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Editorial

February 2011

Welcome to the second edition of the POLYTUBES Newsletter.

This Newsletter will give you information about POLYTUBES, the European FP7 NMP Project that aims to the development of equipment and processes for the manufacturing of micro-tubular components for medical and non-medical applications (Project No: NMP2-SE-2009-229266).

POLYTUBES Newsletter will inform SMEs, researchers, potential investors and potential users about the progress of the research, the consortium and all issues related to the implementation of this 3 years project.

To make sure that you receive all issues of the POLYTUBES Newsletter, please visit and subscribe at the project Web site:

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A Process chain and Equipment for Volume Production of Polymeric Micro-tubular Components for Medical and Non-Medical Device Applications

With a total budget of 5 million Euros, the three-year EU project POLYTUBES is an FP7 NMP Collaborative project targeted to SMEs, which started in July of 2009

The overall objective of the project is to develop a process chain and a corresponding micro-manufacturing platform for the manufacture of polymer-micro-tubes and tubular micro-components for medical and non-medical applications.

The proposed development aims to create new markets for EU SMEs with innovative and economically competitive micro-products and micro-manufacturing equipment to meet the needs for a wide range of emerging applications. The development will also support the SMEs to increase business opportunities with new volume production capabilities in micro-manufacturing.

The proposed development could place EU in a pole position in the manufacture and innovative applications of micro-tubular products.



PTFE microtube, Ø 400µm – the outer surface marked with a micro-code periodic size of 4µm regular shaped lines.

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Laser Technology for Micro-Manufacturing of Polymeric Materials

The demanding request for this Module is to size and drill polymeric materials, e.g. thin-walled tubes and to realize borehole diameters of $2\mu\text{m}$ in a compact Manufacturing System. Actual laser systems provide fast, contactless and precise micro processes but require wide installation space and are cost-intensive.

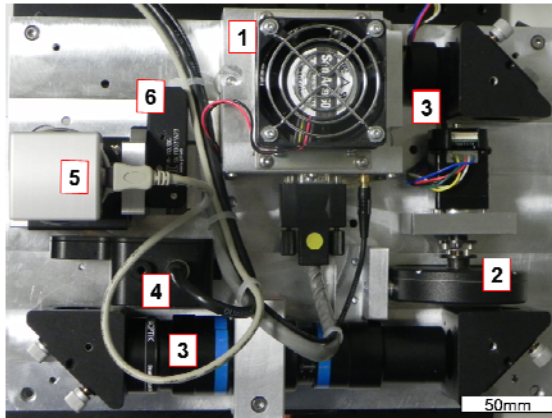


Fig.1: Functional Parts of the Laser Optics, FRA-ILT: 1-Microchip Laser 532nm; 2-motorized Laser Power Control; 3-Beam Shaping; 4-Laser Safety Shutter; 5-Vision Unit; 6-Adjustable Focusing Unit.

The described Laser Module consists of a remote controlled laser system and an additional Inner Handling Unit for precise positioning and multi-axes manipulation. A Microchip-Laser offers high precision ablation processes by low invest. In combination with an automated Laser Power Control and vision assisted focal plane adjustment processing parameters can be aligned to sizing/trimming, drilling or even ablation processes. According to material's absorption the optical components can be customized to 375nm, 532nm and 1064nm laser systems. Edge Detection and the measurement of image sharpness by coaxial image processing enables 3D focal positioning.

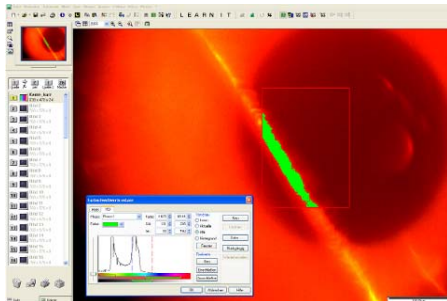


Fig.2: Coaxial Image Processing: Edge Detection by Histogram Analysis for an automated Tool-Center-Point-Positioning, FRA-ILT.

Prospects of the System and Process Development

- **Helical Structures and Complex Geometries** can be accomplished by precise linear stages and a rotational axis of the Inner Handling Unit, equipped with fine mechanical steady rests and adaptable grippers.
- **High Repeatability and Process Stability** ensured by the integrated Vision Unit providing coaxial processing images for an automated edge detection / positioning and focal plane adjustment.

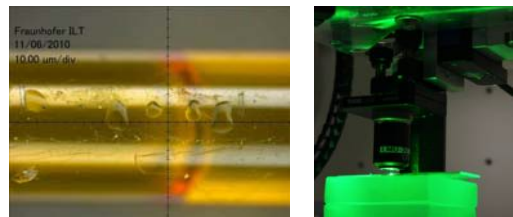


Fig.3, Left: Outpouring of Soap Water through Bore Hole of $\text{Ø}3.38\mu\text{m}$ (PI; OD/ID 1.50/1.44mm); Right: Green (532nm) Laser Application, FRA-ILT.

- Conceived as a laser **Desktop Module**, stringent miniaturization leads to a DIN A3 footprint of the system ($297 \times 410 \text{mm}^2$).
- The Cost-Saving System can be realized by using a **Microchip Laser System** (wavelength 532 nm, pulse duration 600 ps, pulse frequency 7 kHz, pulse energy $10 \mu\text{J}$) and standardized optical components in combination with vision controlled positioning for a greater repeatability.
- **Professional PLC-Interfaces** simplify the interaction with superior handling devices or attached manufacturing modules. **Product Data Bases** provide parameter records for a smooth alternation between products.

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Partnership – Collaboration

If you would like to know more about POLYTUBES or submit a request of collaboration, please visit:

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