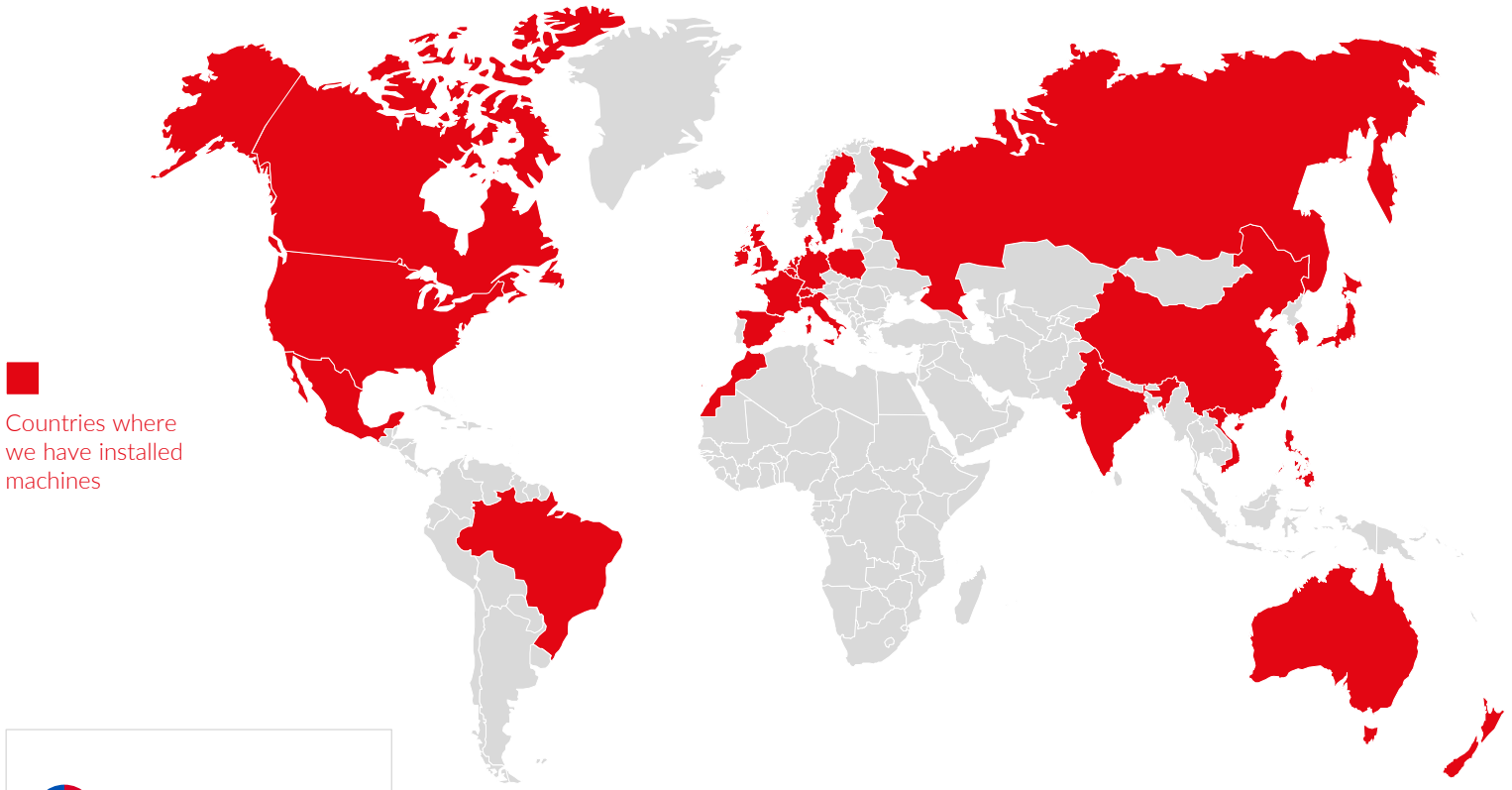
LASEA LASER SOLUTIONS

OPTEC LASEA GROUP

LASEA OPTICAL SYSTEMS

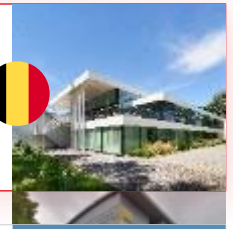
LASER CHEVAL

1.INTRODUCTION: LASEA GROUP LOCATIONS



Countries where we have installed machines

LASEA Belgium Liège (Headquarters)



