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D6.2 Coating Module

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Contributing Partner(s)	
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This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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Executive Summary

This document contains the description and relevant information relating to

Deliverable 6.2 “COATING MODULE”

The design has been documented with pictures and shows the key process steps and equipment interfaces, to guarantee surface quality and processing repeatability.

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1 Introduction

This deliverable describes the design and functions of the developed main “Coating Module“ corresponding to the available 3D-CAD model.

Main components are a micro extruder type TR12, a die head cartridge type C1P591 with cartridge unit at low volume type DOC64 and a cooling bath in POM.

The Electrical panel built with a PLC Omrom series has interfaces for dimensional control of the outer diameter based on a laser technology and a link to an haul off interface for linear speed supervision of the guidewire.

Processing water is maintained at correct settings with a thermoregulation unit, moisture in the material is controlled by a air driven de-humidification system.

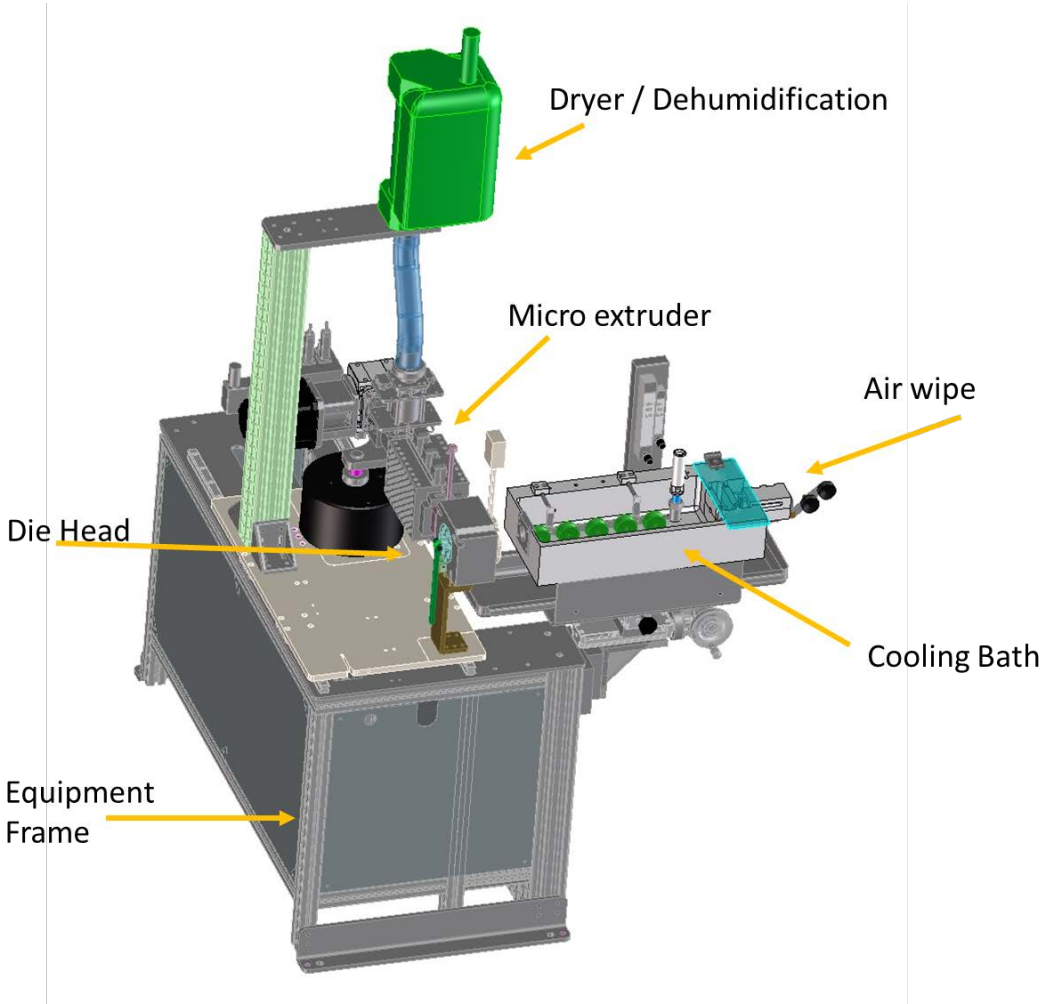

Figure 1: 3D-CAD model of coating module

2 Module description

2.1 Machine frame and housing

The machine has a size of approx. 1.500 x 1.700 x 2.000 mm (length x width x height).

