ARROWHEAD TOOLS

HIGHLY CONFIGURABLE HMI OF CNC CONTROL SYSTEMS

GOAL

The development of a highly configurable HMI enabling efficient customization and use of CNC control systems.

Challenge

Fagor Automation requires a solution that facilitates the integration and the development of the final product at the different levels (HMI, API, machine tool) and for the main different users (OEM, machine operator).

Two engineering phases are addressed in the project, Deployment & Commissioning and Operation & Management. The main challenge is the migration from a machine-centered product with ad-hoc adaptation via parameters and built as a monolithic system to a client-server based architecture developed around a set of tools and services and relying on standards for information exchange instead of custom binary file formats.

The objective of compatibility and interoperability poses another challenge in that converters must be developed to read legacy files and transforming them to the chosen formats. These converters will take the form of isolated modules that can be called or integrated in different applications.

Three independent applications will be developed. The first one is oriented to the definition of the topology and connections (to the devices present in the field buses) and to the edition of the configuration (mapping of physical resources to logical objects (axes, paths…) inside a CNC. This is clearly confined to the deployment phase. Second, an application oriented to a rather difficult task, tuning of the control loops of the machine axes. The tool will indeed also be used for diagnosis of the machine at maintenance, but its main use is during commissioning. Third, on the Operations phase, an application will be developed to assist the operator in making a part piece from a drawing. A modern HMI with high interactivity will help and guide the user to define operations (profile cutting, drilling patterns finding…) from the original drawing, including possibility of importing files from standard file formats and manipulating them.

The application modules will be downloadable under appropriate rights to enhance performance and address new functionalities or data converters.

The goals of the project are:

1. