



# MULTI-FUN

ENABLING MULTI-FUNCTIONAL  
PERFORMANCE THROUGH  
MULTI-MATERIAL ADDITIVE  
MANUFACTURING



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862617 – MULTI-FUN

“Enabling multi-functional performance through multi-material Additive Manufacturing”

[www.multi-fun.eu](http://www.multi-fun.eu)



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# HOW DID MULTI-FUN ARISE?



**METAL ADDITIVE MANUFACTURING PBF** is ...  
suitable to produce **unique parts** or **full series production** ...

**BUT**

It is **NOT** capable of going beyond  
**SINGLE MATERIALS**

Current range of **STANDARD ALLOYS IS RATHER SMALL**



**MULTI-FUN**

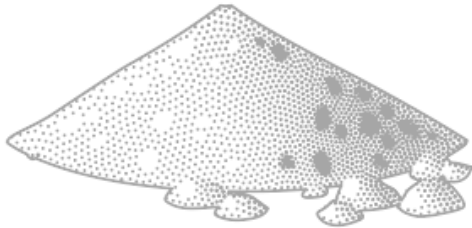
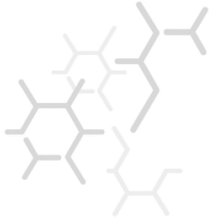
## HOW TO OVERCOME THE SHORTCOMINGS ?

- 1** Integration of multi-functionalities due to:
  - Novel active materials
  - New structural materials for WAAM
- 2** Multi-material design in geometrically complex 3D parts