The main frame and the housing has been build out of Al-profile to guarantee flexibility regarding additional mounting of equipment in the future.

The machine base plate is made of stainless steel with the equipment mounted on precision bushings. The TR12 micro extruder guarantee a constant throughput that is one of the key parameter for a perfect coating on the guidewires.

The control cabinets reflects the standard requirements of industrial installation.

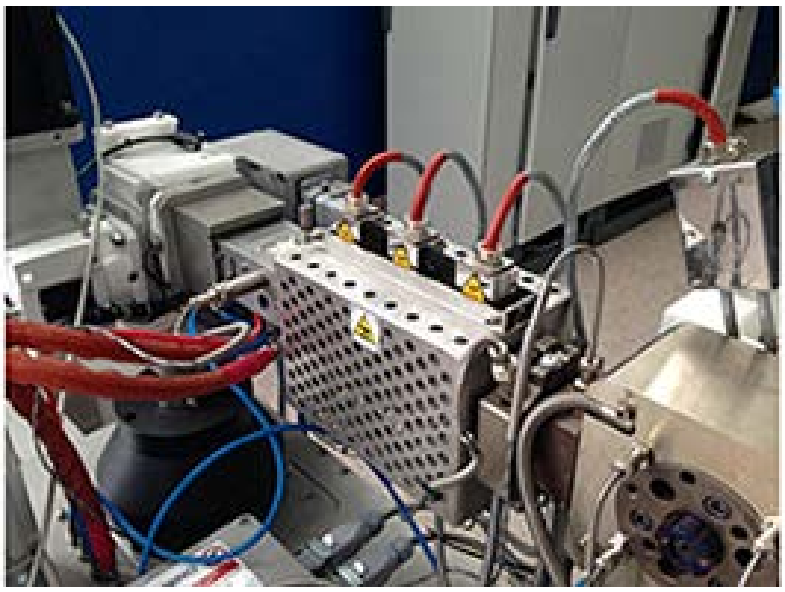

Figure 2: Extruder and die

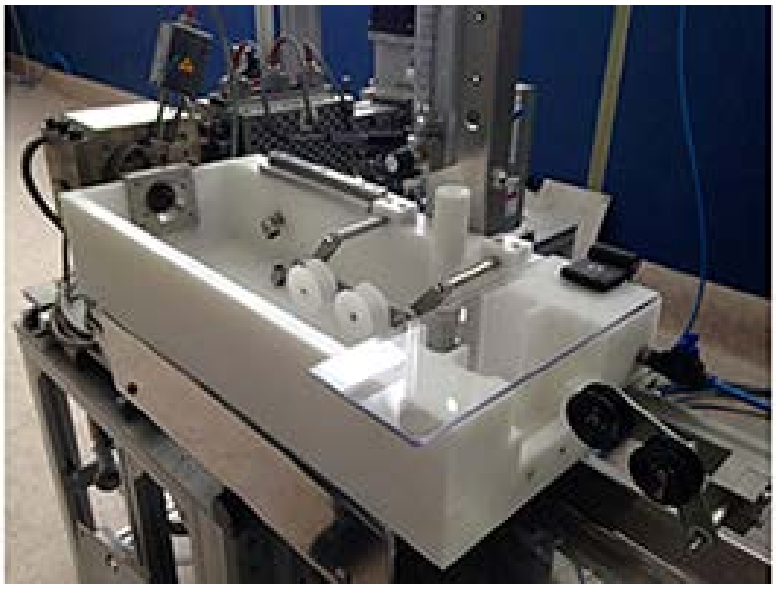

Figure 3: Top view of cooling bath

Figure 4: Electrical control cabinet

2.2 Coating Unit positioning

Either the extruder unit and the cooling bath have movements for centering or execute cleaning and exchange of tools with a JIT approach.

