

Project Name (Working title)

**The Ubiquitous Factory of the Future based on STEP-NC (Ubi-FaST NC)
Future Advanced Manufacturing Over Ubiquitous System (FAMOUS)**

Background (Need for technology, relevance to Manufature & IMS)

The **survival of traditional factories** (especially manufacturing SMEs) within the global economy, with productivity pressures, and scarce resources and capabilities, relies on their ability to embrace new ideas and new organizational forms and to imagine new ways of delivering value to customers, new approaches to collaborating with suppliers. Eliminating the barriers to make possible the new paradigm “**design for customer-centric anywhere, build “intelligently” anywhere**” is a crucial challenge for manufacturing industry to gain competitiveness in the emerging markets, and to better cooperate (and not only to compete) with low-wage countries. **Information Technology** plays a strategic role and the unbundling of the modern global enterprise depends on the **connection of machinery over the Internet** and the new incorporated “**added-value (web) services**” as well as the **ubiquitous behaviour** of machines-tools. **Full interoperability** towards the **digital factory** and **extended manufacturing processes** opens up **new perspectives of collaboration** between OEMs (Original Equipment Manufacturer) firms and their suppliers: the new **STEP-NC Compliant Data Model** based on the drafted ISO/DIS 14649 opens up new perspectives to business and manufacturing processes integration, for both horizontal dimension (collaborative knowledge-based engineering and resource planning) and vertical dimension (distributed agent-based technology).

Objective (Expected output of project)

The future project aims firstly at demonstrating the efficiency of **knowledge-integrated solutions** in manufacturing environments by implementing the **vertically integrated STEP-NC manufacturing processes** for the two industry drivers of **aerospace and automotive**. Secondly, it envisions an **universal manufacturing platform** allowing **full interoperability** for modern manufacturing applications. The project mainly focuses on the realisation of both **extended manufacturing processes through SOA (Services Oriented Architecture)** software assisted by **extensive knowledge resource (knowledge base repository)**, and **intelligent NC controller (hardware)** based on **open architecture**. **Embedded algorithms** based on the STEP-NC data model will allow **on-line tool path computations, corrections and optimisations** for **smart and intelligent machining of features**. The higher information level provided by STEP-NC allows the development of a **new breed of intelligent controllers**, capable to be **self-adaptive and autonomous** to meet the manufacturing requirements to deliver the final part as required by the customer.

Project description (Brief description of work content of project)

The project emphasizes **knowledge integration in manufacturing systems** thanks to the introduction of an **efficient IT standard** for the product definition, throughout its **entire lifecycle**. Basically STEP-NC allows the smooth and seamless exchange of part information from conception to part production. Nevertheless, at this time, many barriers prevent the acceptance of this standard as long as the current machine controllers are still based on traditional G-code technology. The project “FAMOUS” aims at rethinking a completely innovated design of the manufacturing chain “from art to part” for both software and hardware equipments based on both modern information structure and architecture. The STEP-NC data model will be exploited and extended to achieve the future targets:

- A full digital description of the machine-tool and its processes (“**digital factory foundation**”)
- A knowledge-based and rule-based definition of the product and its associated manufacturing processes allowing **virtual machining** and traceability within a global business environment (life cycle integration)
- An **intelligent and self-adaptive process** thanks to deep integration of **on-line algorithms** and software in real-time interaction with “mechatronics” sensors (“vertical intelligent integration”)
- Last but not least, an **e-manufacturing protocol** allowing manufacturing operations across multiple companies and countries, in order to assist SMEs to “coopete” (cooperate and compete) with emerging regions (“horizontal logistics integration”)

Innovative aspects (What new aspects does the project bring to technology, product)

STEP-NC is recognised by international experts as the main **enabling “IT bus” for manufacturing industry**. Therefore, through the future project “Ubi-FaST NC”, it can drive the opportunity for change towards the targets of **digital, adaptive, networking, and knowledge-based manufacturing for the factory of the future**. The manufacturing industry can then meet the three important issues of the future that is characterized by:

- **customer-centric** for best customisation according to the new rules BTO (build-to-order) and CTO (configure-to-order)
- **extended enterprise** allowing work to be done simultaneously in different places.
- **knowledge-based** for best performances and added values thanks to “intelligent agents” and on-line and close-loop functionalities.

Project Outline Summary - proposed for FP7

Ref. No:

Deliverables (Timing and short description of deliverables)

Review of technology push and industry drivers pull (WP1)
Standardization, review & recommendation (WP2)
Overall definition of a STEP NC work-cell prototype for aeronautic and automotive applications (multi-axis milling & inspection), Analysis of 3D free-form typology and enhanced machining/inspection strategy, New "direct machining controller" with embedded "Machining surface" driver (WP3, WP4, WP6)
Virtual machining: machine-tool data, data validation, NC driven simulation, Manufacturing execution system and PLM (WP4, WP5, WP7)
Implementation, testbed, demonstration & e-manufacturing, dissemination (WP8)
Project Management and new business development (WP9)

Exploitation (Expected exploitation routes)

Prototype of ubiquitous & direct machining STEP-NC based controller
Pilot workcell in Industry, SMEs, and research institutes across multiple countries.
National Learning factory and technology transfer centres.

FP5 and FP6 Relevance (Links with other framework projects; past, current, and expected)

OPTIMAL, STEP-NC, HIQU, FAME, OSACA, NEXT, KOBAS, MANTYS, FUTMAN, ...

Estimated project cost (First "ball-park" estimate)

20 M euros (1500 MM)

Timing (Projected start date)

2007 – 2011

Duration (Overall time frame for project)

42 months

Lead organisation and contact details

Airbus , or SIEMENS

Expected partners

30 expected partners
EU: Airbus, Volvo, Fidia, Osai, MCM, TTS, ...
Swiss: CADCAMation, EIG, EPFL, Witech, Fast, Mikron, DGSA, ...
Asia: Postech
USA: Step-tools, Boeing, ...

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