# WHAT WILL MULTI-FUN DELIVER?

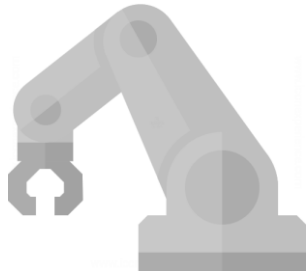


Combinations of **DIFFERENT MATERIALS ...**



... combined with the most appropriate

**AM TECHNOLOGY FOR THE DEPOSITION**



**MAXIMIZE THE  
BENEFITS**



# FEATURES ALLOWED BY INCLUSION OF NANO-MATERIALS



## HEAT SINK MATERIALS

with the highest thermal conductivity

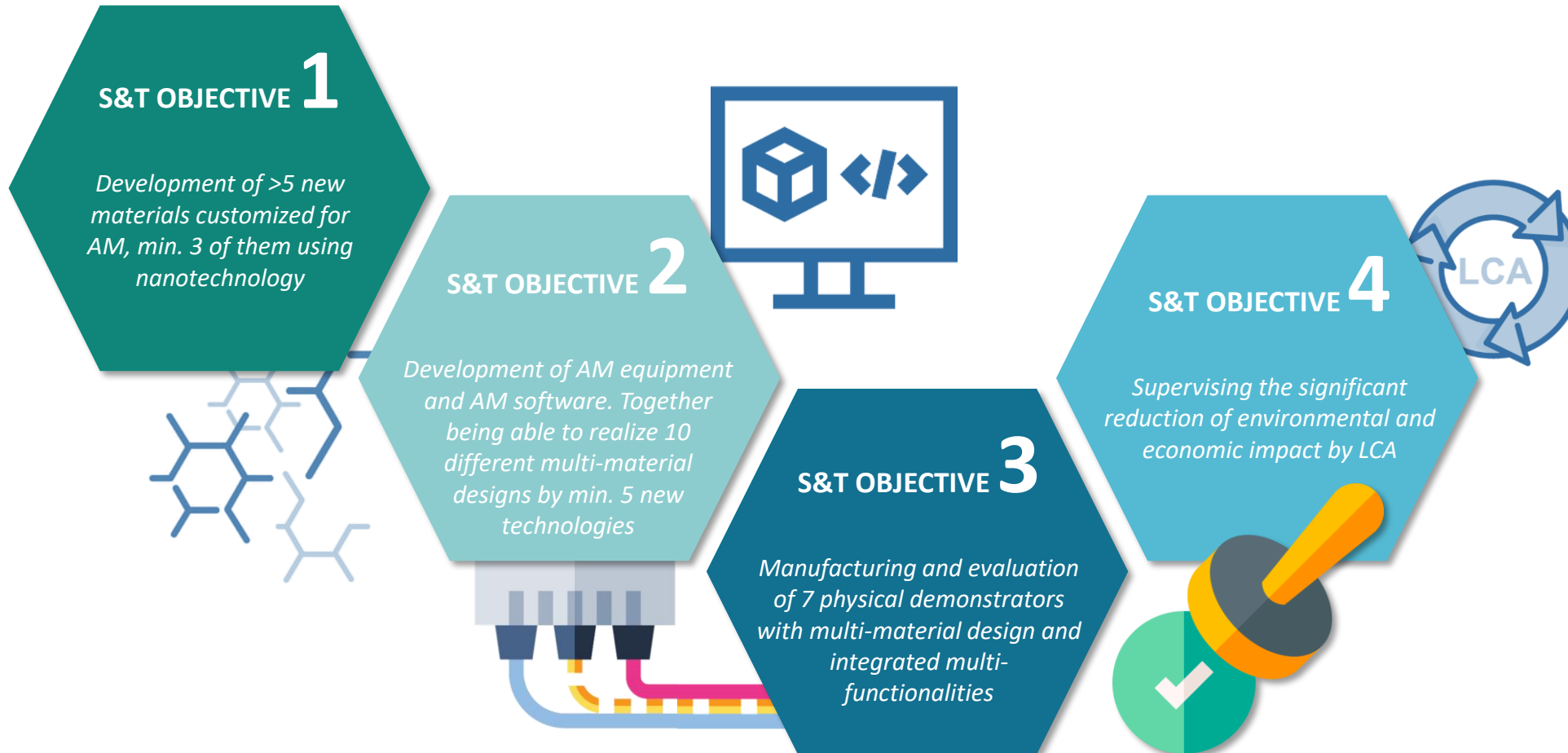
## A HIGH DEGREE OF INTEGRAL DESIGN

that makes possible to embed electrical conductors in complex shaped metal structures

Addition of **SENSING AND DATA TRANSFER CAPABILITIES** to the equipment and software development

The integration of **TAILORED OPTICAL FIBRES** will enable bringing advanced thorough sensing capabilities to the manufactured parts to perform **STRUCTURAL HEALTH MONITORING (SHM)**

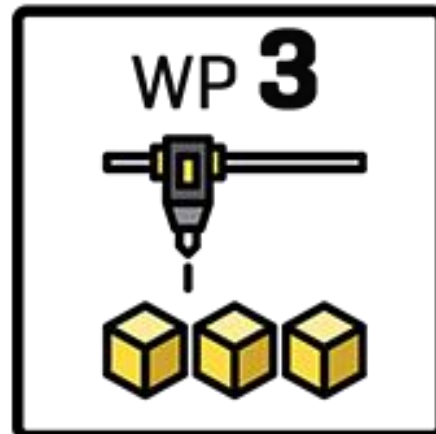
# SPECIFIC OBJECTIVES



# PROJECT IMPLEMENTATION | PHASE I



**INTERACTIVE  
DEVELOPMENT OF  
NOVEL MATERIAL &  
APPROPRIATE AM  
TECHNOLOGIES**



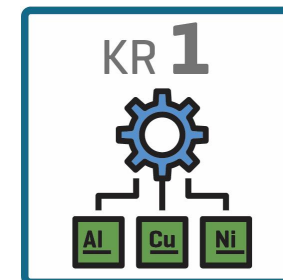
**SPECIFICATIONS,  
REQUIREMENTS &  
TARGET VALUES FROM  
LCA(WP1) & USE CASE  
(WP5)**