The machine base plate has a height of 1.065 mm corresponding to the defined center of the guidewire.

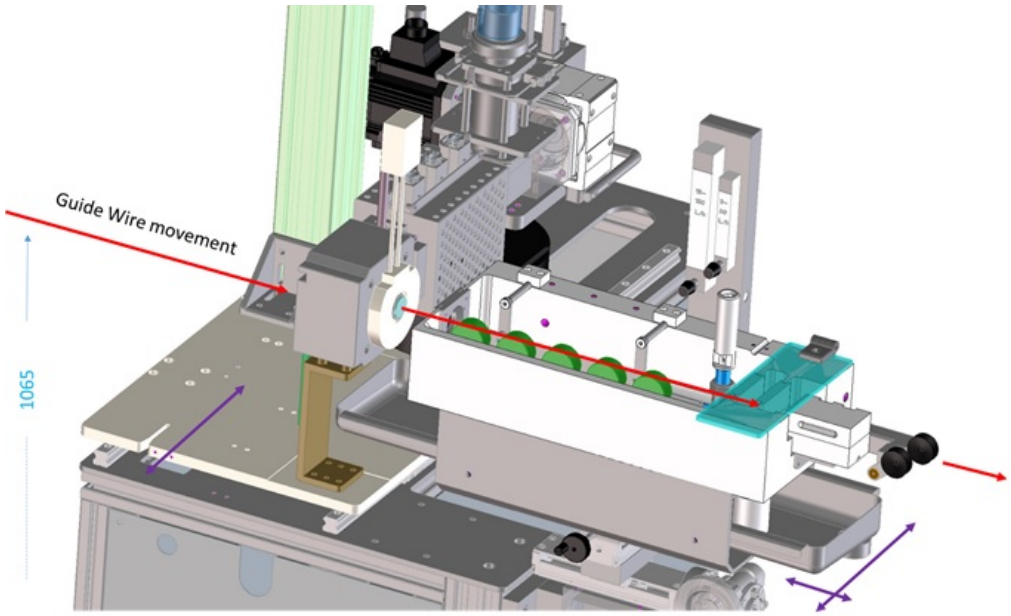

Figure 5: Front-view & adjustments

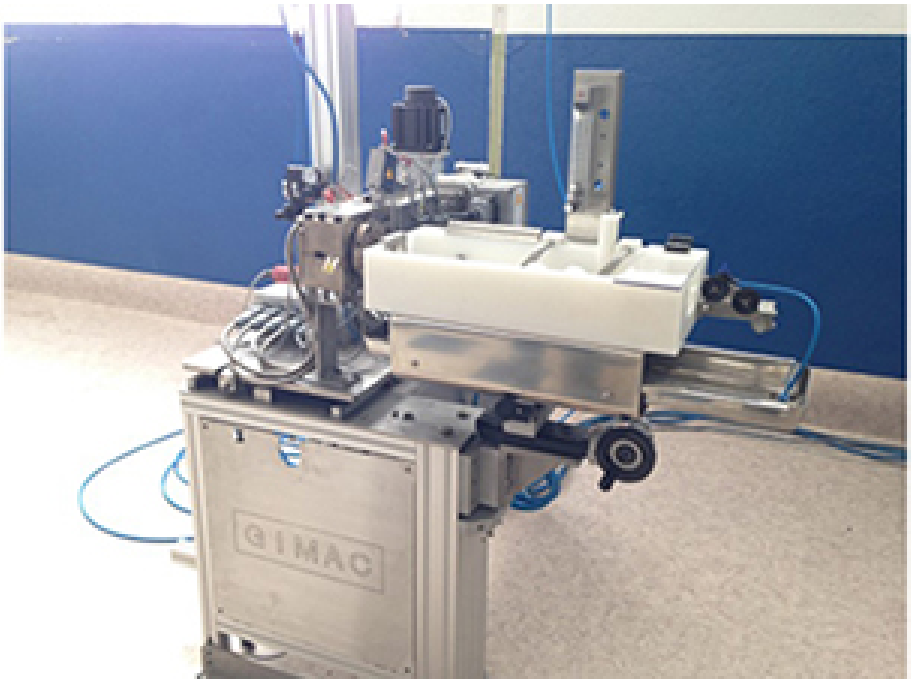

Figure 6: Complete micro-extrusion module

2.2.1 Coating Die Head

The die head is designed to minimize the resident time of the material inside the distribution channels , to preserve potential material degradation and to guarantee optimal flow of the melted material on the Aramid core. Pins and die are specifically designed to meet the specification of the product to be manufactured and a regular backpressure.

