ABOUT THE PROJECT

KRAKEN is a three-year project funded by the European Union's Horizon 2020 research and innovation programme. The project started in October 2016 and will end in September 2019.

It aims to develop an automated, robotic, machine for hybrid multi-material manufacturing, combining both subtractive and novel additive technologies. The objective is to develop a machine capable of producing functional parts up to 20m long, with high accuracy and quality. The parts will be made in aluminium, thermoset polymer or a combination of both materials.

The project will contribute to the consolidation of the hybrid manufacturing value chain by linking research results to technological needs for software, monitoring, automation, materials, standardisation and end-users.

Partners

Aitiip
Coordinator
Spain

Acciona
Partner
Spain

Alchemie
Partner
United Kingdom

Arasol
Partner
Spain

Autonomous Systems SRL
Partner
Romania

CECIMO
Partner
Belgium

Centro Ricerche FIAT (CRF)
Partner
Italy

CSEM
Partner
Switzerland

Espace2001
Partner
Luxembourg

Leica Geosystems
Partner
Switzerland

Pininfarina
Partner
Italy

Teamnet Group
Partner
Romania

TWI
Partner
United Kingdom

VBC
Partner
Greece

Vero Software
Partner
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KRAKEN

The future of industrial additive and subtractive manufacturing

www.krakenproject.eu

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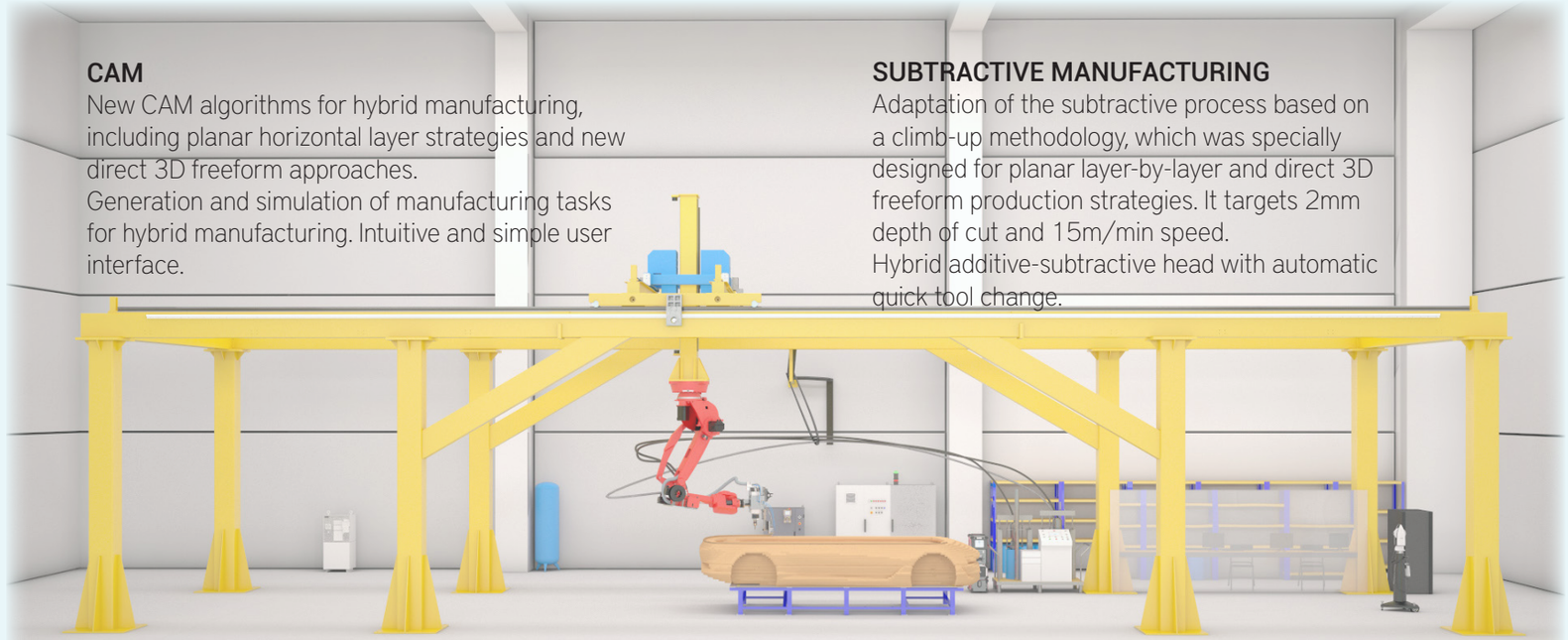
DEMONSTRATION CASES

The KRAKEN system will be validated through 3 demonstration cases:

WATERPROOF COVERING MODULES FOR TUNNELS:
Hybrid lining panels for road tunnels, which embed electrical wiring for the emergency lighting, will be manufactured with the KRAKEN machine for ACCIONA Construction. This approach could result in a revolutionary alternative to current methods, reducing time and cost.

ALUMINIUM METALLIC BACK AND FRONT FRAMES FOR A CAR:
CRF will validate the KRAKEN technology by manufacturing the back and front metallic frames of an Alfa Romeo 4C. This solution combines the deposition of metals on composite materials and represents a new approach that will simplify assembly by integrating mechanical connections between monocoque and supporting frames.

MOCK-UP OF A PININFARINA CAR DESIGN:
A manufactured mock-up of a Pininfarina car design will be created using KRAKEN. This represents an opportunity to test a new method that could become an interesting alternative to the current method, which consists of a series of manual operations followed by final milling through a CNC machine.



CAM
New CAM algorithms for hybrid manufacturing, including planar horizontal layer strategies and new direct 3D freeform approaches.
Generation and simulation of manufacturing tasks for hybrid manufacturing. Intuitive and simple user interface.

SUBTRACTIVE MANUFACTURING
Adaptation of the subtractive process based on a climb-up methodology, which was specially designed for planar layer-by-layer and direct 3D freeform production strategies. It targets 2mm depth of cut and 15m/min speed.
Hybrid additive-subtractive head with automatic quick tool change.

MULTIMATERIAL ADDITIVE MANUFACTURING
Combination of non-metallic and metallic Additive Manufacturing. New resin extrusion process with a deposition rate reaching 120kg/h. Scalable system, capable of being assembled in 3-axis machines and by industrial robots.
New machine-dispensable, fast-curing, 2-component polyurethane paste (ALCHEMIX PU3720A/B) which is adapted to Additive Manufacturing. It cures rapidly and once cured it can be machined easily.
Wire Arc Additive Manufacturing with aluminium grades and a deposition rate of up to 10kg/h, depending on the geometry of the part. Development of an Arc Spray metallisation process based on Zinc alloys.

REAL-TIME CONTROL AND MONITORING
Automatic machine calibration based on absolute laser tracking.
Closed-loop control of robot motion and end-effector position and orientation (6DoF) based on absolute laser tracking in real-time.
In-process geometry validation of (semi-) finished parts by laser tracker-based scanning.
Monitoring of surface quality and the resin extrusion process with a Vision-based Process Monitoring System