



New Generation Controllers for Smart Machining

The FoFdration project envisions a 'Smart Factory' architecture and implementation which has the potential to achieve significant benefits in earlier visibility of manufacturing issues, faster production ramp-up time, faster time-to-volume production and subsequently shorter time-to-market, reduced manufacturing costs, improved product quality, as well as sustainability objectives like reduced energy consumption and waste reduction.

Realizing the objectives of the project requires that several pieces are integrated with each other. At the center of these pieces is the Smart Machine tool Controller (SMC).

The original vision in FoFdration for the SMC is to implement an advanced machine controller based on an open-architecture, standard enabling data access and data visualization application. Additionally, an extended STEP standard will be seamlessly integrated to bring CAD-CAM data down to the shop floor level, thus enabling intelligent and self-learning manufacturing process.

A smart machine is defined as a machine equipped with an advanced controller that knows the capabilities of the machine to be driven. Such a machine is able to define the most efficient method to produce 'first part correct' every time. It will do this all whilst monitoring itself and utilizing data that closes the gap between the designer, manufacturing engineer, and the shop floor, whilst allowing high level production management and supervision.

To accomplish the above SMC characteristics, a generalized architecture has been developed in order to enable both progressive and breakthrough innovations for industry. Therefore the innovation of the SMC is not just a product in the conventional sense but it is an architectural framework that can be implemented on several platforms.

The progressive innovation must be based on defined components that are compatible with legacy systems, thus supporting the industry's transformation by introducing more IT-assisted technologies into conventional and existing manufacturing chains for better optimization of the manufacturing process. This condition is necessary to support the transformation

of prevalent brand name controllers (FIDIA, SIEMENS, etc.) mostly based on ISO G&M code into STEP-NC compliant controllers, thereby allowing companies to increase their production performance without heavily investing in new expensive machines and time-consuming training. Implementations developed need to be usable in the short term by industry to show immediate benefits and encourage commitment and investments from machine tool industry.



ECN works on the STEP-NC SMC Interface with a FIDIA controller

Breakthrough innovation is based on a STEP-NC SMC interface for part programming tightly integrated with the optimization module. The controller will be able to generate cutter trajectory and optimize the cutting strategy in real-time. This is possible with an embedded STEP-NC SMC interface including its own tool-path generator, e.g. for surface milling.

Envisioning the long term evolution of the industry, FoFdration proposes a framework to support the evolution of the numerous CNC controllers while encouraging Open cohesive breakthrough innovations in its SMC.

“2013 will be a year to really open doors, when we can show what we have done and can do.”
Jean-Bernard Hentz, Airbus Operations SAS

The FoFdration EU Project Newsletter
Issue 2 - February 2013

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NEW! Watch our video on YouTube!

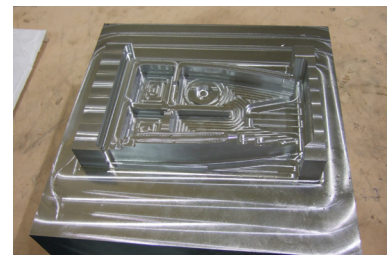
Welcome to the second quarterly newsletter of the FoFdration project!

Please [click here](#) to sign up to our email newsletter and please share it with your friends and colleagues.

FoFdration News

Artis and Delcam complete a three day workshop in Birmingham

Artis visited Delcam at the end of November to run the first set of machining experiments to validate the initial research outcomes of the 4th Work Package.



The Airbus aerospace test part 'Fishhead' being used as a common test piece

ECN realise Next-Generation CNC machine-tool

ECN have been busy trying to give a glimpse into the future by creating a prototype platform for the Next-Generation CNC machine-tool. This particular prototype uses currently available tools and new developments to build an Open-NC platform for showcasing CNC functionalities that are expected, even demanded, in the future CNC machine-tool.



Milling at ECN with LinuxCNC

4th GA Meeting at ECN, Nantes

Consortium partners of the FoFdration project gathered at ECN in Nantes, France, from 16th-19th October 2012 to share results and update everyone on the progress made so far towards achieving the project objectives. There were some excellent discussions and very informative presentations, and also individual work package meetings.