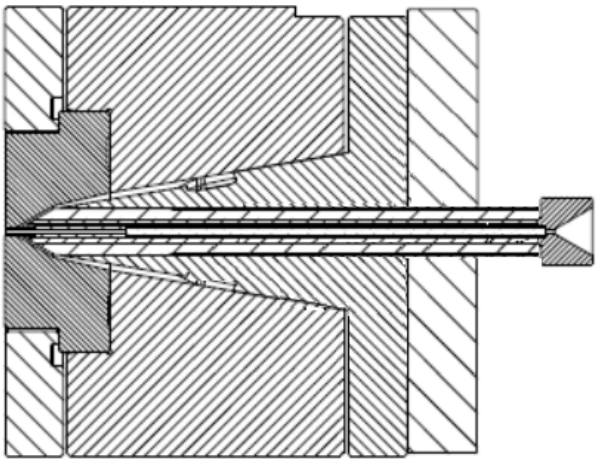

Figure 7: Die head DOC64

2.2.2 Cooling system

After applying the proper quantity of polymer on the substrate it is also important to properly harden it by cooling off. The line is equipped with a thermoregulation unit, where proper settings can be defined. Water flow can be regulated specifically with flow meters.

In Figure 8 the entrance is marked by the green arrow, the water level can be adjusted by rotating the overflow device. The positioning of the tube / catheter in the water is also adjustable with the wheel-train (red arrows).

