2ND WORKSHOP ON APPLIED AND SUSTAINABLE ENGINEERING

UNCONVENTIONAL HYDRO-JETTING TECHNOLOGIES

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GENERAL INFORMATION

The Unconventional Hydrojetting Technology Center (CNTH) was formed in 1.06.2006 on The Koszalin University of Technology as the separated posefaculty science unit. Integration of economy and science environment through creating science-research grids and supporting interdyscyplinary activities in aid of hydrojetting technology development determines the principal aim of The Unconventional HydroJetting Center which helps to create content-related and innovative back-up facilities in range of high-pressure water jet utilization. The CNTH's operations are adjust for international activities however in the first place we offer our competences to polish institutions, companies and organizations.

The real beginning of activities in field of hydrojetting technology in Koszalin dates back to 1987 when prof. Jozef Borkowski formed one of the first in Poland half private research-science institution: BORTEX Hydroabrasive Comp. Ltd.. This company was equipped with set of high-pressure technological devices which made up the full cutting system - Streamline Hydroabrasive - produced by American Company Ingersoll-Rand. The main aim of statutory activity of BORTEX was promotion of technological progress in field of hydrojetting processing but especially popularization of high-pressure abrasive water jet cutting technology.

Dominant subject area of research activities of this Center was hydrojetting erosion caused by high-energetic water jet,with mono- and multiphase stucture, showing especially among other things in theoretical study of erosion basis which was caused by high-pressure abrasive-waterjet assisted by cavitation development and cryogenic application controll. Knowing mechanisms deciding about high-pressure water jet erosion helped in working out effective method of forming abrasive slurry jet and taking up study over high-pressure abrasive-water stream with lower pressure application, including microprocessing realized according to analogical MicroBorJet system, as well as processing with originally worked out various kinds of high-pressure ice-water and hybrid jet: abrasive-water-ice jet (CO_2).

The Unconventional HydroJetting Technology Center is presently unique in the world and the only one in Poland research institution dealing with basic and research studies, aiming to complex utilization of high-pressure waterjet as versatile erosion tool. Principal objective of this Center is transfer of the newest world's technologies utilizing high-pressure waterjet energy and leading studies over hydrojetting technologies and integration of science sphere and economy through innovative creating in aid of hydrojetting technology development and their practical applications. The Center's activities are adjust on international activity but in first place we offer our service to the polish institutions and organizations, especially small and medium companies.

Currently The Unconventional HydroJetting Technology Center owns several complete pump units and high-pressure hydromonitors with solid technological fittings, mostly made in Germany, Japan and America. Those devices were built to realize determinate technological processes including original BorJet and MicroBorJet systems used to slurry jet cutting and many others connected with it research stations. Center possesses also specialist investigative and measuring apparatus as well as apparatus used to evaluation of processed surfaces such as complex three-dimensional surface analyzer Talysurf CLI 2000, Taylor-Hobson.

HIGH-PRESSURE SYSTEMS AND HYDROJETTING FITTINGS

Currently The Unconventional HydroJetting Technology Center possesses several complex pump unit and high-pressure hydromonitors with full technological fittings, usually German, Japanese and American production. Such systems and much more connected with it test beds were built to realize precise technological processes.

We also owe the newest high-pressure abrasive-water jet (AWJ) machining center as well as original own production BorJet and MicroBorJet systems to cutting slurry water jet. Moreover CNTH is equipped with various special investigative units for example pipelines monitoring camera system - Modular Mainline System.

Machining center OMAX JetMachining Center Models 55100 / 4055V with a dynamic operating head type Tilt-A-Jet.

▪ Pipelines monitoring camera system Modular Mainline System.

▪ Various type high-pressure handguns and special peripherial fittings as well as a range of multi stream rotary heads e.g. type XL 1500-2.

▪ Hydromonitor built on basis of KOBE pump, p max =220MPa.

▪ Hydromonitor built on basis of HDP 164 Hammlemann pump, p max =220 MPa.

▪ Stationary hydromonitor with plunger pump from P30 to P22.

▪ High-pressure hydromonitor built on basis of T30/300 pump unit.

▪ Highly efficient diesel hydromonitor HAMMELMAN High Pressure Pump Type HDP 483, Power 550 kW.

MACHINING WITH HIGH-PRESSURE WATER JET

Application of hydrojetting technology to cleaning of great size surfaces allows replacing conventional dangerous technologies such as: sand blasting, chemical agents action or high temperature. Each of these methods add to environment destruction, first polluting air then, as a result of mixing with precipitation water, soil and water-courses as well. During sand blasting, the removed material and used abrasive grains spontaneously spray in the air causing dustiness of the surrounding area.

Innovativeness

In modern solutions utilizing hydrojetting technology, surface cleaning is realized using so called Spiderjets, which enabling full working zone protection by attaching to the cleaning surface by vacuum force. Such protection of the cleaning zone eliminates noise, splashes and solids which are finally carried out to filtering unit. Vacuum suction system and pneumatically driven wheels allow stripping of vertical, inclined and horizontal surfaces.