

FLASH

Flexible Laser-Based Manufacturing

PROJECT

CATALOGUE



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Project Overview

Flexible Laser-Based Manufacturing



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Project Overview

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The **FLASH** project aims to revolutionize manufacturing by leveraging *future-proof, highly customizable* and *energy-efficient laser-based production* systems to achieve highly precise photon distribution, with applications in **cutting, drilling, welding, cladding, and micro-machining**.

- **Funding Programme:**

HORIZON-CL4-2023-TWIN-TRANSITION-01-02

- **Project Consortium:**

16 industry leaders, from 11 different European Countries

- **Project Duration:**

36 months, 2024-2027

3drivers
QUADRANTE

aimen
CENTRO TECNOLÓGICO

ATS

cailabs
SHAPING THE LIGHT

diamoutils
PRECISION DIAMOND TOOLS

IMA AUTOMATION

University of
HUDDERSFIELD
Inspiring tomorrow's professionals

Prima
Additive

ROBUST AO

SYNOVA

EWF

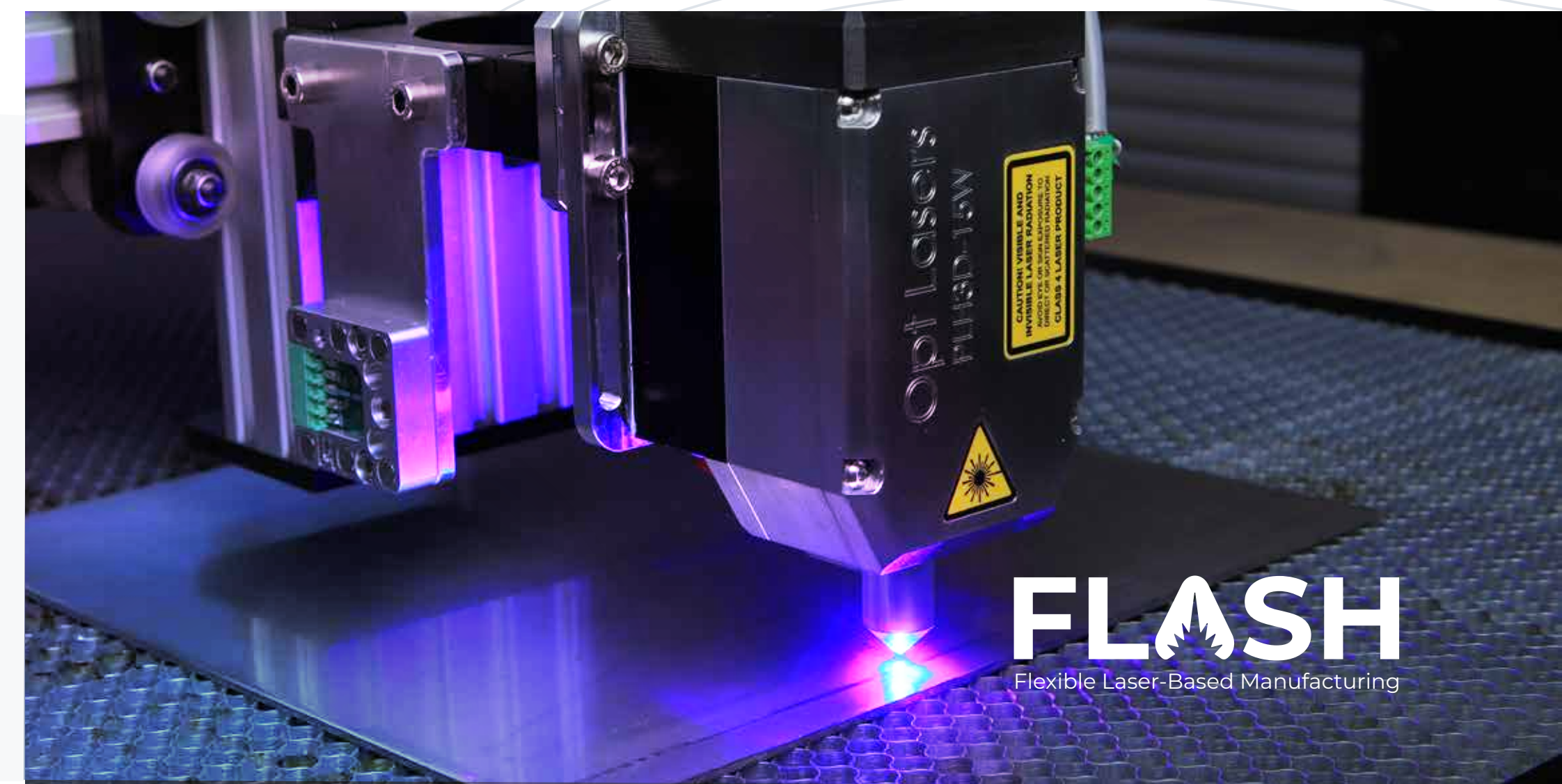
UNIVERSITÀ
DEGLI STUDI
DI PALERMO

COSMOS THRACE

mtc where
progress
happens

TOFAŞ
TÜRK OTOMOBİL FABRİKASI A.Ş.

DePuy Synthes
THE ORTHOPAEDIC COMPANY OF Johnson & Johnson





Project Motivation

Flexible Laser-Based Manufacturing



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Project Motivation (1/2)



Motivation #1

More Flexible



Motivation #2

Use fewer
consumables



Motivation #3

Generate less waste



Motivation #4

Allow digital control



There is a
need for
machining
tools that are:

There is a
need for
machining
tools that are:

tools that are:

Project Motivation (2/2)

Laser-based Manufacturing

*Traditional Mechanical,
Chemical, or Thermal Processes*

**Cutting, Welding, Drilling, Machining,
Milling and Polishing.**

Existing laser-based machines are for **single applications**;