OPTEC Mons

LASEA France Bordeaux

LASER CHEVAL France Besançon

LASEA Switzerland Biel

LASEA USA Optec LLC San Diego

- CohPros
- Rainford Precision
- LAS Photonics

Raymax

- Sydney

BEAMS

- Tokyo

1.INTRODUCTION: 4 STRATEGIC MARKETS

LUXURY

MEDICAL

ELECTRONICS

RESEARCH

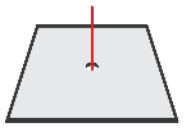
1.INTRODUCTION: 4 STRATEGIC MARKETS

LUXURY

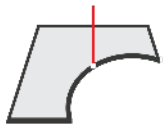
MEDICAL

ELECTRONICS

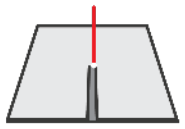
RESEARCH



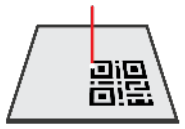
DRILLING



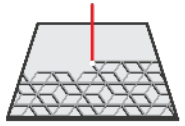
CUTTING



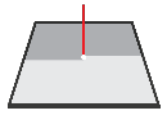
ENGRAVING



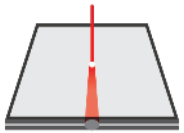
MARKING



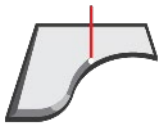
TEXTURING



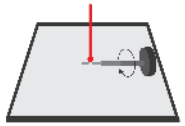
THIN FILM REMOVAL



