Dear NetExCNCer,

Happy New Year and welcome to the 12th issue of NetExCNC Newsletter! One purpose of the newsletter is to inform the community about the developments in the context of CNC both in New Zealand and overseas.

In this newsletter, we first present the agenda for the 2012 ISO STEP meeting. Interested pasties are invited to attend the meeting held in a beautiful city of Stockholm. The initial discussion of the National Simulation Service SBIR Project are given. Also included in this newsletter is a synopsis of a recently completed PhD research on STEP-NC Enabled Machine Condition Monitoring. An article on composite product manufacture talks about a new prospective of STEP/STEP-NC to be used for manufacturing processes other than machining. Finally, the latest publications and book releases in the area of STEP-NC research are included.

From this issue onward, the newsletter will only be published when there is enough information to be included. We appreciate your understanding and continued interests in the topics covered.

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http://sakai.bestgrid.org/netexcnc
The National Simulation Service SBIR project led by STEP Tools has been discussed during the STEP-Manufacturing teleconference meeting on 17th June 2011.

The service will bring together CAD, process, cutting tool, and machine tool models using STEP, STEP-NC, and ISO 13399 standards-based interfaces, provide a rich web interface, and let users test manufacturing plans with models of actual tools and machines to see if they meet the tolerance goals.

During the meeting, the importance of portraying reliable results from the machining program that meets requirements has been raised out. It was noted that CAD systems are beginning to export STEP GD&T, which when combined with the machine tool error models, enable testing the tolerances.

For more information:
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STEP-NC Enabled Machine Condition Monitoring

It is widely recognised that feed-rate optimisation is an effective way of improving and obtaining better machining performances. The rigid data format of ISO 6983 (G-code) makes feed-rate optimisation difficult because the controller normally executes the code with pre-set feed-rates. In order to select and use the best parameters to automatically deal with the “worst case scenario”, the study incorporates process monitoring and control based on the STEP-NC (STandard for Exchange of Product data for Numerical Control) data model.

With the aim of enabling and improving machining optimisation, this research proposes new system architecture for generic feed-rate optimisation, process control and knowledge-based evaluation. The system is divided into three sub-systems:

(i) Optimisation system based on STEP-NC called optiSTEP-NC
(ii) Adaptive NC program executor with feed-rate optimisation called AECopt, and
(iii) Knowledge-based Evaluation (KBE) system.

Integration of all these stages under a single platform opens up an avenue for developing an intelligent machining environment. This PhD research project was recently completed by Dr. Firman Ridwan in the Intelligent & Interoperable Manufacturing Systems, University of Auckland, New Zealand.
Deployment of STEP-NC on machining processes has been ongoing for some years. The rigor of such work is to be maintained as we still have many issues to be resolved and plenty of work to do to convince the users in general and machine tool manufacturers in specific in the uptake of the data standard. Some of the attention has however been diverted to other type of manufacturing processes such as composite product manufacture.

The STEP-Manufacturing team (headed by Martin Hardwick from RPI) has started looking into possible ways of utilising STEP-NC to enhance design-manufacturing processes of composite products. In a teleconference held last year, David Odendahl, Associate Technical Fellow of Boeing in Seattle and the Chair of OMAC Machine Tool Working Group, explained some of the composite tape laying and fiber placement processes in the production of B777 and 787.

While use of such processes is set to become more prevalent in aircraft manufacture, when it comes to the automation level of these processes, there is still much to be desired of. Tighter integration of, and improved way of using, design and process data for composite manufacturing is another urgent matter. STEP-NC may have a role to play in providing a standard data format for both design and manufacturing of composite parts.

Currently, a large proportion of work is still manually carried out and therefore laser-based inspection is often required, said David. The process data are primarily CL files, very similar to that contained in a G-code part file. Post-processors and custom-made software are the predominant tools to be used. A unique feature of aircraft manufacture with composite structures is that of a mixed nature, i.e. both manual and automated methods are used. A typical machine is the giant single-head tape layer with a dozen of controllable axes. These machines are customer-made and exceedingly expensive. It is also very hard to control. Some of the issues are path guidance, dealing with cuts, slow speed and quality control. David explained each of these issues in detail. Close integration with design data is necessary as curvature information is needed for programming the axes of the tape layer and tape selection. It seems that STEP design data may be utilised in the path planning algorithm that generates process data in STEP-NC (e.g. AP 238) format. This way, design and manufacturing data are consolidated. The team decided to work on a test part and use a second-hand laying machine for some preliminary testing.
Recent Publications


This book features an overview and in-depth understanding of a complete dimensional metrology system, highlight some basic theories and key technologies to solve the practical dimensional measurement problems in modern dimensional metrology practices and introduce the information modeling techniques and data models in dimensional metrology.

The book also analyzes interoperability issues in dimensional metrology systems and describes information modeling techniques. It discusses new approaches and data models for solving interoperability problems, as well as introducing process activities, existing and emerging data models, and the key technologies of dimensional metrology systems.

For more information and contributions

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