Traditional laser-based processes are generally **unsuitable** for manufacturing advanced composites and highly reflective materials;

There is a **lack of know-how**, making process design slow and expensive.



Project Objectives

Flexible Laser-Based Manufacturing



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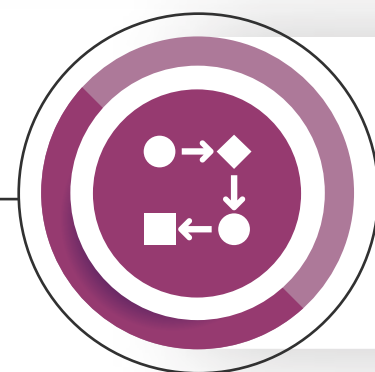
Project Objectives

The **FLASH** project aims to pioneer the next generation of laser machining through four key technology developments. The project will exploit new, advanced *methods laser-based* to enable *flexible* and *customizable production*.



Integrate 3 laser sources in a single laser module:

- 3 beam delivery heads & Dynamic beam shaping.



In-process monitoring and control:

- Acoustic Sensors & Optical Sensors.



Stablish processes for laser-based manufacturing:

- Identify the best sequence of individual processing steps.





Project Impact

Flexible Laser-Based Manufacturing



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Project Impact

The **FLASH** project is expected to be transformative *across several dimensions*, influencing the **manufacturing industry** and **associated sectors**. The advancements introduced have the potential to *reshape industrial practices* and contribute significantly to the *competitiveness of European manufacturing* on a global scale.

Provide agility, speed, cost-effectiveness, material flexibility, and energy savings compared to existing technologies



Agility

Quick/automated change laser beam settings: 10-15 seconds (vs minutes/hours)



Speed

Reduction in cycle time by up to 50%



Low CAPEX and space needs

Capital investment saving of at least €700k
Physical footprint ~86% less than 6 separate machines.



Material Flexibility

High-quality machining of advanced reflective metals for innovative materials.



Energy Savings

Up to 78% energy savings vs. single-step laser processing and 66% vs. three laser machines.



