RESEARCH + DEVELOPMENT

WATER JET CUTTING:

INNOVATIONS FOR INDUSTRY AND COMMERCE.

ORIGIN AND APPLICATION AREAS OF THE WATERJET LABORATORY.

Water jet cutting often varies from job to job. Usually, specific customer requests are at the beginning of research and development projects: Is there a process for the mass production of a particular work piece? Can a certain material be cut with a water jet? The Waterjet Laboratory is practice-oriented and tries to find solutions for its customers.

The laboratory carries out tests on new materials. Feasibility studies are created for process developments including prototypes. Appropriate cutting processes and equipments are needed before a once-tested method can be implemented as standard, and these too are developed in the laboratory.

In most cases, applied research in water jet cutting represents an interlocking of various research areas. Each test material is connected to a cutting process. Behind each tested cutting method is the ambition to apply the method serially (process development). Nevertheless, five areas can be distinguished in the Waterjet Laboratory.

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CUTTING MACHINES / CUTTING PROCESSES

Micro Waterjet Cutting AWJmm® is the perfect example of the development of a cutting process which resulted not only in a new process, but also in the development of new water jet cutting machines. The patented process AWJmm® is the world's most accurate type of water jet cutting (micro water jet cutting).

PROCESS DEVELOPMENT / PROTOTYPING

With water jet cutting and micro water jet cutting, process and method development are closely interrelated and often result in the production of a prototype. At the beginning of the process development, specific questions emerge: How can existing processes be optimised (faster / cheaper)?

How can the service life of the machined components be extended? Which abrasive is used for the respective materials? The goal: an automated process that is commercially viable for the customer.

MATERIAL TESTING

With material testing, specific customer requests are the starting point of a test series. Tests are carried out with various cutting machines, abrasives and varying degrees of pressure. Together with partners, the Waterjet Laboratory develops new products, such as acoustic panels made of glass, which are revolutionising micro acoustics (project with the University of Applied Sciences FHNW).

FEASIBILITY STUDIES

Feasibility studies are carried out in the Waterjet Laboratory, on the one hand for customers and on the other hand to continuously test and further develop our own expertise. Feasibility studies include material experiments, prototypes and questions about production processes and automation for serial production.

WATERJET RESEARCH IS APPLIED RESEARCH

The example of the production of a forex stand is prototypical for Waterjet's research and development in water jet cutting and shows how different areas of research interlock.

FOREX STANDS FOR CHILDREN'S ALARM CLOCKS

An international watch manufacturer produced children's alarm clocks for the world market – a cheap, sturdy product. The majority of the materials used were plastic. Waterjet was assigned to produce from the material forex the stands on which the children's alarm clocks could stand firmly. By using water jet cutting, the watch manufacturer hoped to obtain lower production costs compared to conventional injection moulding processes. First of all, material tests were carried out in the Waterjet Laboratory. They proved: polyvinyl chloride foam (forex) could be precisely cut with a water jet.

For the manufacturer, the commercialisation of the production was crucial, which is why Waterjet had to develop a commercially viable production process. The following criteria were considered: a high degree of automation and dry and sand-free production – a major challenge for abrasive water jet cutting. The development process included a washing and drying process.

During the development process, Waterjet built a new dual head system for efficient, loss-free cutting and developed a completely new cutting machine. This was not an entirely unusual event: New machines (swivel heads, nozzles) are often an additional result of the development of a new production process.

The utmost precision was required so that the final step (design printing with a screen printer) could be performed serially and loss-free. To prevent the forex board from sagging, Waterjet developed a special toughening process, together with the screen printer, and optimised the production process.