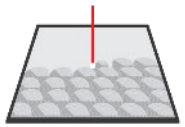
WELDING



CHAMFERING



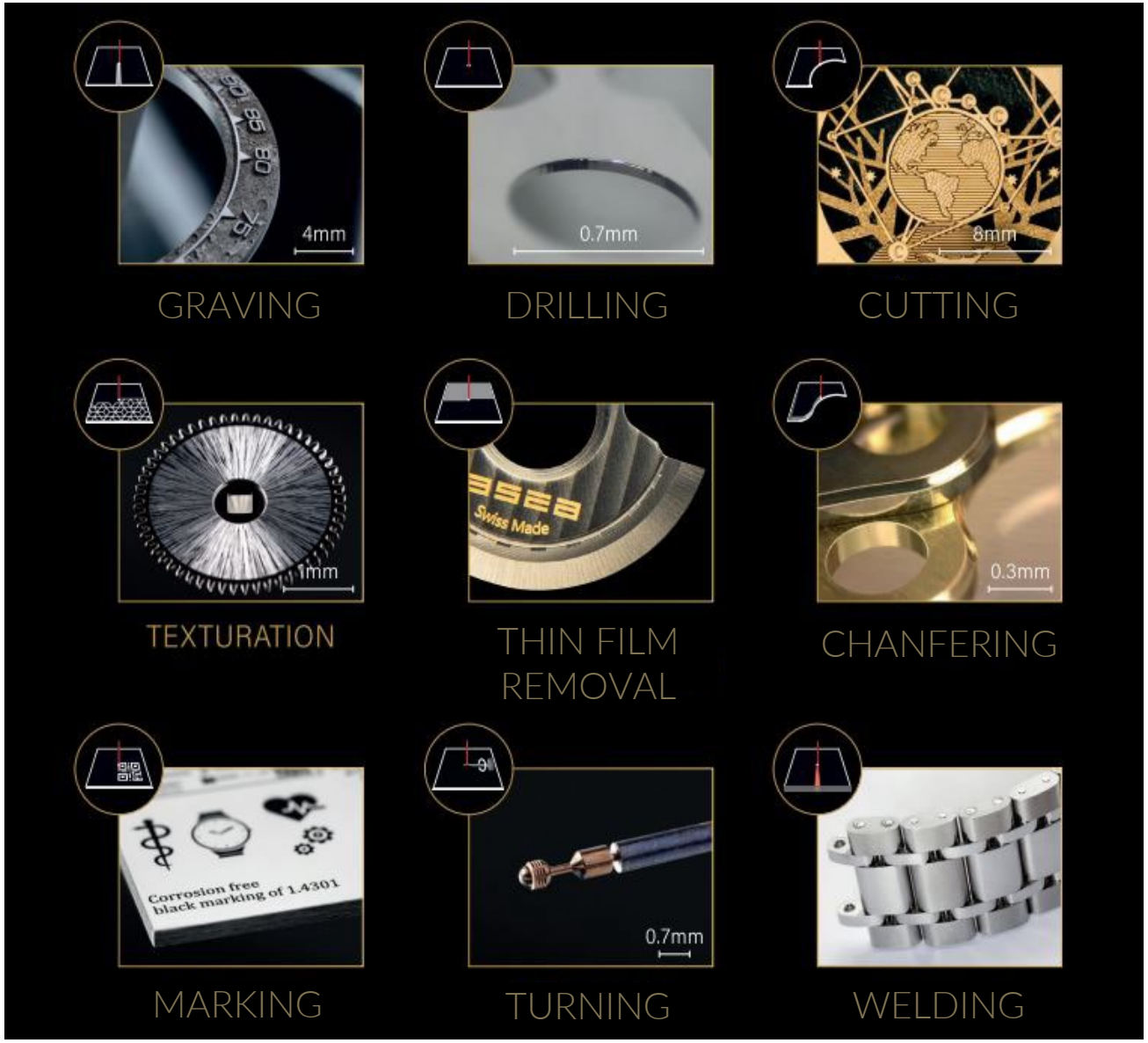
TURNING



PERLAGE

1.INTRODUCTION: 4 STRATEGIC MARKETS

LUXURY

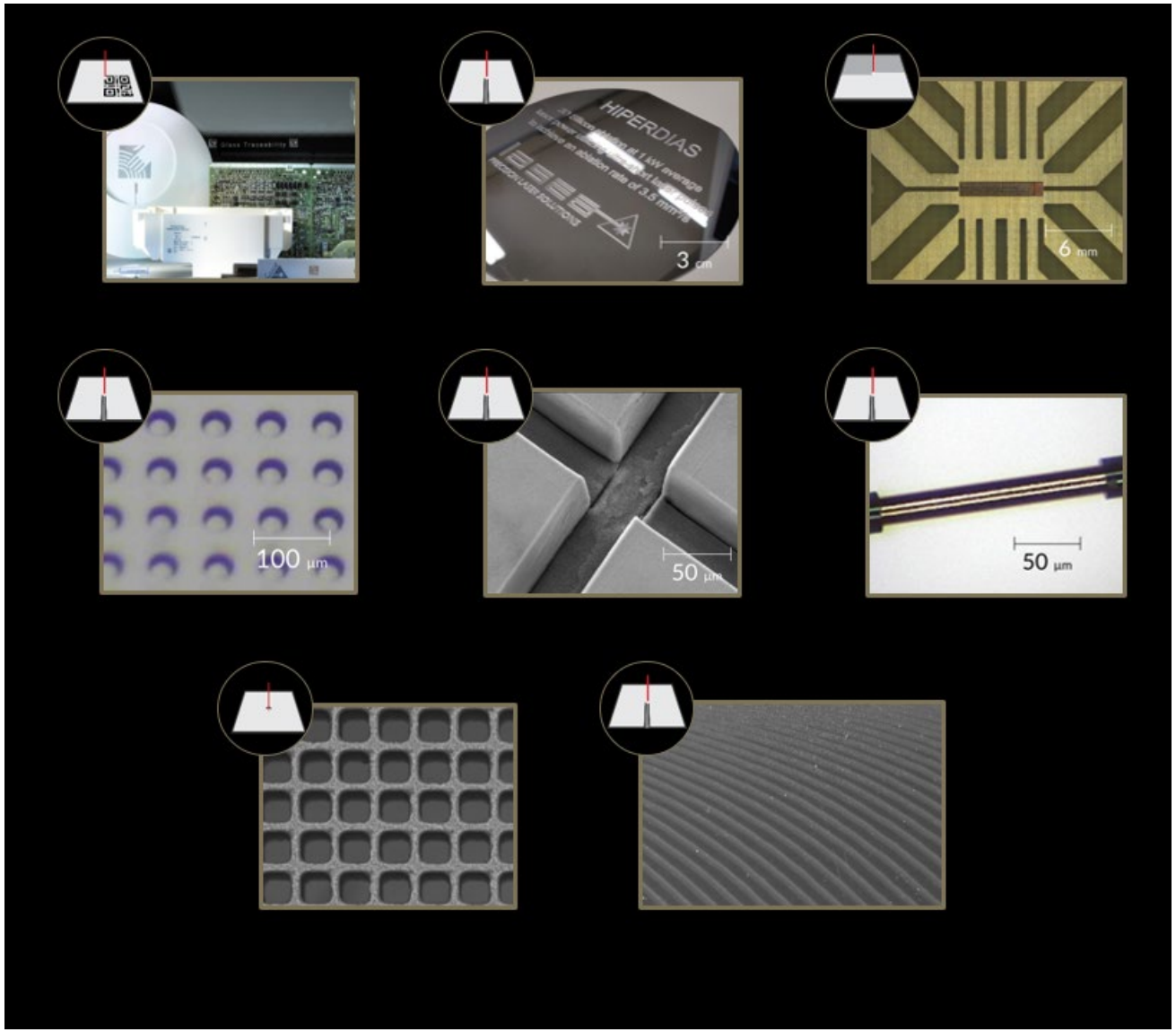


INTRODUCTION: 4 STRATEGIC MARKETS

MEDICAL

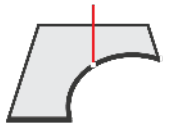
1.INTRODUCTION: 4 STRATEGIC MARKETS

ELECTRONICS

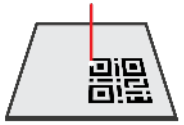


User case: production of isolated circuits on a foil for Morrow

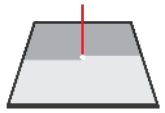
ELECTRONICS



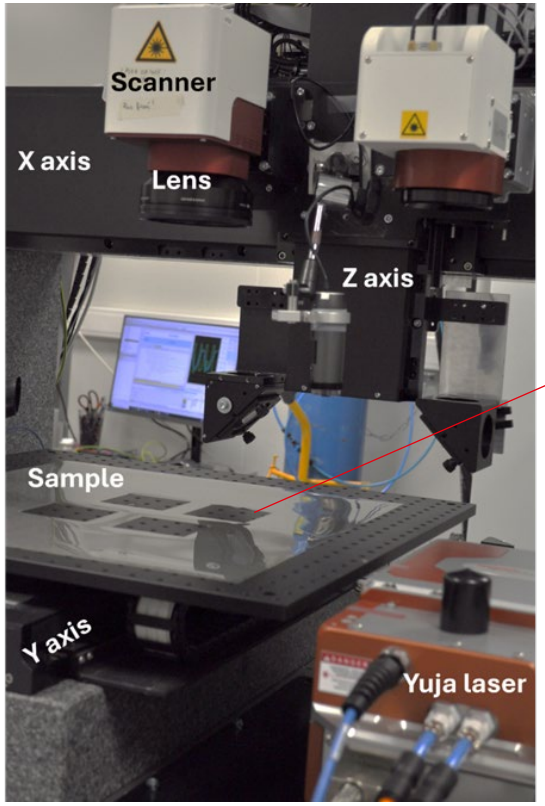
CUTTING



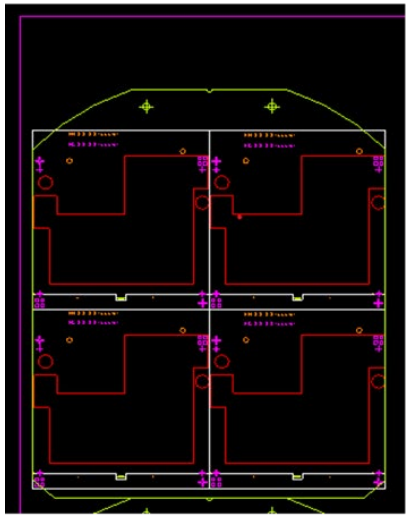
MARKING



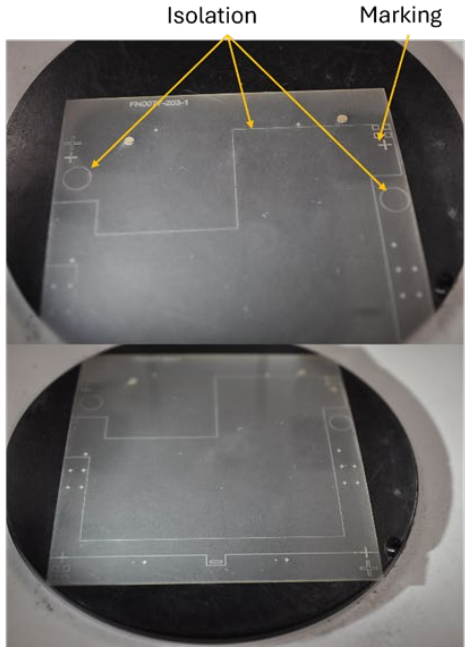
THIN FILM REMOVAL



MORROW



Dxf of the cells

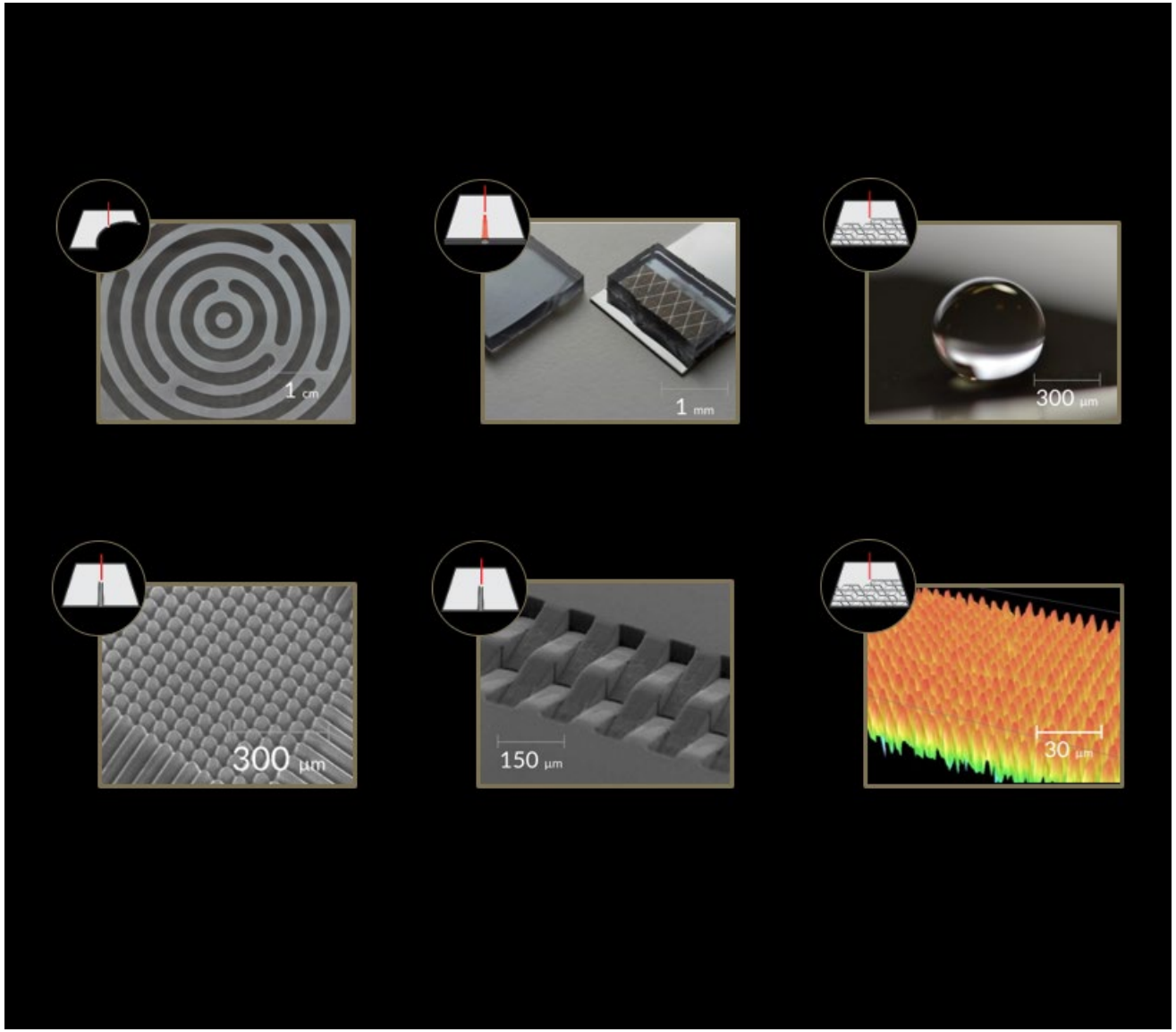


Proof of concept: small production to evaluate:

