HIGH-PRESSURE WATER JET TECHNOLOGY AND EQUIPMENT FOR CUTTING ANY KIND OF MATERIAL BY MODEL (CONTOUR)

A Romanian research institute developed a technology and the specific equipment for cutting any kind of material by contour/model, by water jet at high pressure. The main advantages are that the thermal structure on the cutting area is not damaged, there are no changes in form in the cutting area forces, good quality of the surface, and the possibility of realising complex contours. The developers are looking for industrial partners interested in using the technology or developing other applications.

The process of cutting with water jet at high pressure (usually 200-400 MPa) is characterised by accelerated erosion of the material that is under the influence of a fine jet of water (1mm in diameter), with a high energy density. Adding some abrasive particles into it, it is possible to cut practically anything, all kinds of materials now existing (metals, non-metals, rocks, composites, wood, rubber, PVC, etc.). The process is partially automatic, allowing complex shapes, regardless of the type of material. The cutting speed is superior to that obtained using laser, but 30-50% lower compared to the conventional methods of thermal cutting.

It can be used with success in cutting materials that cannot be cut using other technologies, in industrial branches such as mechanics, car industry (board panels, metal parts, composites), aeronautics (sandwich structures), constructions (concrete, ferro-concrete), etc. The developer has experience in cutting a large spectrum of materials and also in producing the specific equipment.

The main advantages are:

- Possibility to cut a large spectrum of materials with the same equipment, without adapting it;
- Cutting without changing the thermal structure of the material or deforming it, regardless of its nature (cold cutting, small cutting forces);
- Possibility to obtain complex profiles even for the hardest materials;
- Low consumption compared to the current technologies (30-50%), good precision, and good surface quality;
- Good quality/price ratio.

Innovative aspects

The contemporary industrial products include many new materials, with different mechanical properties that make them difficult to be processed with the current technologies. The water jet technology has huge potential, being used in cutting all kinds of materials in any industrial sector. It is a potential replacement of the current cutting technologies in most industrial applications.

Promoted by

Innovation Relay Centres (IRC) Network

Potential market applications

Construction industry; Industrial chemicals; Instruments, measuring equipment; Manufacturing control systems

Collaboration sought

Manufacturing agreement; Information exchange/Training; Other

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INTELLIGENT END-TO-END PARCEL TRACKING AND TRACING SYSTEMS

Technology the size of a grain of sand now enables individual items to be tracked and traced from the point of dispatch to the moment they are removed from the supermarket shelf.

The CEN/ISSS have designed and implemented an end-to-end tracking and tracing system, such that the instant location of any given package can be made available anywhere and anytime. Using RFID (Radio Frequency IDentification) technology where the respective RFID chips are no bigger than a grain of sand, the ParcelCall project aims to provide continuous monitoring information of the track and trace functions.

Within this project, there were three primary objectives consisting of item level tracking and tracing, real-time continuous tracking and smooth integration into existing IT applications. As a result, the project developed two workshop agreements that set the agreed requirements of the tracking and tracing systems and the functional specifications on open multimodal tracking and tracing systems.

Such tracking systems are a wish come true for many end users and also for certain suppliers, simply because the need for customer demand forecasting is almost eradicated. Further, such technology will enable the end user to know the exact content of their stock levels, right down to an individual item, and when new stock is due for arrival. Additional benefits include enhanced security details necessary for open and seamless real-time tracking and tracing between different carriers and countries.

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Real-time, universal tracking and tracing systems offers more comprehensive coverage of the status of goods in transit

Additional benefits that are already envisaged present themselves in the ability to transmit the environmental conditions to the controller so that the required environmental parameters are not exceeded. This feature may also enable re-routing of specific cargos so that the quality of the consignments does not deteriorate during transit, even in the case of unexpected traffic scenarios.

The short-term future for these overall distribution systems will eventually realise short-range and long-range communication subsystems via technology such as Bluetooth and GPRS. Whereas for the long-term future, intelligent thinking tags are also taking shape, and are based on the requirements of postal, express and air cargo carriers. Because the open architecture is currently being developed, these far-off systems are not as far away as some people may think.

Programme
Funded within the 5th Framework Programme IST (User-friendly Information Society)

Collaboration sought
Further research or development support; Licence agreement; Information exchange/Training; Available for consultancy

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IDENTIFICATION OF FACTORS AFFECTING SITUATION AWARENESS AND CRISIS MANAGEMENT ON THE FLIGHT DECK

The purpose of Work Package 2 was to identify hazardous states relating to situational awareness and to specify current strategies used on the flight deck and by operators for managing crisis events. This involved the interrogation of relevant material in both normal and non-normal operations. In particular, accident data obtained in previous research projects were screened for relevant events to help define training requirements in WP3. Further, data from normal operations were collected to capture flight crews, knowledge of critical Crisis Management and Situational Awareness skills. Finally, airline-training practices in Crisis Management and Situation Awareness were identified from a high-level perspective.

As a result of the work programme, it was recommended that the Training Needs Analysis at the centre of ESSAI should focus on the issues that will form the basis for the design of the training tool(s) in subsequent work packages. The ESSAI partners have, now in some depth, investigated both SA and CM conceptually, through user consultations and in current airline practice and elsewhere. Specifically:

- It is suggested that the training requirement is not to provide more CRM and HCI training, but to provide training in the form of the underlying cognitive processes associated with SA.
- It is recommended that potential users review the many factors identified here and those collected by the crew interviews and assesses their trainability.
- Training and design solutions for loss of SA have been identified but their practical value needs to be assessed. Generally, losses in SA occurred during periods of high workload, during periods of multi-tasking, a preoccupation with other tasks, inadequate feedback from crew members, during periods of stress and during interactions with automated systems.
- Situation Assessment and Teamwork are significant factors in CM. Crews supported training in Systems Knowledge. Research should continue in this direction.
- The concept of negative training was introduced and it is recommended that it be reviewed in aviation safety practices.

The report provides examination of theoretical constructs in real settings and develops a cognitive model of crisis management that is pertinent to other users of complex human system technologies.

Programme
Funded within the 5th Framework Programme GROWTH (Competitive and sustainable growth)

Potential market applications
Pumped storage; Carrying capacity assessment; Data, information security; Education, learning systems, distance teaching; Aerospace; Ship, boat building

Collaboration sought
Further research or development support; Joint venture agreement; Information exchange/Training; Available for consultancy; Other

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