AI Driven Industrial Equipment Product Life Cycle Boosting Agility, Sustainability and Resilience

AIDEAS

"AI for a more sustainable and circular EU Manufacturing and Process Industry"

AI in Machinery Industry and the AIDEAS project

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AI Driven Industrial Equipment Product Life Cycle Boosting Agility, Sustainability and Resilience

Topic: HORIZON-CL4-2021-TWIN-TRANSITION-01-07 - Artificial Intelligence for sustainable, agile manufacturing (AI, Data and Robotics – Made in Europe Partnerships) (IA)

Partners: 16

EU funding: € 5 999 694

Total cost: € 6 610 338,75

Starting date: 1 October 2022

Project duration: 36 months

Coordinated by: ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS - CERTH

Cordis website: https://cordis.europa.eu/project/id/101057294

Project Information

AIDEAS
Grant agreement ID: 101057294

DOI
10.3030/101057294 ↗

Start date
1 October 2022

End date
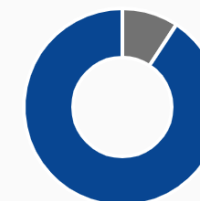30 September 2025

Funded under
Digital, Industry and Space

Total cost
€ 6 610 338,75

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Coordinated by
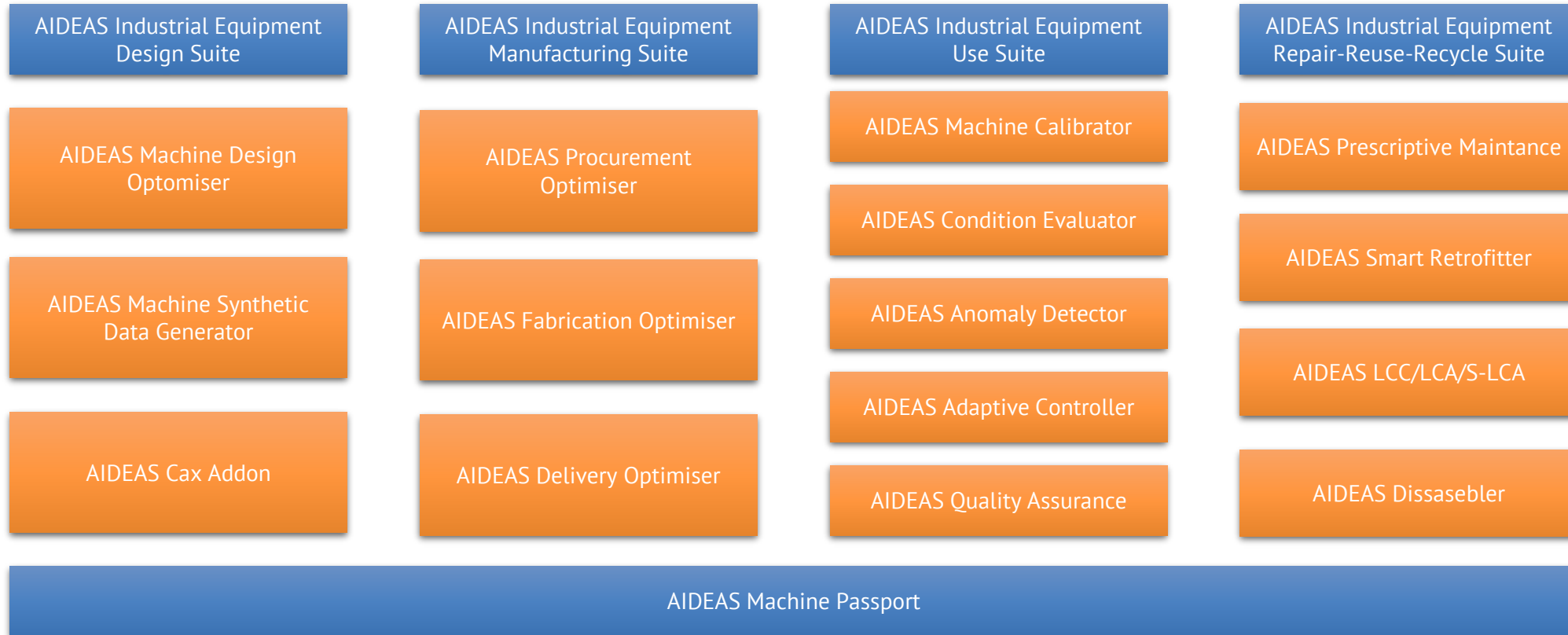ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS

🇬🇷 Greece

Consortium

ID	Participant organization name	Acronym	Country	Logos
1	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	EL	
2	UNIVERSITAT POLITECNICA DE VALENCIA	UPV	ES	
3	UNINOVA – INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS-ASSOCIACAO	UNINOVA	PT	
4	IKERLAN S.COOP	IKERLAN	ES	
5	TAMPEREEN KORKEAKOULUSAATIO SR	TAU	FI	
6	UNIVERSITA POLITECNICA DELLE MARCHE	UNIVPM	IT	
7	INSTITUTO TECNOLOGICO DE INFORMATICA	ITI	ES	
8	CE.S.I. CENTRO STUDI INDUSTRIALI SRL	CESI	IT	
9	IANUS SIMULATION GMBH	IANUS	DE	

| ID	Participant organization name	Acronym	Country	Logos
10	XLAB RAZVOJ PROGRAMSKE OPREME IN SVETOVANJE DOO	XLAB	SI	
11	FUNDINGBOX ACCELERATOR SP ZOO	FBA	PL	
11.1	FUNDINGBOX COMMUNITIES SL	FBC	ES	
12	DIN DEUTSCH INSTITUT FUER NORMUNG EV	DIN	DE	
13	PAMA SPA	Pama	IT	
14	D2 TECHNOLOGY – MAQUINAS E EQUIPAMENTOS INDUSTRIAIS LDA	D2TECH	PT	
15	BBM MASCHINENBAU UND VERTRIEBS GMBH	BBM	DE	
16	MULTISCAN TECHNOLOGIES SL	MULTISCAN	ES	

- **AIDEAS** will develop **AI technologies** for supporting the **entire lifecycle** (design, manufacturing, use, and repair/reuse/recycle) **of industrial equipment** as a strategic instrument to improve **sustainability, agility and resilience** of the **European machinery manufacturing companies**.

