

## UHP water jet protector – Development of protectors against risks when working with hand-held high-pressure and ultra-high-pressure water jets

### Objective

Hand-held water jet systems are replacing sandblasting in many applications as a cost-effective and environmentally friendly alternative. Typical injuries caused by contact with the water jets are penetration of shoes and feet by the water jet and injection of contaminated fluids into the lower and upper leg area, torso, hands and forearms, in some cases even serious injuries to the back of the body.

Therefore, the aim of the project was the development of protectors based on metal platelet structures providing effective protection against high-pressure water jets (using different nozzle types) with pressures of at least 1550 bar.

### Approach and results

The project began with the development of a requirement profile for the protectors and a study of different plate shapes, sizes and thicknesses. A suitable scale structure was then developed and implemented. Using an automatic button sewing machine, which was modified during the project, the plates can be easily sewn onto a textile substrate (polyester knitted fabric with an interlock structure) in the selected scale structure. Further experiments with direct and hotmelt coating were carried out to improve the fixation of the metal plates to the knitted fabric. The structures were then sewn into a highly abrasion resistant and water proof CORDURA® fabric for test and demonstration purposes.

As a result, overlapping metal plate protector structures were developed that provide the following protection against the various water jet applications:

- Round jet/point jet nozzle up to 500 bar
- Rotary nozzle up to 1000 bar
- Fan nozzle up to 1000 bar



*Silicone coated protector structure*

The results suggest that a protective effect can be achieved by further optimisation of the protector structures using round jet/point jet nozzles at pressures up to 1550 bar.

### Acknowledgement

We would like to thank the Federal Ministry for Economic Affairs and Climate Action for funding the research project UHP water jet protector (Reg. No. 49MF190118) within the funding programme "FuE-Förderung gemeinnütziger externer Industrieforschungseinrichtungen – Innovationskompetenz (INNO-KOM) – Marktorientierte Forschung und Entwicklung (MF)".

INNO-KOM

Supported by:



on the basis of a decision by the German Bundestag

The final report on this project is available on request.

Contact: Dr.-Ing. Yvette Dietzel

Phone: +49 371 5274-223

Email: [yvette.dietzel@stfi.de](mailto:yvette.dietzel@stfi.de)

[www.stfi.de](http://www.stfi.de)

29/06/2023