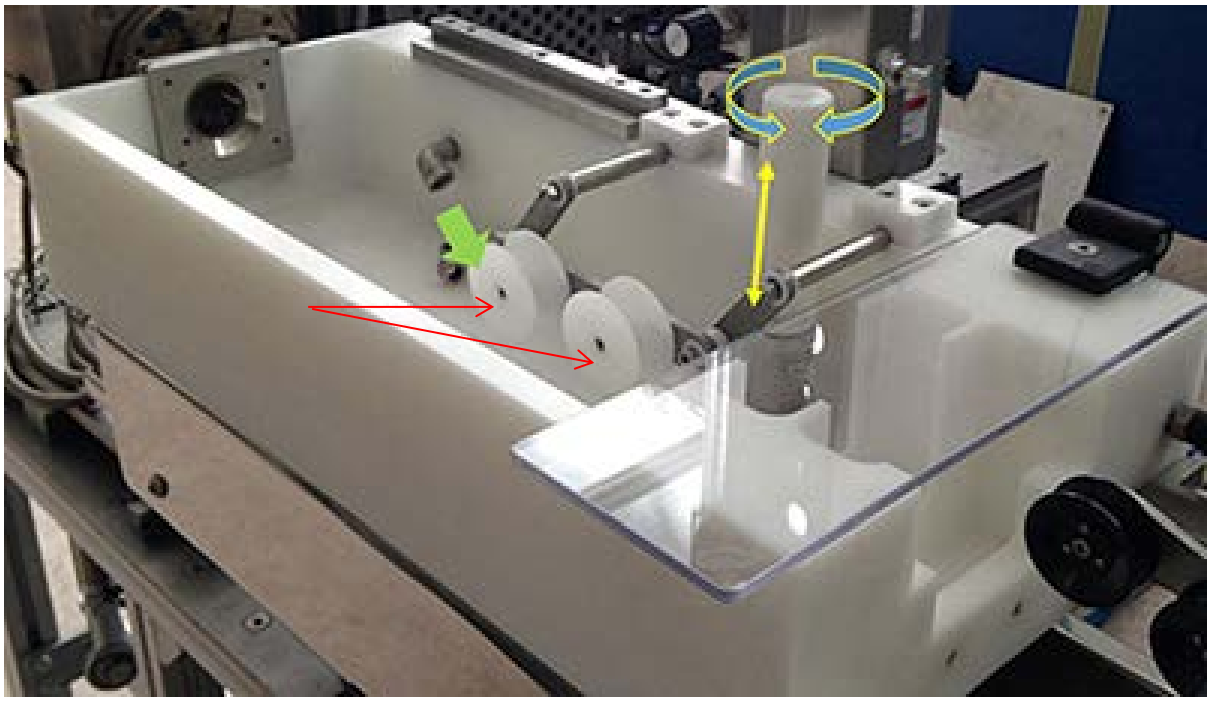

Figure 8: Water flow and water level control

2.2.3 Linear speed & pulling device

Uniform pulling force and constant linear speed are two other key parameters to apply a uniform quantity of coating on the substrate.

The haul-off from Figure 9, with FDA conform belts can guarantee with very low clamping force the optimal traction on the guidewire. The user can adjust closing and opening speed, clamping force and the product centering.

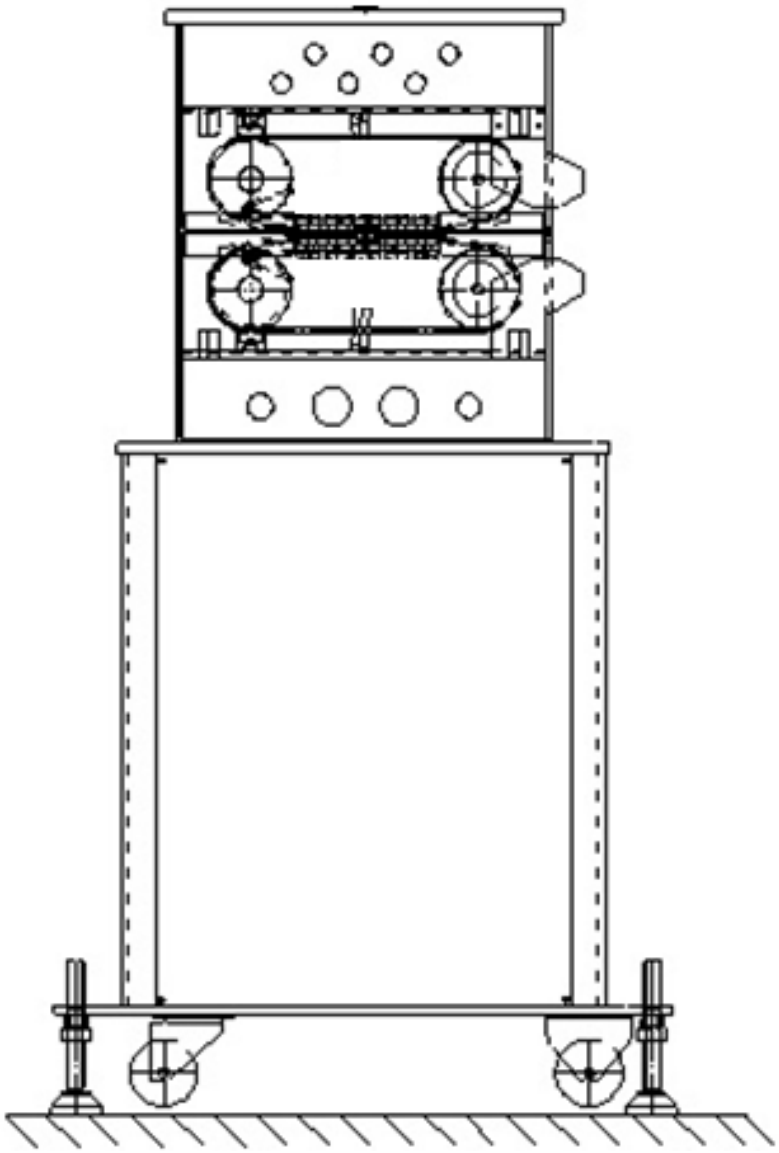

Figure 9: Haul-off

2.3 Measuring equipment

A two axis laser measurement device guarantees reading of external diameter and ovality. The unit can be set to a nominal value and the allowed span of tolerance to monitor properly the goods produced in real time.

