High Performance Production Through 3D-Printing Pilot

GRIPP3D

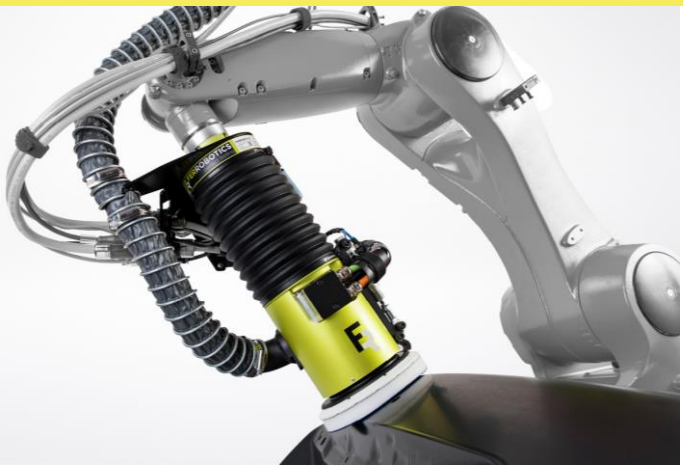
VANGUARD INITIATIVE

FERROBOTICS
perfect feeling

Challenges

- Increasing the sensing capabilities of robitic arms
- Improve the flexibility and application possibilities of industrial robots

Project duration: **9 months**
Industrial sectors: **Manufacturing**
Consortium coverage: **Austria, Spain**



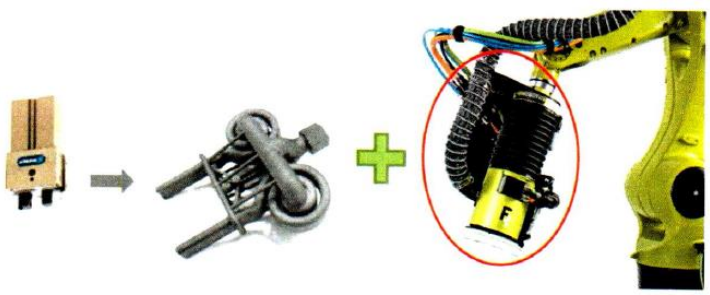
FerRobotics an the international technology leader in sensitive automation which makes robots 'feel' what they are doing. This contact-intelligence is the new industry standard to automate tricky handwork and to install autonomous system cooperation in flexible automation flows instead. The automotive, aviation and general industry are absorbing contact-sensitive automation as solid and long-lasting pillar within their manufacturing capacity. What differentiates FerRobotics from other players in the market is their own developed technology. While automation usually tends to come along with costly programming efforts, FerRobotics solutions' mastermind the individual contact situation intuitively, fast and secure.

The Challenge

Conventional flanges and grippers which are attached to industrial robots are unique, designed for a specific purpose and operation. This leads to the production of single application, complex parts with high costs and longer time to market. In order to increase the adaptability of robotic arm flanges and grippers, and to allow for a single component to be used more flexibly, FerRobotics developed a multi-functional flange. To further optimise the performance of the flange as well as the manufacturability, FerRobotics turned to 3D printing to find a solution. One of the main challenges identified was the integration of sensors within the flanges and grippers and to optimize the multi-material printing process.

The Project

The main objective of the GRIPP3D project was to validate the patented concept of a 3D printed flange with a custom specific (replaceable) lightweight gripper which is manufactured using additive manufacturing, based on a DFAM (Design for Additive Manufacturing) strategy. Furthermore, GRIPP3D focussed on the integration of printed sensors (which measure pressure and temperature) and the conductive tracks within the final flange and gripper. The integration of the sensors within the gripper represent a next step in the development and production of smart grippers. The combination of pneumatically driven, sensor functionalised flexible flange and grippers open new possibilities in fine & sensitive handling and grasping applications for the food, medical, textile and automotive industries.



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Role of the Facility Centres

For the implementation of the GRIPP3D project, FerRobotics partnered up with LEITAT based in Spain and ProFactor based in Austria. Based on the patented flange design from FerRobotics, LEITAT generated an optimised design and model for the gripper. Parallel to this, LEITAT was also responsible for the development of the guidelines that supported in the selection of the most appropriate and suitable 3D printing process and materials to be used, based on the requirements of the handling strategy and system. Finally, LEITAT printed the test samples using polymers (as production in metals has a higher associated cost) and conducted a study on multi-material integration in a single gripper design to use them in specific application areas. Special considerations were taken for the food industry to fulfil strict requirements associated with food contact devices. ProFactor was involved to prepare the functional technological background for the printing of flanges. The optimised technology developed by ProFactor enables multilayer and multi-material printing, grey scaling of printed material on the drop level for tuning of mechanical properties. ProFactor printed the flange designed by LEITAT and integrated conductive tracks during the printing process as interconnection for further assembly of electronic components into the printed gripper. FerRobotics finally realised a functional mock-up from the printed components supplied by LEITAT and ProFactor and assembled the component with the connections to the electronic components required for control, data evaluation and communication to perform testing and prove the functionality in lab conditions.

Results achieved

Within the GRIPP3D project, FerRobotics, together with the implementation partners LEITAT and ProFactor, demonstrated that it is possible to integrate printed sensors within the printed gripper structure. Furthermore, the new design and structure not only improved the structural integrity and rigidity of the gripper, it was also realised with a reduction in total number of parts needed as well as a weight reduction, thus lowering the inertia of the moving robotic arm. With the achievements realised in the project, it is possible to adapt the flange and gripper to suit the customer needs and to react quickly to changing requirements. Through successful implementation of their project, FerRobotics succeeded in expanding its product portfolio and thus provide a competitive solution for companies looking to increase the adaptability and flexibility of their production lines.