- ✓ Quality
- ✓ Repeteability

1.INTRODUCTION: 4 STRATEGIC MARKETS

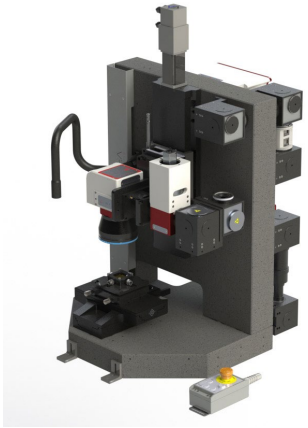
RESEARCH



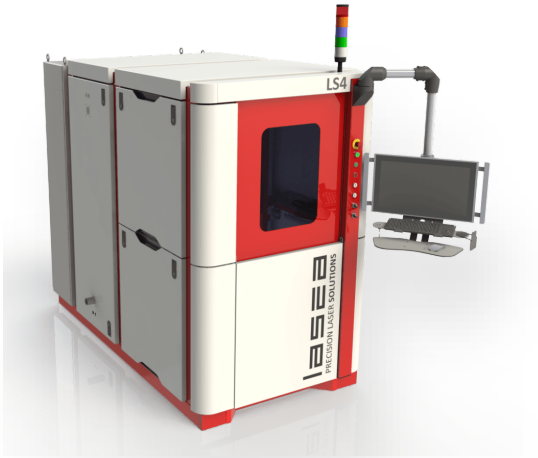
2. LASER MACHINES

Wide range of workstations: a solution for each application

LS-LAB



LS4



New product: LASEA neo

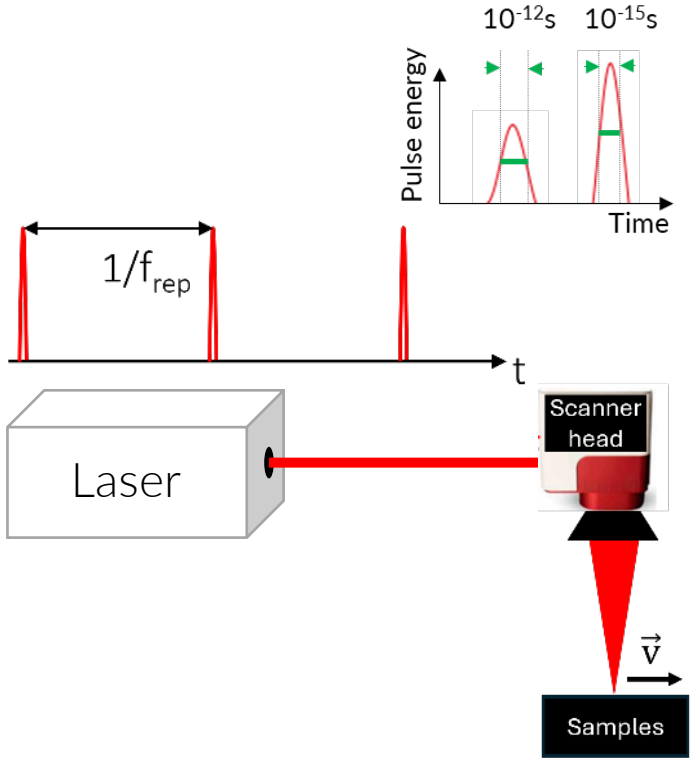
Custom machines

LS4-P

2. LASER MACHINES

Ultrafast lasers: picosecond or femtosecond pulse duration

- Wide range of accessible parameters for each process to develop:
  - Laser parameters (i.e. Pulse energy and frequency f_{rep})
  - Engraving parameters (i.e. Scanning speed $\vec{v}$)



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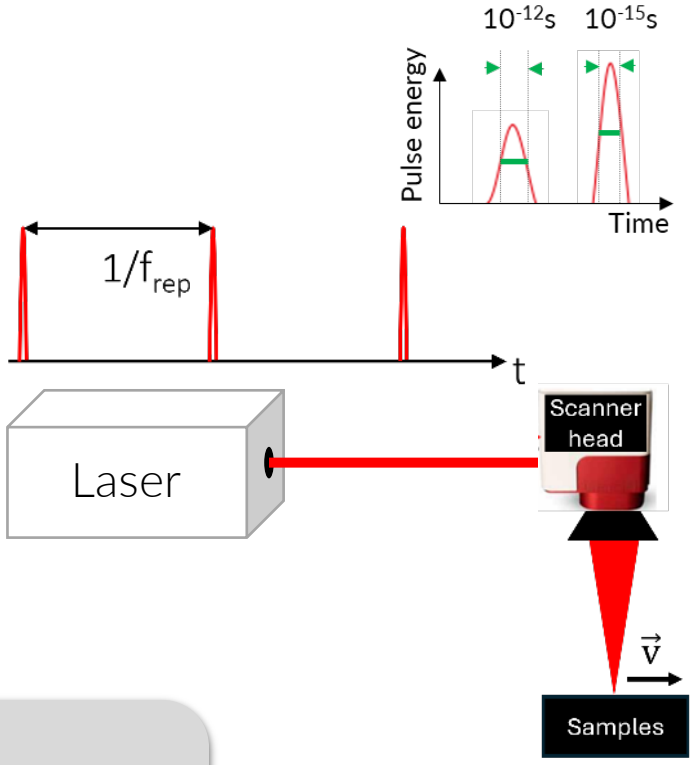


- Advantage of ultrafast lasers:
  - No thermal damage

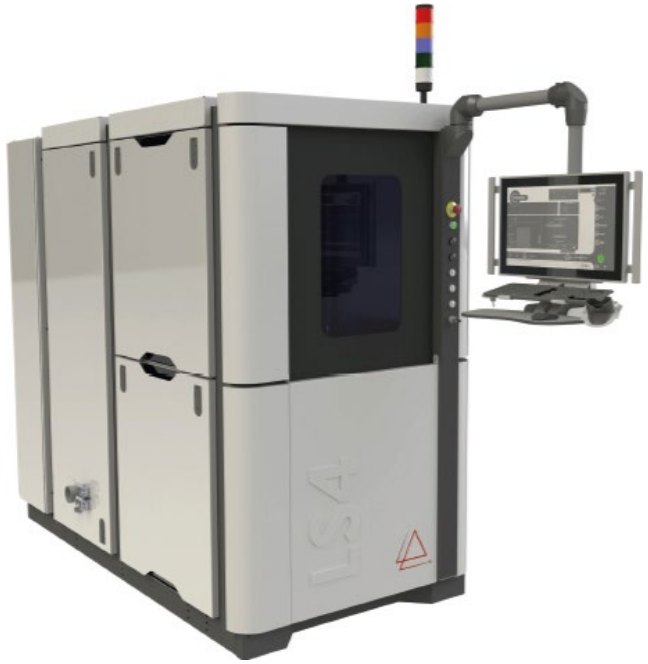
- High quality
- Excellent repeatability
- Wide range of materials that can be processed

2.LASER MACHINES

Wide range of workstations: a solution for each application

Flexibility : One machine to cover all the applications
From cutting to texturing or engraving