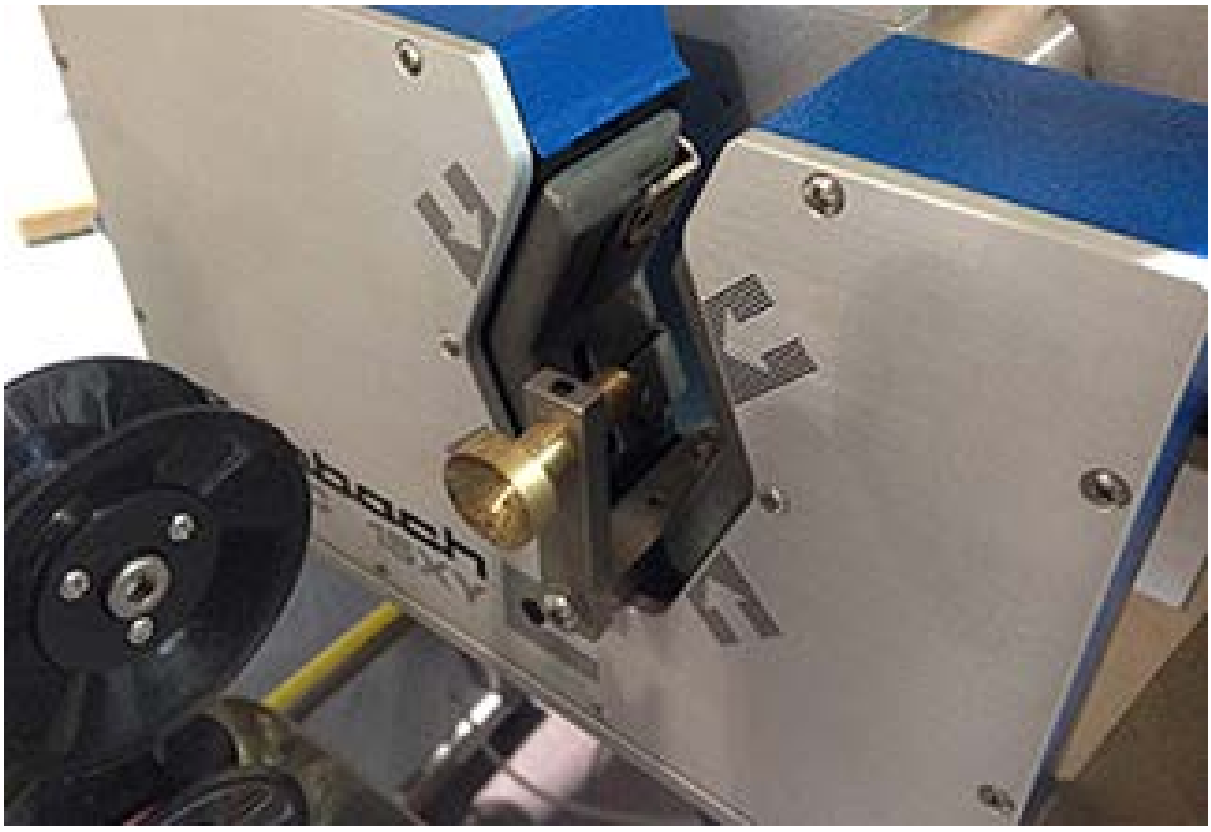

Figure 10: In-process measuring equipment

2.4 Electrical equipment

An industrial electric cabinet UL rated IP55 is the core where all controls and electronic are installed, the system is supervised by a OMROM-PLC that controls all main features and drive logic of the motors and other equipment.

Figure 11: Internal view of the electric control cabinet

3 Conclusion

The design and construction has been completed, first testing performed with positive results.

Tools have been manufactured for the actual size of the guidewires, a first process setup has been validated and the span was of variation was evaluated.

Next steps are further tests of repeatability of product properties in the tests of the initial operation analysis (T6.3) and the interface with the other manufacturing modules up / down stream in the overall process chain.

During this process we have to work together with IPT and the other suppliers of manufacturing technologies to evaluate performance and quality of the parts.