# PROJECT IMPLEMENTATION | PHASE I

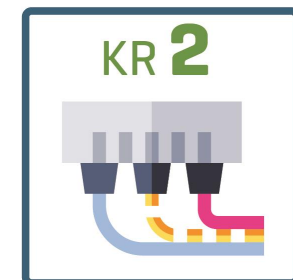
**INTERACTIVE  
DEVELOPMENT OF  
NOVEL MATERIAL &  
APPROPRIATE AM  
TECHNOLOGIES**



**DELIVERING**



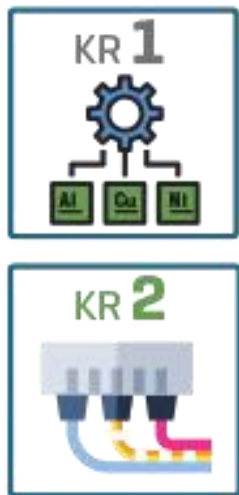
**MATERIALS**



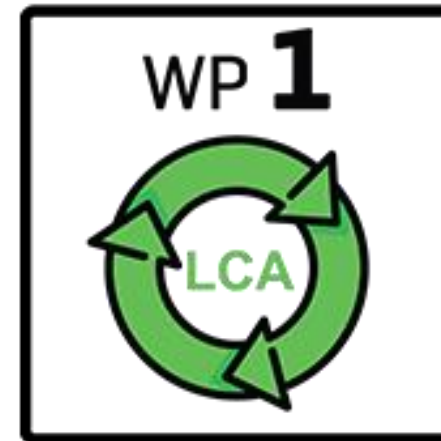
**EQUIPMENT**



# PROJECT IMPLEMENTATION | PHASE II



**USING KR1 & KR2 FOR  
CONCEPT, DESIGN  
AND MANUFACTURING  
OF 7  
DEMONSTRATORS  
(WP5)**



**LCA SUPERVISION  
LESONS LEARNED**

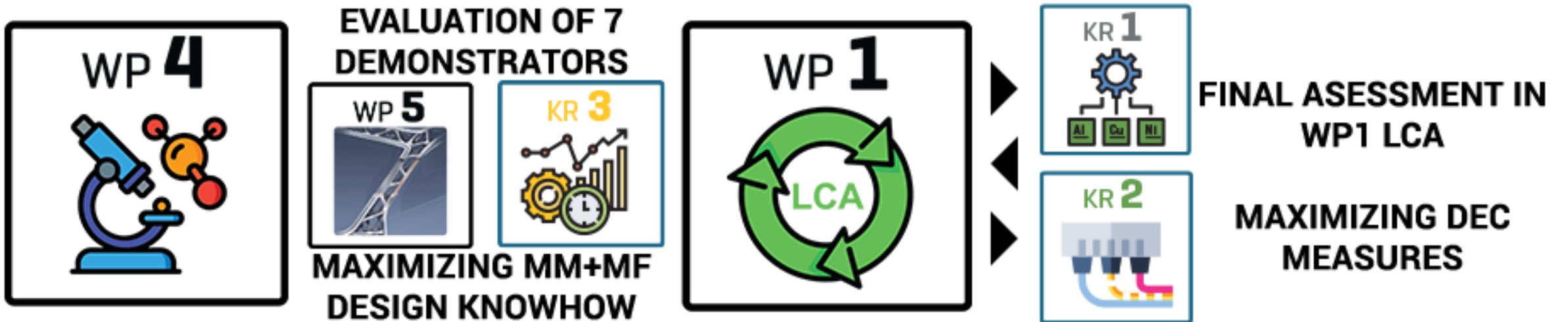


# PROJECT IMPLEMENTATION | PHASE II

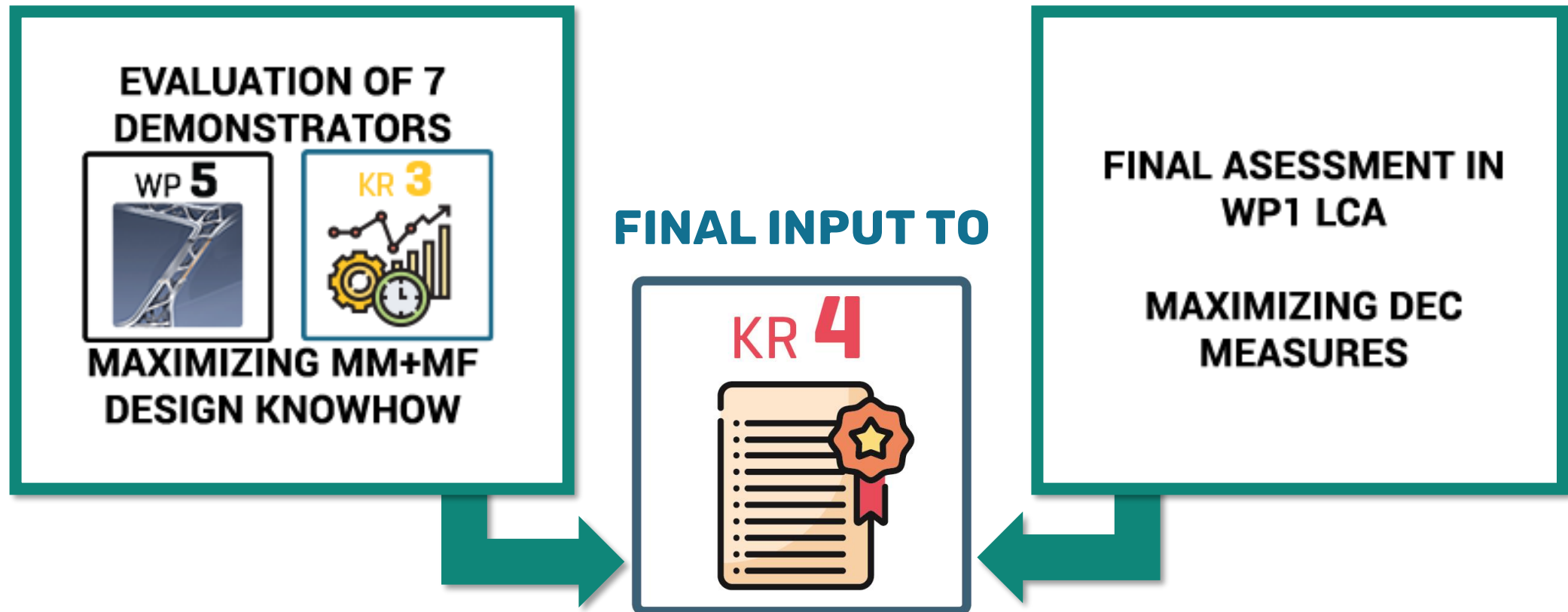
## MAIN INPUTS FOR



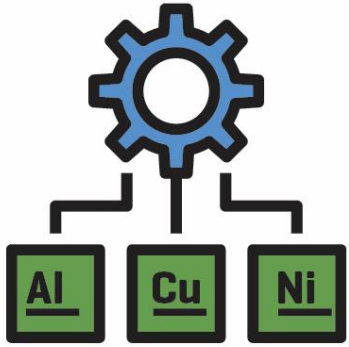
# PROJECT IMPLEMENTATION | PHASE III



# PROJECT IMPLEMENTATION | PHASE III

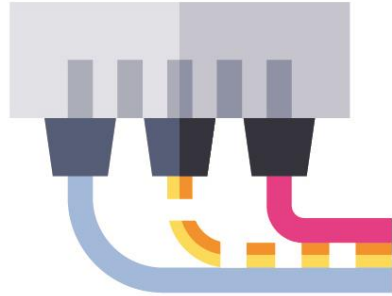