FLASH
Flexible Laser-Based Manufacturing

Project Implementation

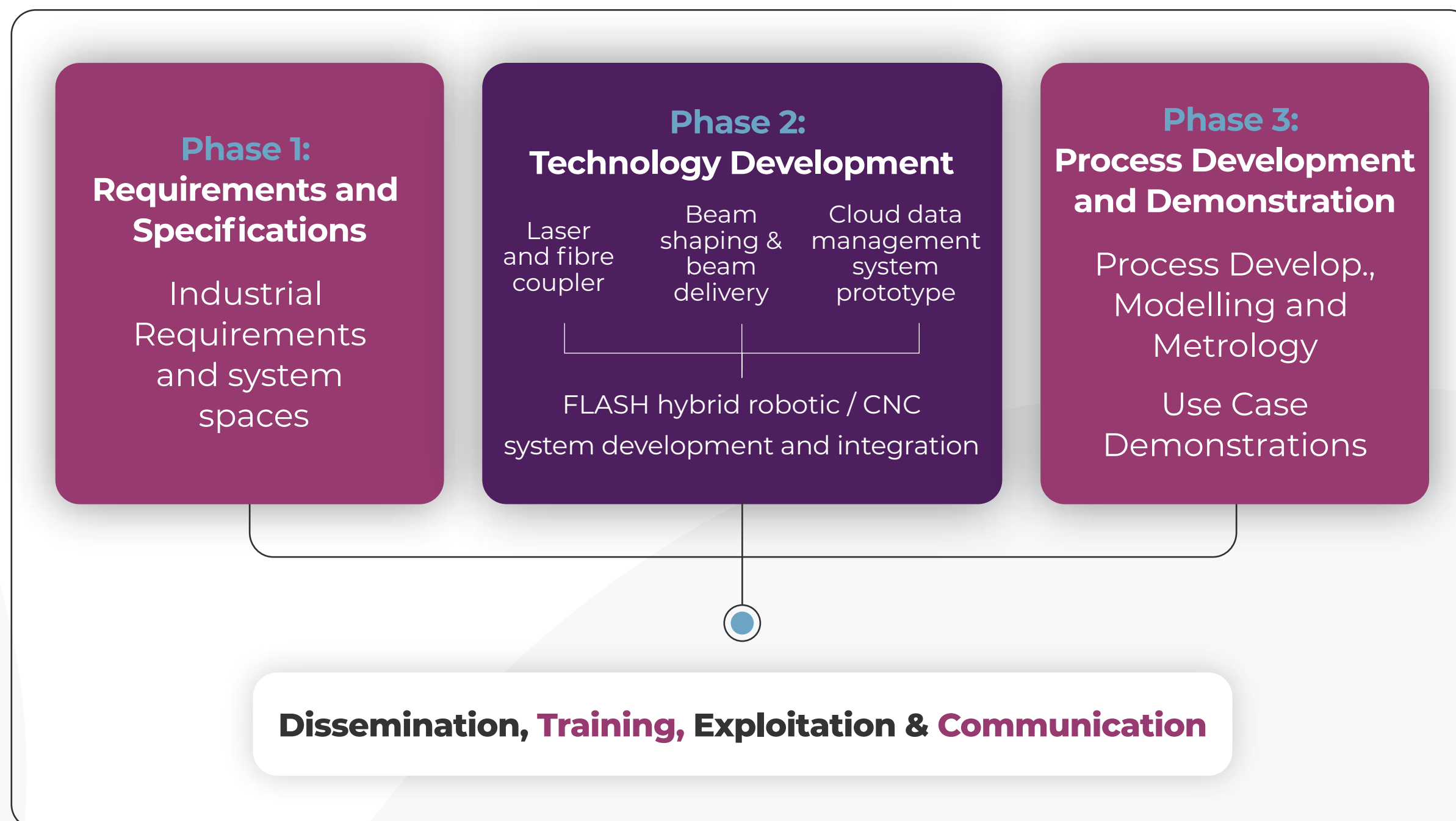
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Project Implementation

The **FLASH** solution introduces the potential for emerging business models by implementing **flexible** and **customizable tools**. This approach ensures modularity, aligning the **solution dynamically** with market demands.





Project Results

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Project Results



Five industrially relevant process designs for **laser-based manufacturing** of commercial components.



Technology transfer plan for **uptake of processes** by end-users.