LS4 & LS4-P



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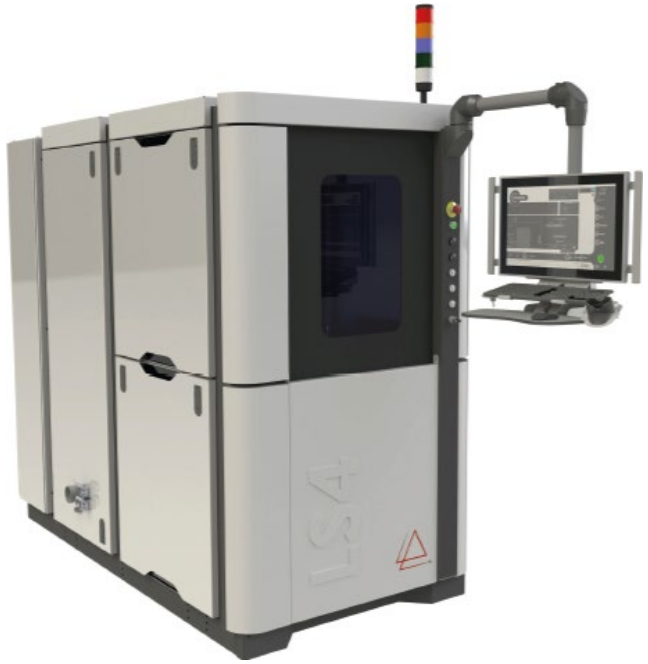
LS4 & LS4-P



Flexibility : One machine to cover all the applications
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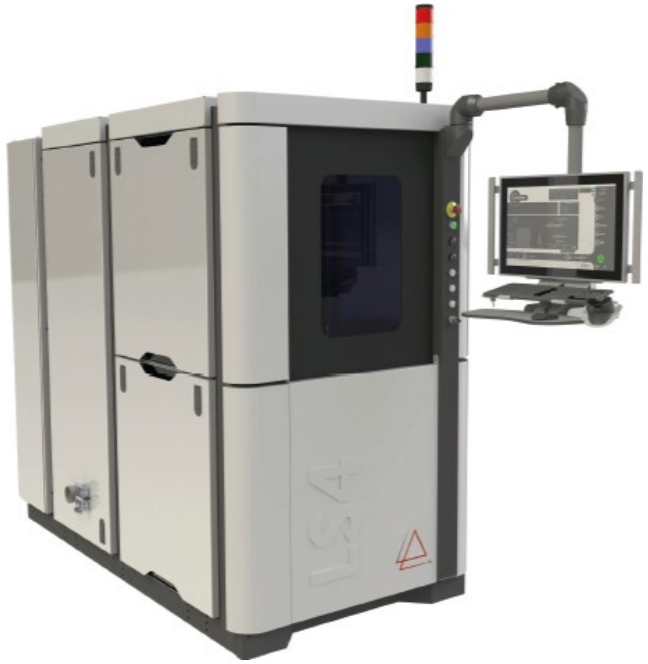
Single or multi-wavelength machines / Single or multi-laser source machines
From deep UV (Excimer) to far IR (CO2)

2.LASER MACHINES

Wide range of workstations: a solution for each application

LS4 & LS4-P



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Zero taper possibilities

2. LASER MACHINES

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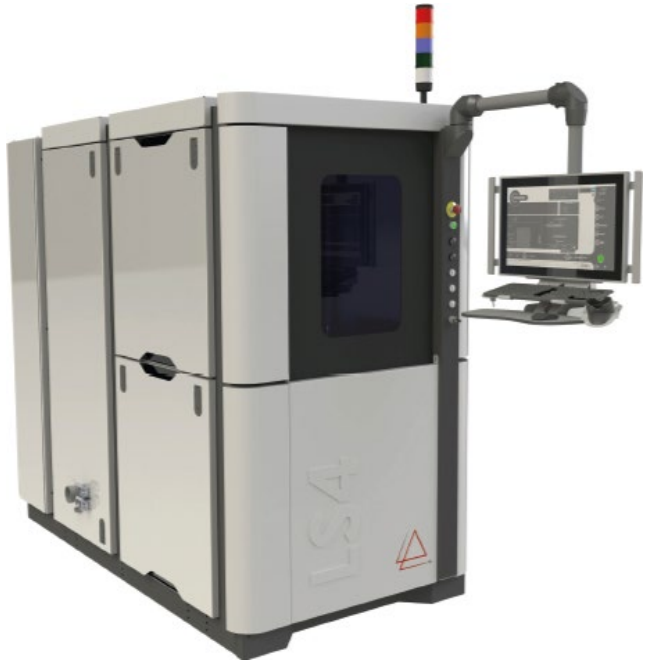
LS4 & LS4-P



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Zero taper possibilities

3 to 5 axes

Automated solutions for 24/7 production

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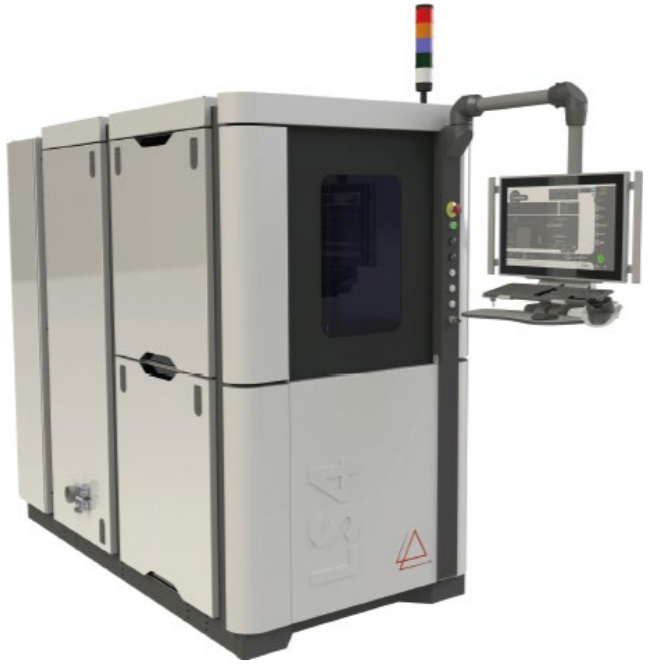
Wide range of workstations: a solution for each application

LS4 & LS4-P



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Zero taper possibilities

3 to 5 axes

Automated solutions for 24/7 production

Needs of the industry:
- Quality
- Accuracy
- Productivity
- Flexible/automated

2.LASER MACHINES

Wide range of workstations: a solution for each application

New product: LASEA neo

Mutliheads machines

Two heads on one axis/Two heads on two axes

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Wide range of workstations: a solution for each application

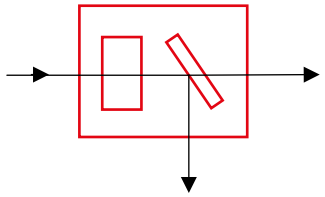
New product: LASEA neo

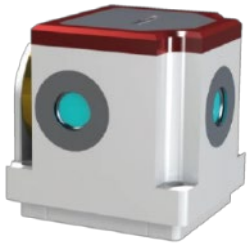
Mutliheads machines

Two heads on one axis/Two heads on two axes

Increased productivity

Beam divided in two beams- One beam/Heads





Polarizing optics

3.FUTURE: AI PREDICTIONS: ENHANCE PRODUCTIVITY AND AUTOMATION

Optimal process development for each application:

