

The Perfactory® 3D printer from EnvisionTEC has transformed the product development process at Spray Nozzle equipment manufacturer.

Hypro EU with its performance capabilities and cost saving results.

### EnvisionTEC GmbH

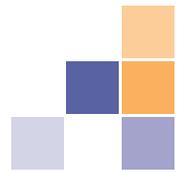
Brüsseler Straße 51 • D-45968  
Gladbeck • Germany  
Phone +49 2043 9875-0  
Fax +49 2043 9875-99

### EnvisionTEC, Inc.

15162 S. Commerce Dr  
Dearborn, MI 48120 • USA  
Phone +1-313-436-4300  
Fax +1-313-436-4303

[www.envisiontec.com](http://www.envisiontec.com)  
[info@envisiontec.com](mailto:info@envisiontec.com)

# Case Study



## Hypro EU | Perfactory® Mini ML

Hypro EU has been manufacturing spray nozzles for agricultural and industrial applications at its Cambridgeshire, UK site since 1954. A global leader in this field, Hypro has built a reputation for producing superior products for spray equipment for a wide range of applications, including crop spraying, fire suppression, paint pre-treatment and many others.

Working closely with its customers to fulfill their specific, and often unique requirements; Hypro operates a policy of continuous product development incorporating the latest additive technology for prototyping applications and more.

With absolutely no compromise on quality, Hypro products and processes must meet stringent quality standards to ensure accurate and reliable product performance. For Hypro, quality assurance is not only vital for the finished product, but also at every stage of the product development process. To meet this need, Hypro has in-house additive manufacturing (AM) capabilities: a Perfactory® 3D printing system from EnvisionTEC that is widely recognized as one of the most accurate machines for building 3D models and parts.



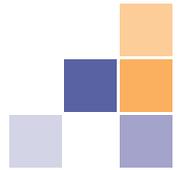
A great example of how the Perfactory® 3D printer garners positive results for Hypro is the development process for one of the company's most recent product launches: the Guardian AIR Twin air inclusion nozzle, which was introduced to the UK market at LAMMA show 2011.



The Guardian AIR Twin is a crop spraying nozzle design, which incorporates a new attachment concept. The patented attachment method is a twist ring that eliminates the traditional attachment method requiring separate caps. This precision part required the tightest possible tolerances and the capabilities of the Perfactory® successfully met these requirements.

Trevor Swan, Principle Engineer at Hypro led the development of this product through to successful market launch, with the Perfactory® system central to the project's success.

Before Hypro invested in AM technology the company's designers were able to create products using all the knowledge and experience at their disposal - but it was very easy to overlook features of the design that would fail in use due to extremes of pressure and temperature etc. Invariably Hypro engineers had to commit to production tooling straight from the CAD model and could only field



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Trevor Swan, Hypro's Principle engineer: "The Perfactory 3D printer has revolutionized the way we work because we can now produce single or multiple parts quickly and easily in production materials, which can be tested for suitability in the field. With the twist ring attachment part this was vital and would not have been possible without the Perfactory® due to the highly accurate parts it produces first time off the machine."

trial at this stage. If a problem with the design then became apparent, rectifying it was always a compromise because design changes were then constrained to what was possible with the existing mold tool, which had already been purchased.



Trevor continued: "We used the Perfactory® to build the precision parts from which we could then build a rapid tool to create test parts in the exact production material before committing to the expense of the production tool. This was a key part of the development process and allowed us to achieve the optimum design."

The twist ring, which comprises two separate parts that snap-fit together with mating teeth, was designed in Solidworks. The snap-fit functionality of the parts required supremely accurate results and the Perfactory® did not disappoint. Each part was 3D printed on the Perfactory® and achieved a resolution of 16 microns first time off the machine.

From these original prototypes the rapid mold tool was formed using a highly aluminum-filled two part epoxy, cast in a vacuum. The result was a perfect replication of the prototype parts that allowed 150 test parts to be produced

for testing. Samples were assembled and tested in house for tooth engagement, deformation under a microscope and torque breakage force. With the production tooling for the test ring amounting to £36,000, it was essential that Hypro was able to establish that the product was exactly right before committing to this costly phase.

Indeed, Trevor Swan sums up the Perfactory's® performance during this project: "Ultimately, the Perfactory® 3D printer saved - and continues to save - us time and money. For the twist ring development, the Perfactory® potentially saved Hypro tens of thousands of pounds on final tooling costs and reduced our lead-time by weeks. On that basis alone it has provided us with an excellent return on investment. However, beyond that, the accuracy of the Perfactory® system allows us to provide our customers with a superior design and a more reliable product. You cannot put a price on customer satisfaction."



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Fax +49 2043 9875-99

### EnvisionTEC USA

15162 S. Commerce Dr  
Dearborn, MI 48120 • USA  
Phone +1-313-436-4300  
Fax +1-313-436-4303

[www.envisiontec.com](http://www.envisiontec.com)  
[info@envisiontec.com](mailto:info@envisiontec.com)

### Contact

Hypro EU Ltd  
Cambridge | UK  
Tel +44 (0) 1954 260097  
[info@hypro-eu.com](mailto:info@hypro-eu.com)

### Distributor

Sibco Ltd  
Stoke-on-trent | UK  
Tel +44 (0) 1782-418030  
[enquiries@sibco.co.uk](mailto:enquiries@sibco.co.uk)