Project Summary
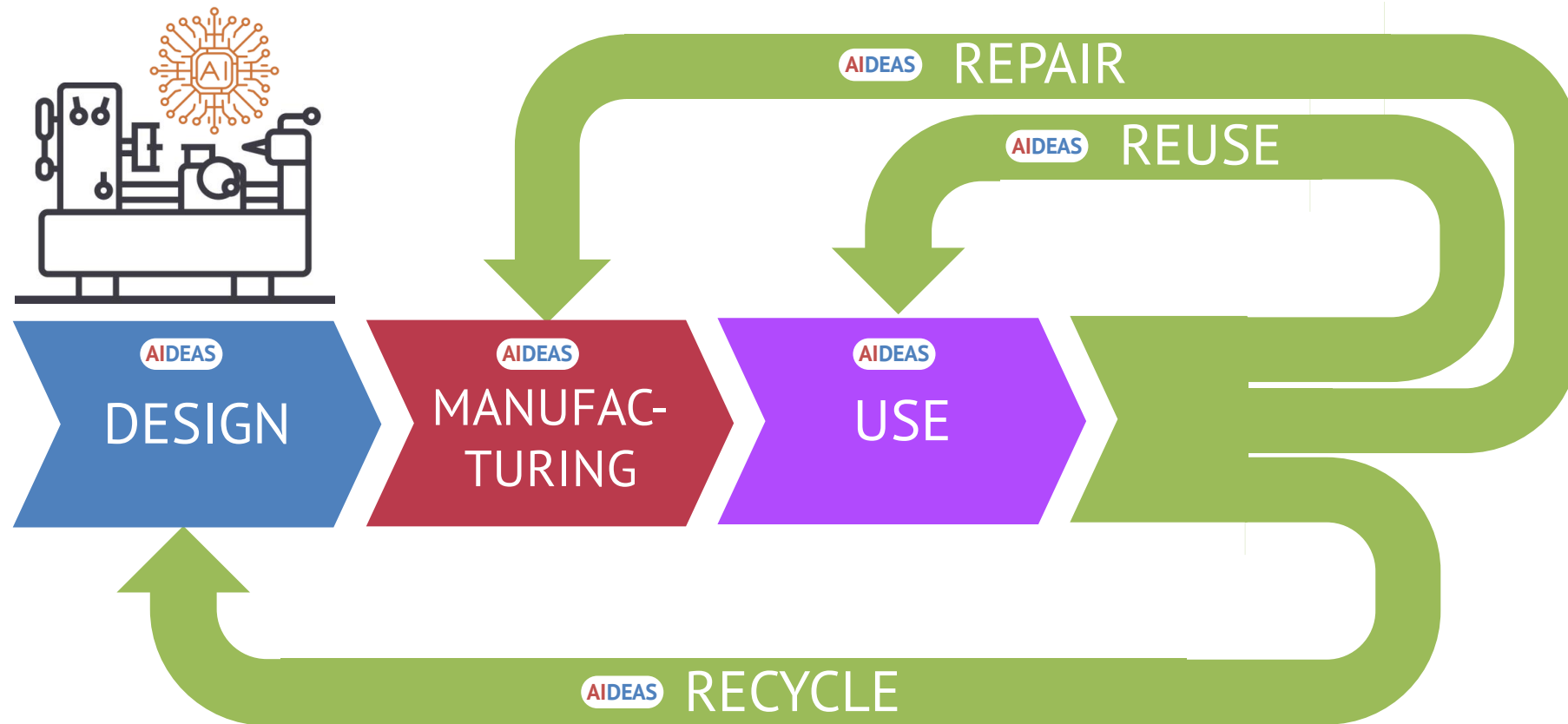
AIDEAS Project will deploy 4 integrated AIDEAS Suites and 1 AIDEAS Machine Passport as Key Exploitable Results:

AIDEAS Industrial Equipment Design Suite	AIDEAS Industrial Equipment Manufacturing Suite	AIDEAS Industrial Equipment Use Suite	AIDEAS Industrial Equipment Repair-Reuse-Recycle Suite
AIDEAS Machine Design Optomiser	AIDEAS Procurement Optimiser	AIDEAS Machine Calibrator	AIDEAS Prescriptive Maintance
AIDEAS Machine Synthetic Data Generator	AIDEAS Fabrication Optimiser	AIDEAS Condition Evaluator	AIDEAS Smart Retrofitter
AIDEAS Cax Addon	AIDEAS Delivery Optimiser	AIDEAS Anomaly Detector	AIDEAS LCC/LCA/S-LCA
		AIDEAS Adaptive Controller	AIDEAS Dissasebler
		AIDEAS Quality Assurance	

AIDEAS Machine Passport

The 4 AIDEAS Suites are composed by 15 AIDEAS Solutions, which aim to improve a set of Key Performance Indicators (KPIs), linked with the AIDEAS specific objectives.

