"COMET" Project targets industrial robots for high-end machining

COMET is a research project aimed at bringing industrial robots to the accuracy requested by high-end machining. COMET stands for “plug-and-produce Components and METHODS for adaptive control of industrial robots”, i.e. a novel control platform to enable high-end machining with robots, obtaining cost effective, flexible and reliable manufacturing solutions.

The project objective is to overcome the challenges facing European manufacturing industries by developing innovative machining systems that are flexible, reliable and predictable with an average of 30% cost efficiency savings in comparison to machine tools. From a conceptual point of view, industrial robot technology could provide an excellent base for machining being both flexible (due to their lay-out) and cost efficient (robots cost 2-5 times less than machine tools). However, industrial robots lack absolute positioning accuracy, are unable to reject disturbances in terms of process forces and lack reliable programming and simulation tools to ensure right first time machining, once production commences. These three critical limitations currently prevent the use of robots in typical machining applications.

Innovations to overcome these limitations proposed by the COMET consortium include an adaptive robot path generation system based on kinematic and dynamic models, an adaptive tracking system and a High Dynamic Compensation Mechanism (HDCM) - see picture below. These innovations will improve robot accuracy, reduce setup times by 50% and enable precise first time programming and simulation with real-time robot path correction.

The project involves 14 technical partners from 8 countries across Europe coordinated by Delcam.

COMET is co-funded by the European Commission as part of the European Economic Recovery Plan (EERP) in the sector of Factories of the Future (FoF), Factories of the Future is a EUR 1.2 billion program in which the European Commission and industry are collaborating in research to support the development and innovation of new enabling technologies for the EU manufacturing sector.

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Welcome to the first Quarterly newsletter of COMET project

The COMET news is aimed to disseminate the project research achievements to all institutions and companies in EU interested in high end machining and robots, both from industrial and scientific communities. The newsletter will keep you updated on the latest developments in the project and key news from our consortium partners, on a quarterly base.

Also keep an eye on our website www.cometproject.eu that will be launched in January 2011. Go there also to subscribe our email newsletter to make sure you keep in touch with the latest information.

You can also follow us on:

Facebook: http://www.facebook.com/pages/Comet-project/136898793033336
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Starting Date: 1st September 2010
Duration: 30 months
Budget Total: 8.0 M€
Budget Funding: 5.3 M€
FP7 Thematic Area: “FoF.NMP.2010-1: Plug-and-Produce components for adaptive control”
Coordinator: Delcam plc
**The COMET Consortium**

The COMET consortium contains a unique combination of partners from industry, research institutes and universities who all have an enormous drive to deliver project results to European manufacturing industries.

The consortium involves 14 partners from 8 countries across Europe. Partners include Delcam (UK), Nikon Metrology (B), ARTIS (D), AMRC (UK), TEKS (Fr), Fraunhofer IPA (D), BTU (D), Lund University (S), Gizelis Robotics (Gr), University of Patras (Gr), N Bazigos (Gr), DemoCenter Sipe (It), SIR (It), and Nisaform (CZ). Some are mainly involved in developing the new technologies for the novel control system: B-TU and Lund University for the kinematic and dynamic modelling of the robot, together with the industrial partner ARTIS specialized in machining control systems; Delcam for the toolpath generation software; Nikon Metrology for the optical tracking systems and IPA for the compensation system. AMRC, TEKS, SIR, Gizelis Robotics, Bazigos and Nisaform bring their experience as robot integrators and machining companies driving the novel control development and testing it in real industrial environments, coordinated by Italian partner DemocenterSipe specialised in technology transfer services. Finally University of Patras will be engaged in disseminating all COMET achievements both to scientific and industrial communities.

**A 1st Insight on COMET Technologies**

The novel robot control system is based on four main innovations. They coincide with four main components to be plugged in the robot controller, completing the ‘puzzle’ of the COMET plug and produce controller. Below you can find a short introduction to the COMET four innovations:

- The 1st is a methodology for describing kinematic and dynamic models of industrial robots so as to accurately define the static and dynamic behaviour of any industrial robot, which is then represented by its unique signature. It’s the grey piece in the puzzle, Machine Specific Kinematic and Dynamic Models.
- The 2nd innovation is an integrated programming and simulation environment for adaptive robot toolpath generation for machining with industrial robots. It’s the blue piece, titled Adaptive Robot Path Generation.
- The 3rd innovation is an adaptive optical tracking system to help adjust the robot arm in relation to where it should be according to the initial programmed robot path and make corrections via the robot controller. It’s the yellow piece, the Adaptive Tracking System.
- The 4th is a high dynamic compensation mechanism (HDCM) needed to achieve accuracy better than 50 micrometres, which is significantly beyond the structural capacity of the robot system on its own. It’s the green piece.

These innovations will be plugged into robot controllers for the main industrial robot brands available on the market (ABB, Kuka, Motoman, etc). The complete ‘puzzle’ will significantly improve robot...