Quality and time criteria → ... →

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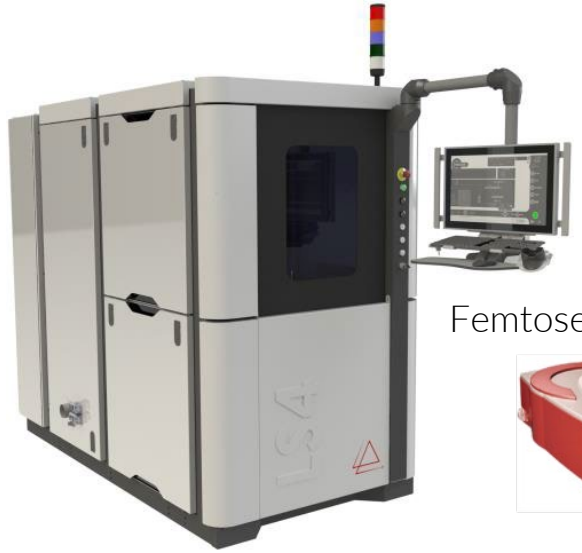
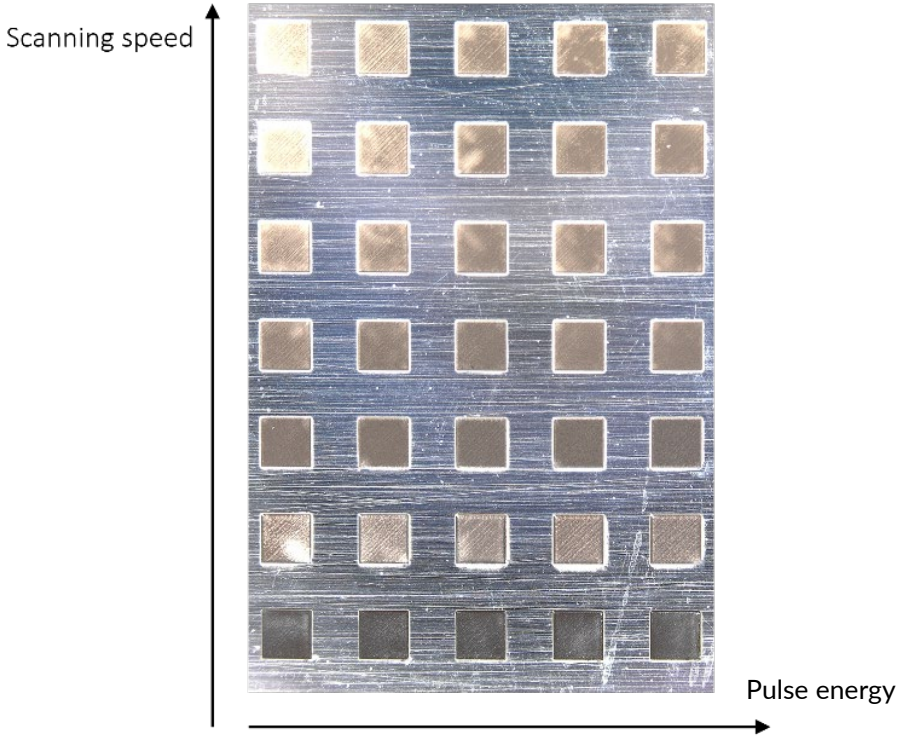
Laser parameters
Engraving parameters



Femtosecond laser

1.Test matrix



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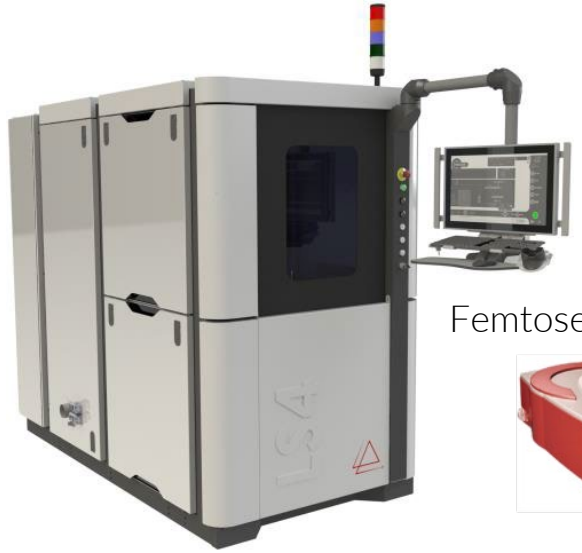
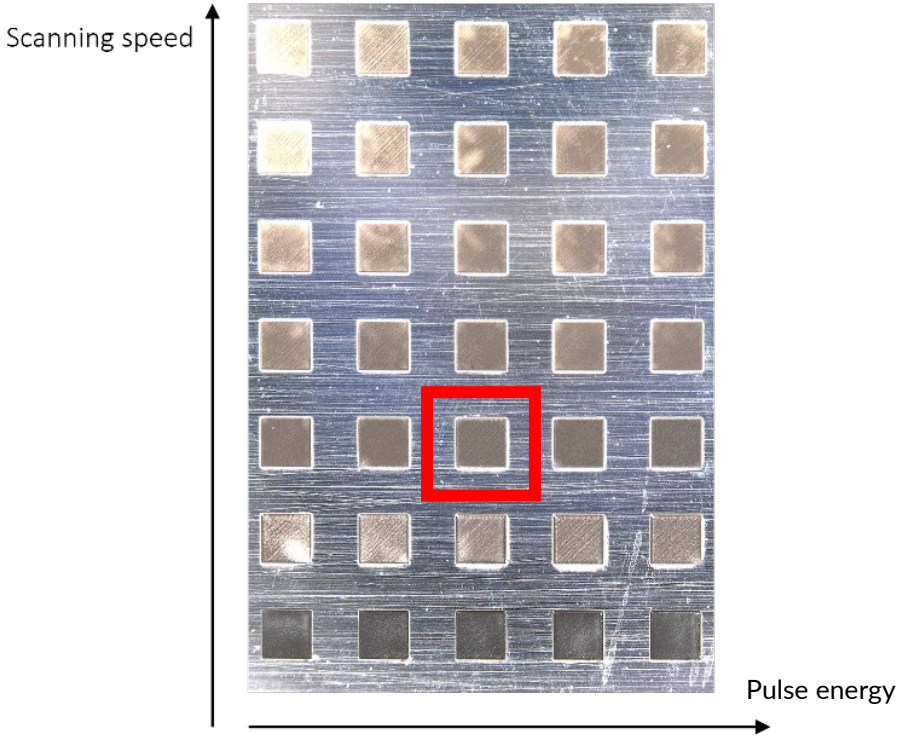