AIDEAS Industrial Equipment Design Suite
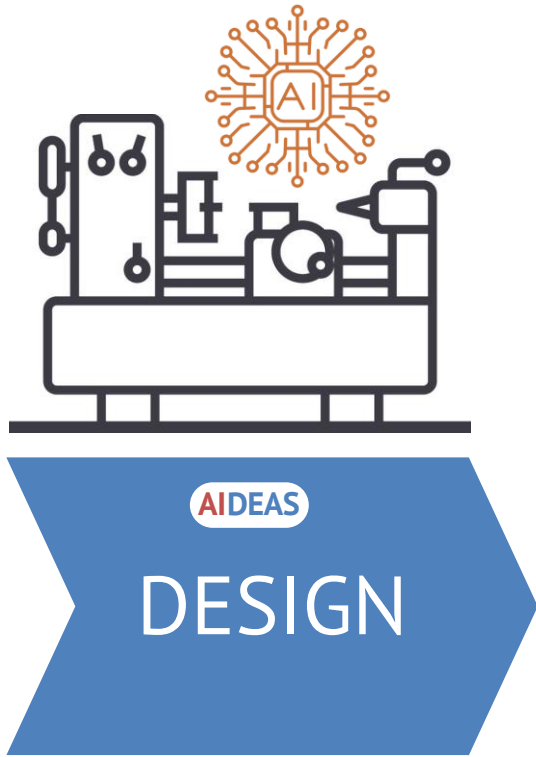
DESIGN

To optimise the industrial equipment design with AI-assisted tools that generate product design suggestions for the optimal construction of machines, allowing companies to reduce waste and to increase the ability to respond to the changing needs of customers (resilience).

AIDEAS Machine Design Optimiser | AI^{MDO}

Toolkit to assist designers to optimally define the key design parameters in multiphysical systems, enhancing machine performance as required for each scenario, through AI.

AIDEAS Machine Synthetic Data Generator | AI^{MDG}

Toolkit for synthesising large high-quality datasets by simulations for the analysis of the machine design and for the training of the optimisation algorithms that will propose optimal design parameters.

AIDEAS CAx Addon | AI^{CAx}

Set of APIs and UIs supporting the integration of AI-assisted optimisation modules into CAx systems.

AIDEAS Industrial Equipment Manufacturing Suite

AIDEAS

MANUFAC-TURING

To increase agility by operating in a predictable manner, even in the face of extreme complexity, with product delivery schedules predicted much more accurately to get much faster to market.

AIDEAS Procurement Optimiser | AI^{PO}

Toolkit for optimising the inventory and purchase of materials and components that are required to build a machine, and meet customer delivery dates using AI.

AIDEAS Fabrication Optimiser | AI^{FO}

Toolkit for optimising production scheduling and resource allocation by predicting production and set-up times, operations dependencies, etc. allowing a near real time response to environment changes like machine breakdowns, last minute customer orders and raw materials delays, through AI.

AIDEAS Delivery Optimiser | AI^{DO}

AI-based toolkit that is capable of optimising the storage and delivery of products. This optimisation will target storage space, storage conditions and product transportation. Additionally, this optimiser will provide optimisation for logistics scheduling and planning.

AIDEAS Industrial Equipment Use Suite

AIDEAS

USE
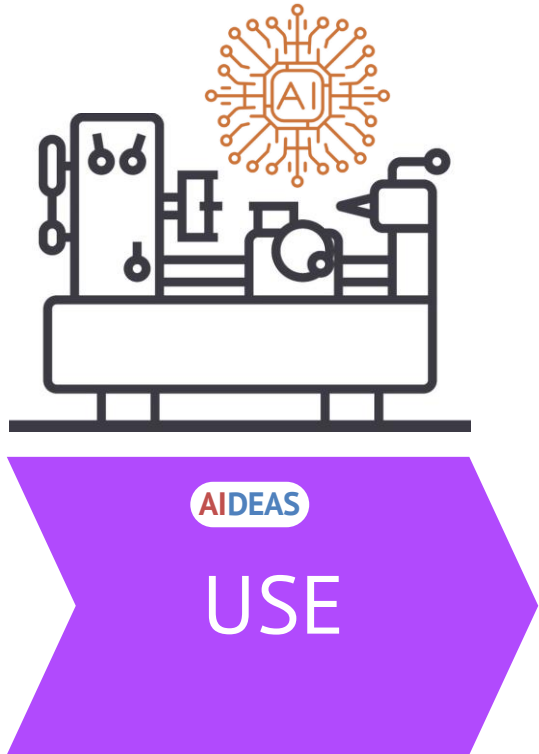
To guarantee the proper industrial equipment installation and initial calibration, the fast machinery condition evaluation and anomaly detection combined with the adaptive control of industrial equipment, and to support the product quality guarantee and zero defects.