Consortium partners at the demonstration in the ECN lab

Being halfway through the project, this General Assembly meeting marked a critical milestone. Jean-Bernard Hentz of Airbus SAS Operations, Project

Coordinator, opened the meeting and when speaking about dissemination said, "Next year, 2013, will be a year to really open doors, when we can show what we have done and can do". Each work package leader then updated the rest of the consortium on what had happened since the last GA meeting.

Notable highlights included:

- Focussing on analysing the existing data exchange standards and identifying which data is missing in order to develop a structure for the Manufacturing Information Pipeline
- Considering sustainability in manufacturing; not just for now but for 10 years in the future
- Looking at creating the perfect model of the imperfect machining process, right from conceptual design through to development and evaluation. For example, feed rate has been identified as a key parameter and therefore needs to form part of the machine tool simulation signature
- Defining the content of the project training days and putting forward proposals and scheduling for the use cases planned.

During the time in Nantes, there was also the opportunity to visit the ECN lab for a live demonstration and a tour of their machining facilities used for experiments, including two wave pools investigating aqua dynamics. ECN has been conducting various tests on their machine tools to investigate open-NC machining and to contribute to the overall project objectives.

FoFdration Partner Profiles



Fidia SpA is a world leader in the design, production and distribution of integrated systems

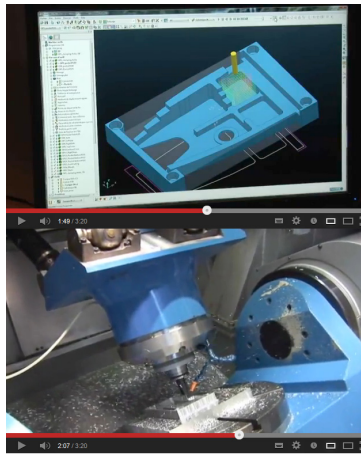
for the realization of complex shapes. Fidra produces and distributes numerical control devices for milling systems, high speed milling systems, and CAM software for the cutting of complex shapes. The main markets that they operate in are automotive, aerospace and tyre moulds. Being a CNC manufacturer, FIDIA will be in charge of the interfacing and interconnecting of the self-learning core with the real world, constituted by the conventional machine tool, equipped with sensors and tools according to the specifications coming from two of the work packages. The CNC will have to be ready to implement the solutions and algorithms developed within the framework of the project, in order to put adaptive strategies and sustainability monitoring functions into action FIDIA will investigate innovative solutions for integrating, coordinating and managing process control information coming from different kinds of sensors.



Centrale
Nantes

ECN's, specifically the MO2P Branch (Production Process Modelization and Optimization) main research focus is to define, develop, simulate and optimize the whole manufacturing process of mechanical parts within a product/process framework. With extensive experience, ECN couples the study and optimization of several physical processes along with virtual production which enters the modeling and simulation world to further improve process optimization.

Within FoFdration, ECN is strategically positioned to be able to exploit and maximize the use of its knowledge and experiences across several of the project's work packages and tasks. ECN brings knowledge of manufacturing standards (STEP-NC etc), of machining processes, of process modeling, simulation and optimization. As a key demonstration site and future site of one of FoFdration's Living Labs (InnoLab France), ECN hosts both the conventional (Legacy) and innovative (Open-NC) machine tools that the project's goals, solutions, results and frameworks will be demonstrated on to the European manufacturing community and to the general public.



NEW! Watch our video on YouTube now!

To further share our progress with you we have created a video and a YouTube channel. The video gives a brief introduction as to what the FoFdration project is all about, what the current challenges are facing the manufacturing industry, what the many benefits to industry - particularly to SMEs - that stem from our project developments and how they affect us both commercially and also our customers. To view our video please [click here](#).

Coming soon...

- Airbus publication - February 2013
- Review Meeting at the European Commission, Brussels - 21st March 2013
- More videos on YouTube!

Find us and follow us!



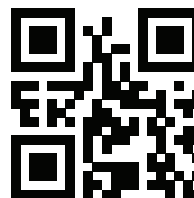
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