Femtosecond laser

2. Identify good parameters



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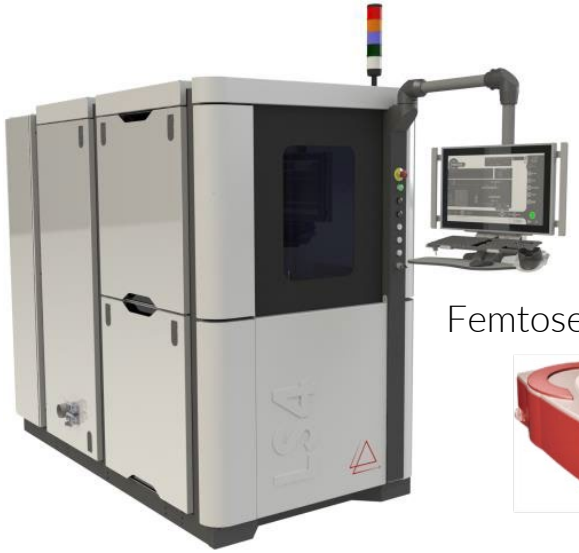

Femtosecond laser

3. Test & adapt to the specific application

Finding optimal process is time, samples, and personnel consuming

3.FUTURE: AI PREDICTIONS: ENHANCE PRODUCTIVITY AND AUTOMATION

Optimal process development for each application: AI prediction of optimal laser parameters sets for several materials

EP 3 743 236 B1

US12 032 878

Goals:

- Avoid the research phase of parameters for any kind of different materials
- To have a model easy to adapt to a new material and/or to a different machine

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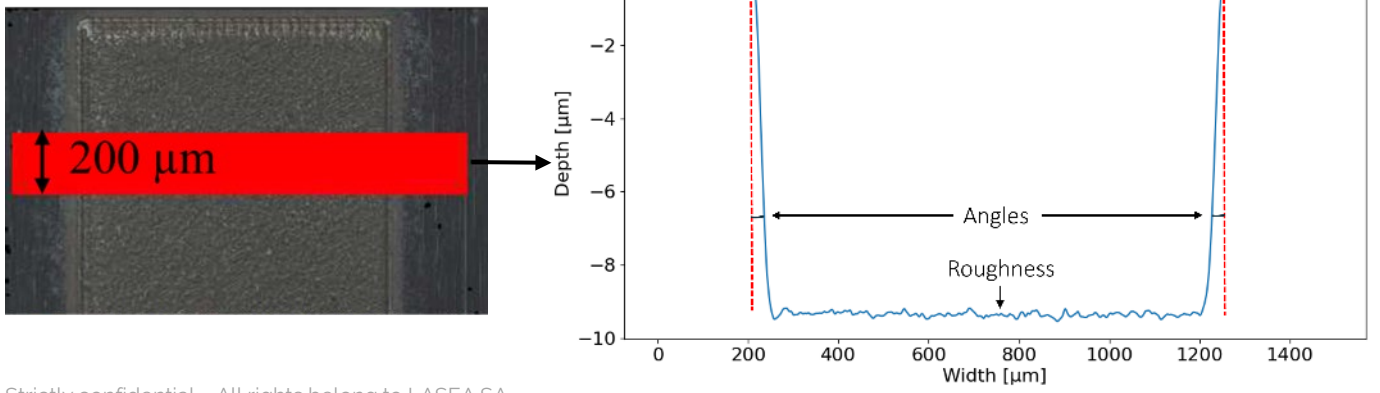
Targeted characteristics

- Ablation depth
- Surface roughness S_a
- Burrs
- Angles



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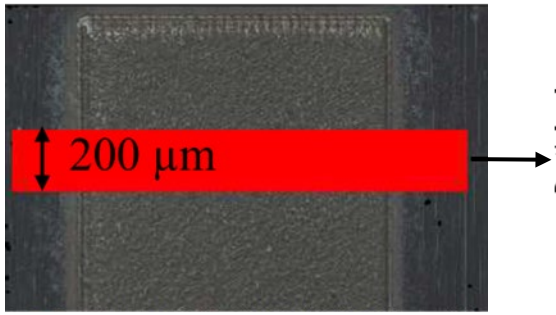
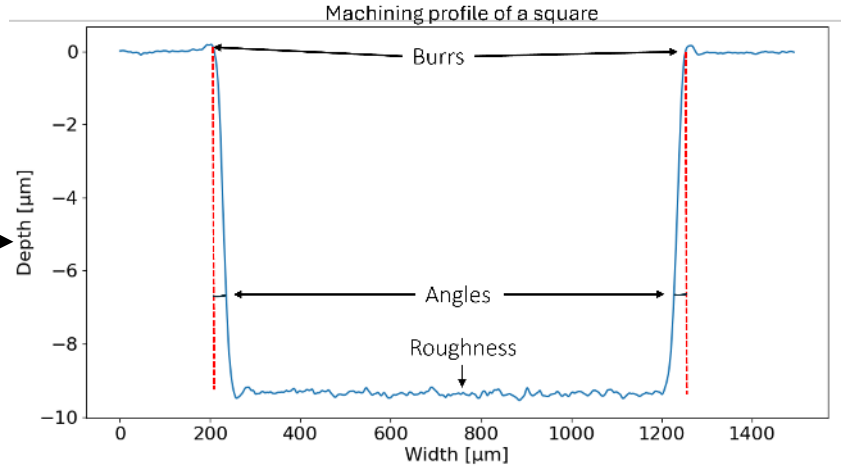
Predicted engraving parameters:

- Power
- Frequency
- Scanning speed
- Spot diameter
- Hatch pitch
- Number of layers
- Angle between layers