AIDEAS **Machine Calibrator | AI**MC

Toolkit for the fast calibration of industrial equipment when installed for the first time in a factory or when a re-calibration is needed. It uses AI techniques for providing the most well-suited calibration parameters.

AIDEAS **Condition Evaluator | AI**CE

Toolkit for determining the condition of the machine as a whole or of some of its components when it is in working conditions in the factory where it is being used.

AIDEAS **Anomaly Detector | AI**AD

Toolkit that will allow detecting anomalies at component-level or of the machine as a whole when it is in working conditions in the factory where it is being used.

AIDEAS **Adaptive Controller | AI**AC

Toolkit to train models with measurement data and then train machine controllers with said models to accommodate the machine condition and requirements.

AIDEAS **Quality Assurance | AI**QA

Toolkit comprising a set of AI-enabled features for manufactured product quality monitoring.

AIDEAS Industrial Equipment Repair-Reuse-Recycle Suite

AIDEAS

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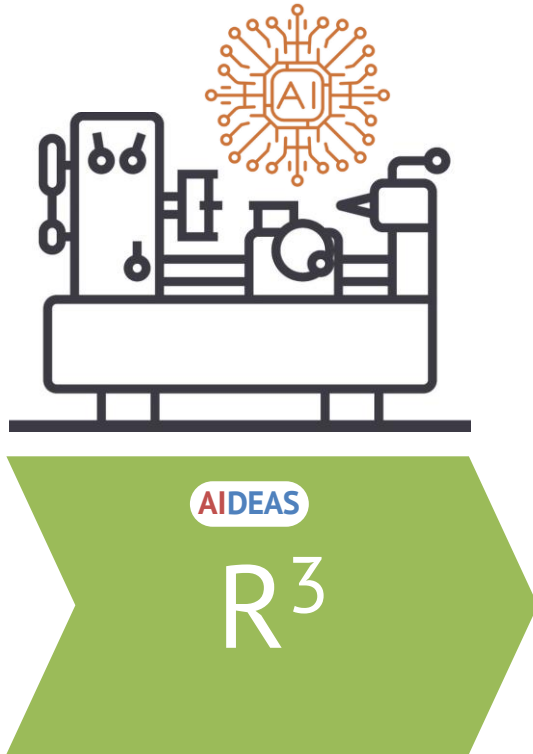
To support a circular production by AI-based solutions for repairing, reusing and recycling industrial equipment, achieving optimal productivity, recycling vs. downcycling, and optimising residual value of materials.

AIDEAS Prescriptive Maintenance | AI^{PM}

Toolkit for predicting remaining useful life and identifying maintenance requirements with the target of extending the overall machine remaining life.

AIDEAS Smart Retrofitter | AI^{SR}

Toolkit for smart retrofitting old machine tools to give them a second life by improving working conditions and product quality, developing a communication system and collaboration, enhancing productivity, efficiency, flexibility, and agility.

AIDEAS LCC/LCA/S-LCA | AI^{LC}

Toolkit that combines AI and Life Cycle methodologies (LCC, LCA, S-LCA) for identifying the best machine end-of-life by devising a multi-objective optimisation strategy to strike a balance between economic, social and environmental benefits.