Standardisation **recommendation** report and roadmap.



Exploitation plan for **commercialisation** of modular machine platform.



FLASH work-based **learning** and **training** resources .





Project Study Cases

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Project Study Cases (1/2)

5 PROJECT STUDY CASES

- Superabrasive Grinding wheels;
- Microdrills with a longer time life;
- Automotive cross-car beam joining;
- Copper hairpin stripping and welding;
- Acetabular orthopaedic implant component.



Acetabular Cup

At least 50% reduction in total machining time, and elimination of process consumables and waste.



Cross Car Beam

Process energy saving of 65% and weight saving of 1.5 kg per cross car beam.

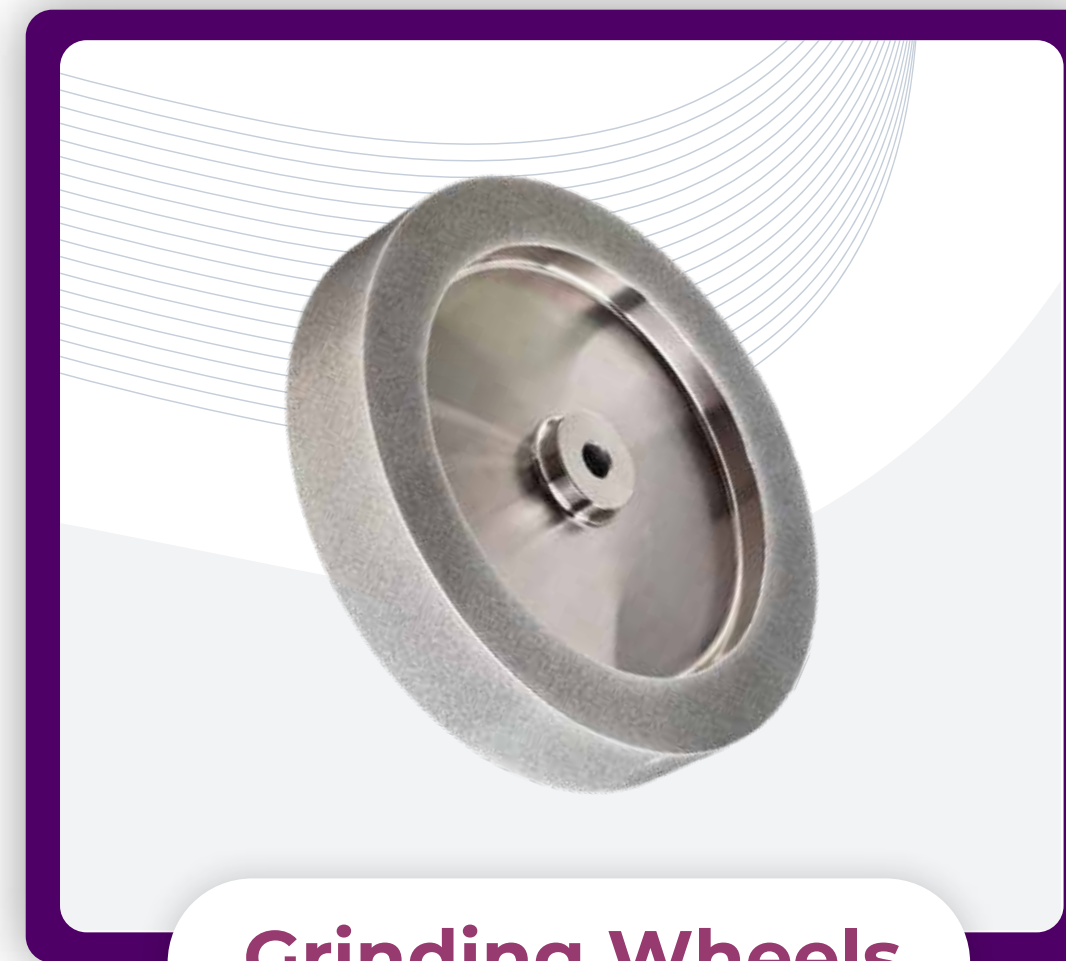


Project Study Cases (2/2)



