High Performance Production Through 3D-Printing Pilot

AGRIAM

VANGUARD INITIATIVE

moses advanced materials

Challenges

- Forest fire prevention
- Reduction in component weight

Project duration: **9 months**

Industrial sectors: **Agriculture**

Consortium coverage: **Spain, Italy, Slovenia**

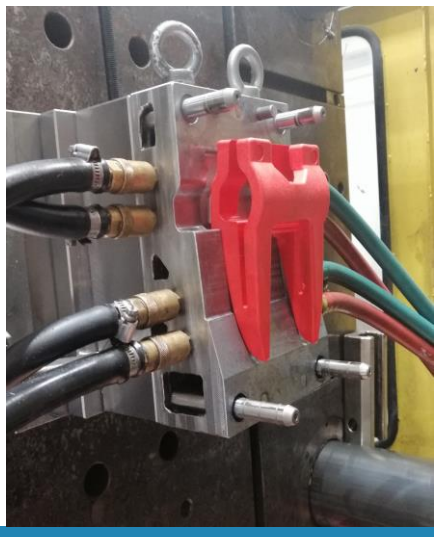
MOSES Productos S.L. is a Spanish firm founded in 2018, and although relatively young, has developed itself into a specialised company focussed on the transformation of fossil-based, biobased and biodegradable materials using extrusion-compounding techniques and plastic moulding processes. MOSES aims to develop the most appropriate materials which meet the (technical) requirements of its clients. As a principle, MOSES works in a manner which keeps in mind the eco-innovative perspective, analysing different alternatives which would reduce the environmental impact of both the products and its production processes.

The Challenge

The AGRIAM project was born out of a challenge to reduce the probability of forest fires caused by the agricultural sector in particularly dry climates. The usage of modern machinery in the agricultural sector, such as combine harvesters, creates a risk of forest fires. This can be attributed to the generation of heat from the combine harvester, such as the engine and exhaust. It was analysed that just over 30% of the forest fires in Spain, caused by combine harvesters, could be sourced and originated at the cutting bar of these combine harvesters. This is because the moving components of the cutting bar can reach temperatures upwards of 400^{o} C whilst operational, far above the ignition temperatures of the biological residues accumulated in the machine and surrounding it. Furthermore, the possibility of stones and rocks creating sparks compounds the risk of ignition and a fire occurring. By producing knife-guards from other materials instead of metal, the overall risk of ignition and fires can be significantly reduced. Through the introduction of Additive Manufacturing production processes, the replacement time of faulty or defective components is also significantly reduced.

The Project

AGRIAM aims to produce thermoplastic parts for agricultural machinery using DED-arc manufacturing to create highly customized functional injection moulds which contribute to a reduction in weight of the components and a decreased risk of forest fires. Through AGRIAM, MOSES attempts to respond to a high-impact market need by manufacturing small batch, highly customized thermoplastic components. Up till now, conventional technologies do not provide a cost or time efficient solution. For this reason, AGRIAM focusses on the rapid manufacture of medium and large metal moulds using DED-arc technology.



High Performance Production Through 3D-Printing Pilot

AGRIAM

VANGUARD INITIATIVE

moses advanced materials

Challenges

- Forest fire prevention
- Reduction in component weight

Project duration: **9 months**

Industrial sectors: **Agriculture**

Consortium coverage: **Spain, Italy, Slovenia**

Role of the Facility Centres

Through the AGRIAM project, MOSES Productos collaborated with three Facility Centres; Fundacion AITIIP based in Spain, University of Bologna based in Italy, and TECOS based in Slovenia. During the implementation phase of the project, Fundacion AITIIP was responsible for the design of the knife-guard as well as its corresponding mould. The design of the knife-guard component was based on the specific product specifications which were delivered by MOSES, whilst the design of the mould was optimised for DED-arc printing processes. Finally, AITIIP was responsible for the manufacturing and testing of the moulds. TECOS on the other hand was responsible for the rheological and mechanical simulations as well as the optimisation of the geometry, prioritizing manufacturability and the productivity of the process to reduce the cycle rate and minimising the weight and therefore the overall amount of material necessary for manufacturing. Finally, the University of Bologna was in charge of the mechanical testing of the knife-guards. Within this partnership, all involved parties were able to contribute by bringing in their individual expertise required in each of the development phases of the project.

Results achieved

Within the AGRIAM project all objectives were met. Through its successful implementation and integration of Additive Manufacturing processes some promising results were achieved. Firstly the project solved the problem of long development and validation phases related to new designs. This is in part attributable to the limited time available for field testing, with regular cereal harvests lasting between 4-6 weeks. As a result of this limited time for testing, it was not possible to design and test new design iterations until the next season and harvesting campaign. Through the developed system it is possible to implement new design iterations in just 4 weeks time, instead of the 12 months which was previously required.

This design and production agility can also be translated and applied in other sectors such as the Automotive sector. Another important result of the project was the validation of the 3D printing of metal parts for large moulds and tools. Related to this, it has been demonstrated that the manufacturing cost is competitive compared to traditional methods whilst not compromising the overall quality of the components with a reduced production time.

VANGUARD INITIATIVE
New growth through smart specialisation

moses advanced materials

aitiip centro tecnológico

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

TECOS
Razvojni center orodjarstva Slovenije