### AIDEAS Disassembler | AI^{DIS}

AI based toolkit for modelling the disassembly/recycle processes to help streamline the infrastructure needed to circulate materials focusing around the ability for AI algorithms to recognise and identify objects using cameras and other sensors.

AIDEAS Machine Passport
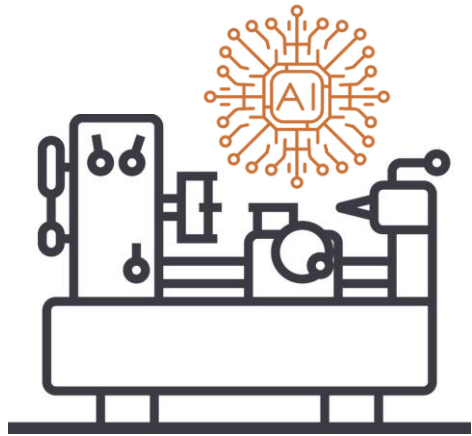
AIDEAS Machine Passport | AI[MP]

Smart platform for multi-source large-scale data acquisition, management and sharing among different devices regarding:

- **Design** phase of the industrial equipment, providing suggestions for the optimal construction of industrial machinery.
- **Manufacturing** phase of the industrial equipment, supporting the manufacturing parties in the supply chain (supplier, manufacturer and customer).
- **Use** phase of the industrial equipment, allowing CNC optimal calibration parameters, data concerning the stable functionality of the machine components along with those concerning the manufactured product quality monitoring.
- **Repair-Reuse-Recycle** phase of the industrial equipment, exchanging data between the end-of-life parties in the supply chain (consumers, repair shops and waste management companies).
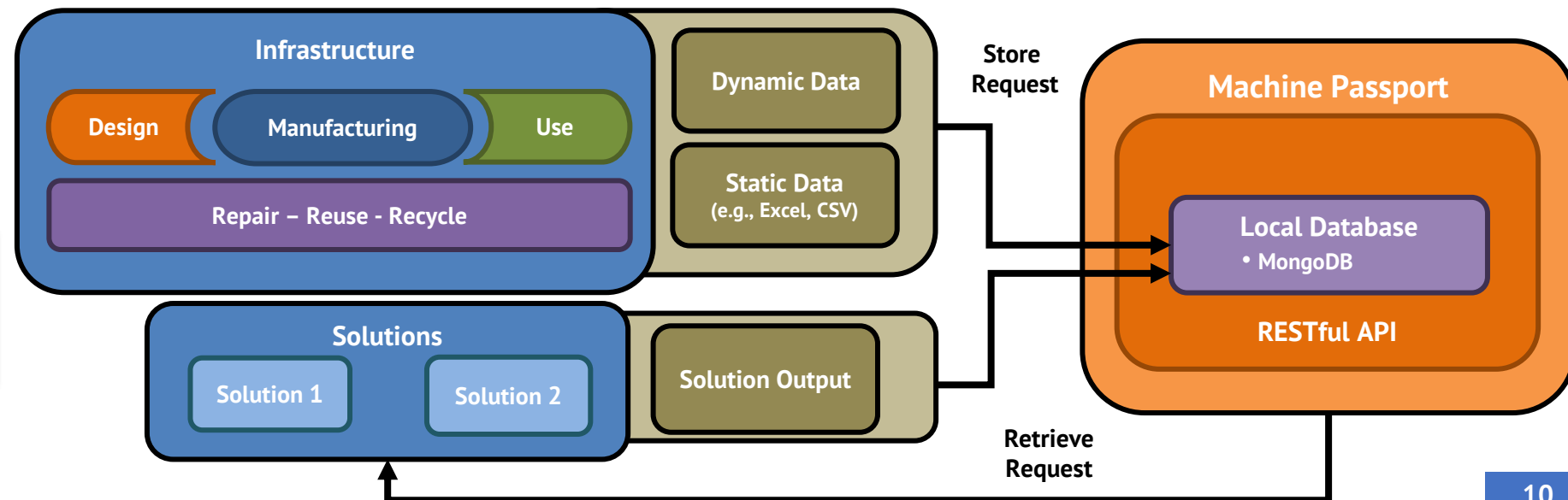
To provide a high added value to industrial equipment, based on the storage of machine data in all phases of their life cycle.