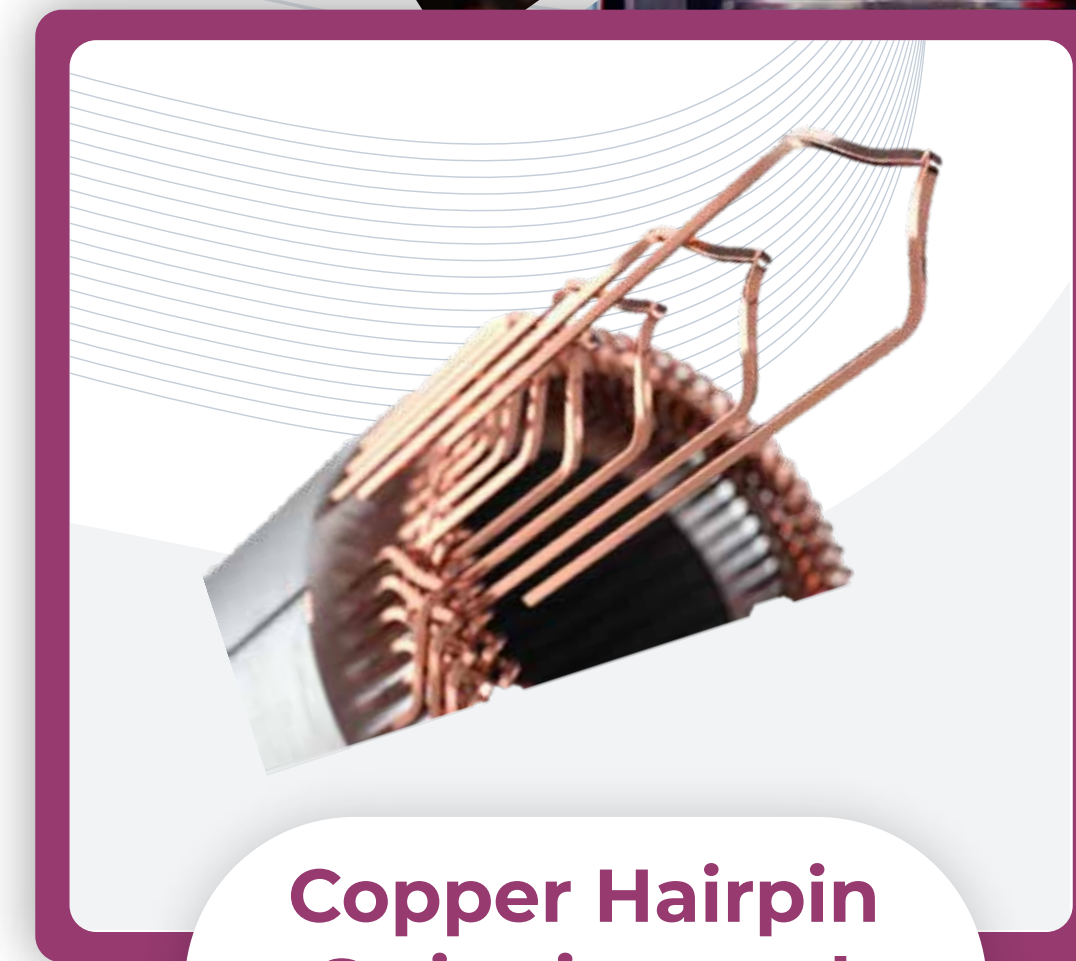
**Polycrystalline
Diamond Micro
Drill**

Reducing material waste by up to 20%, whilst delivering tools with a 10x longer lifetime.



Grinding Wheels

Eliminating the polluting chemicals used in the galvanic electroplating process, reducing process waste by 30% and extending tool lifetime by 3 times.



**Copper Hairpin
Stripping and
Welding**

Increasing the rate of stripping by 70% vs SOTA laser processing and increasing final weld quality whilst reducing energy consumption by 60% vs SOTA IR laser welding.

Thank you.

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Any Questions?

"If there are any questions or if something needs further explanation, please, [don't hesitate to ask!](#)"



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