KR 1



ADVANCED METALLIC MATERIALS

KR 2



NOVEL AM EQUIPMENT

KR 3



MULTI-MATERIAL DESIGN-KNOWLEDGE

KR 4



STANDARDISATION KNOWLEDGE

## EXPECTED KEY RESULTS

*after implementation*

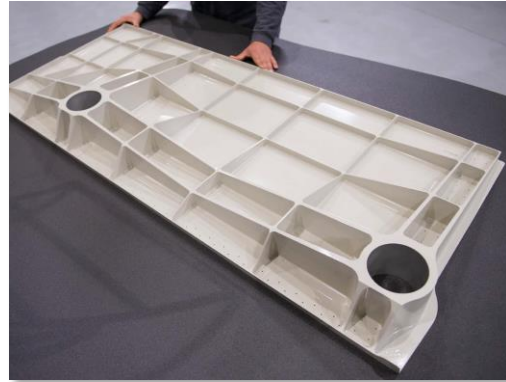
# VALIDATION | THE DEMONSTRATORS



**ACTUATOR HOUSING**

Together ahead. **RUAG**

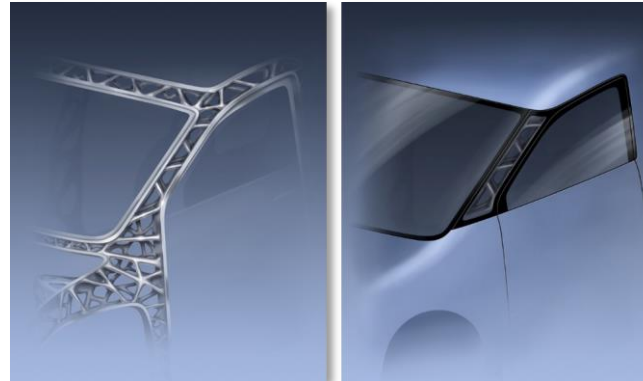
1



**BULKHEAD PANEL**

 aerotecnic

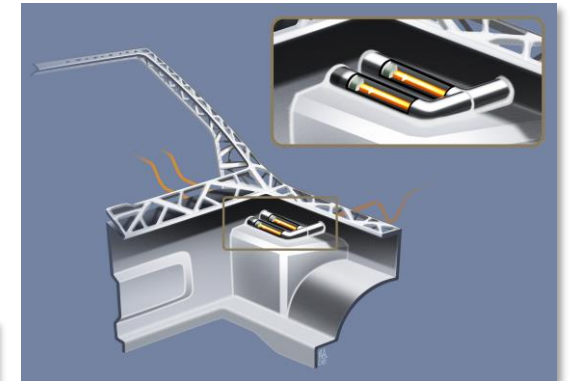
2



**SEE THROUGH A-PILLAR**

 **EDAG**

3



**DASHBOARD CARRIER**

 **EDAG**

4

# VALIDATION | THE DEMONSTRATORS



MOULD FOR AL CASTING **ALUWAG**

5



MOULD FOR CRFP PARTS

**PEAK**  
TECHNOLOGY

6



AUTOMOTIVE TESTING

**AVL** 

7

# IMPACT

# BENEFITS

## PRODUCT



Efficiency + Quality + Reliability

**40%**



High degree of

## INTEGRAL DESIGN



Better use of raw materials and resources with  
**REDUCED ENVIRONMENTAL IMPACT**

**LOWER COST** by



**35%**



Integration of **HEAT SINK MATERIAL** with highest thermal conductivity, resulting in up to 100% increase in local heat transfer rates

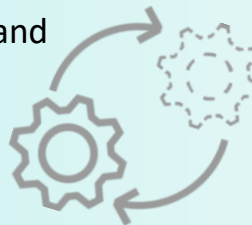
New opportunities & business for European

## SMEs



Adding sensing and data transfer capabilities into metal parts for condition and structural health monitoring purposes as well as process control techniques

## DIGITAL TWIN





# Thank You!

 [multi-fun-project](https://www.linkedin.com/company/multi-fun-project)

[www.multi-fun.eu](http://www.multi-fun.eu)