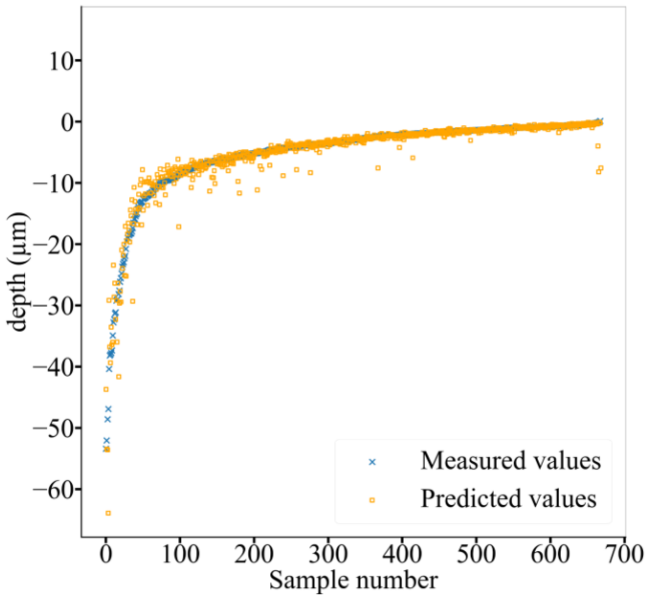
3.FUTURE: AI PREDICTIONS: ENHANCE PRODUCTIVITY AND AUTOMATION

EP 3 743 236 B1

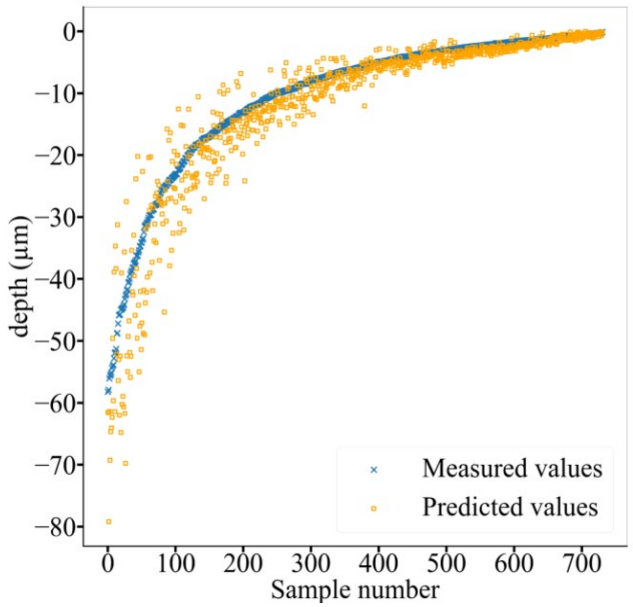
US12 032 878

Proof of concept: AI predictions of the ablated depth for several materials

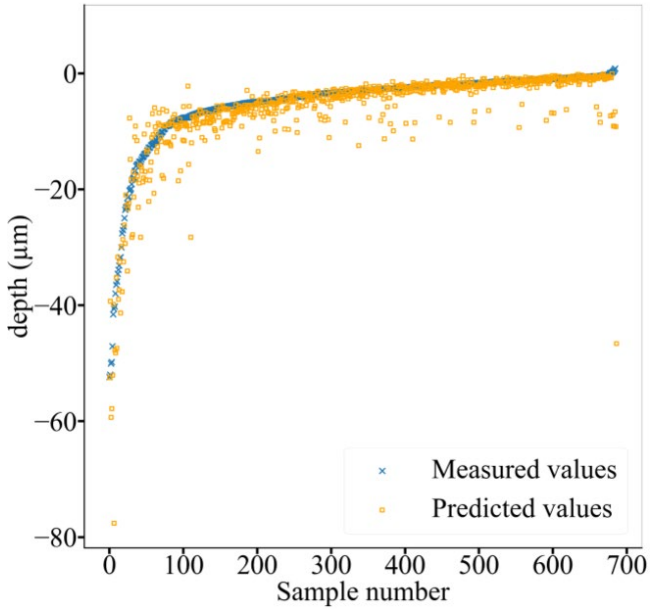
Stainless steel 304



Brass



Titanium



IN COLLABORATION WITH:

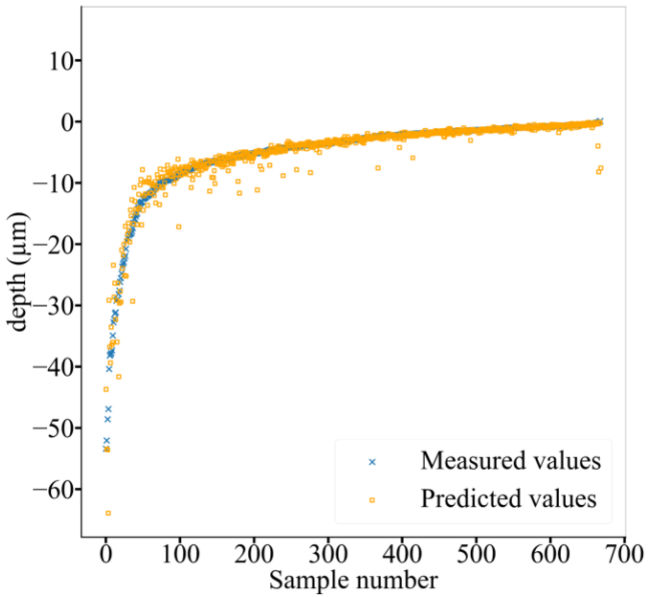
3.FUTURE: AI PREDICTIONS: ENHANCE PRODUCTIVITY AND AUTOMATION

EP 3 743 236 B1

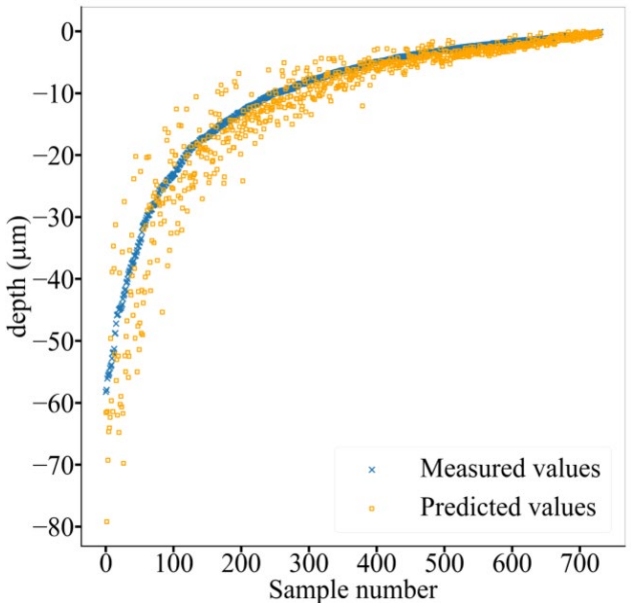
US12 032 878

Proof of concept: AI predictions of the ablated depth for several materials

Stainless steel 304



Brass



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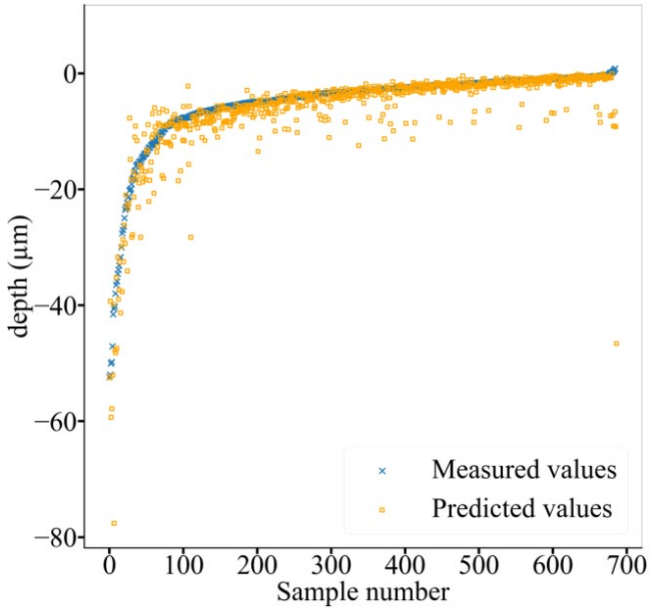

AI predictions of optimal laser parameters will enable productivity improvement by reducing time and material costs, and facilitating machine operation

IN COLLABORATION WITH: Sagacify

4. CONCLUSION

LASEA laser machines equipped with ultrafast lasers have:

- Single or multi-wavelength machines
- Single or multi-laser source machines
- Zero taper possibilities
- 3 to 5 axes
- Mutliheads
- Automated solutions

Future: machines equipped with AI prediction of optimal laser parameters

- ✓ Quality
- ✓ Accuracy
- ✓ Productivity
- ✓ Automated
- ✓ Flexibility: covering a lot of applications

Thank you for your attention

Contact
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Supports

Avec le soutien de la Wallonie

Phabulous

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