Functionalities

- Utilities to acquire and store multi-source manufacturing data that are obtained throughout the product life phases

- Preprocessing of the acquired data to ensure the compatibility, interoperability, consistency, and quality of the manufacturing data

- Methods for the provision of manufacturing data

- Definition of the communication protocols and the format of the exchangeable messages

- Development of interfaces for smart trustful data storing, sharing and exchange between different AIDEAS Suites and manufacturing stages in industry

- Provision of knowledge produced from Machine Learning models and Explainable AIs
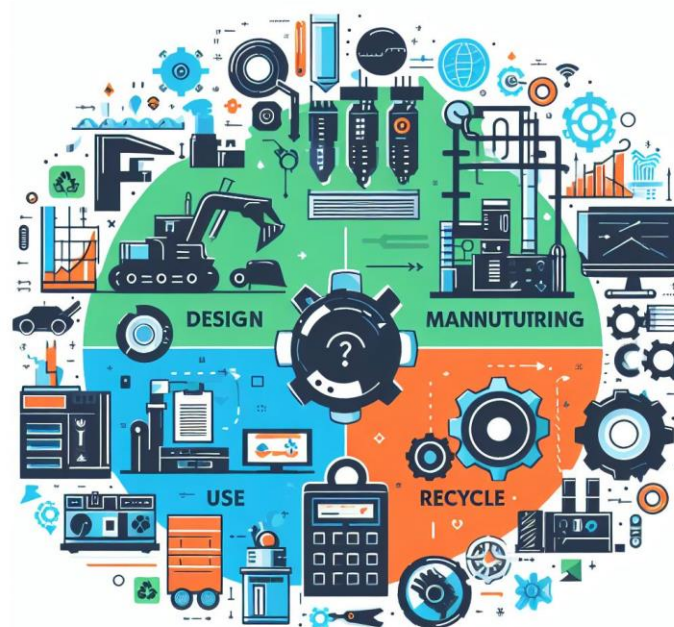
Pilots

- **The AIDEAS Solutions will be demonstrated in 4 Pilots of machinery manufacturers that provide industrial equipment to different industrial sectors: metal, stone, plastic and food.**

  - **PAMA SpA** - AI for Machining Centres (metal sector)
  - **D2 Technology** - AI for Cutting Machines (stone sector)
  - **BBM Maschinenbau** - AI for Blow Moulding Machines (plastic sector)
  - **Multiscan Technologies** - AI for Inspection Machines (food sector)
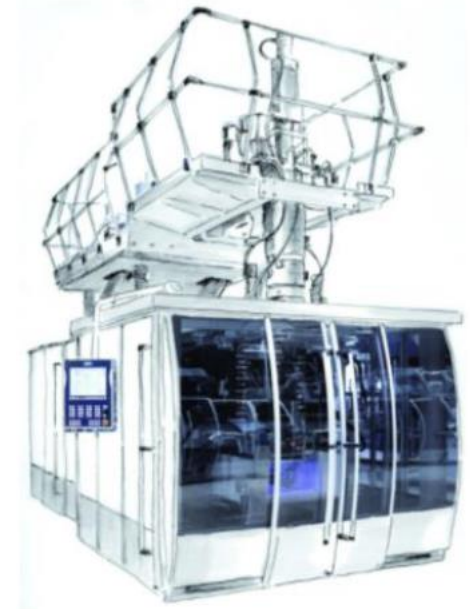
AIDEAS webpage and social media channels

- https://aideas-project.eu/
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- https://www.linkedin.com/company/aideas-project/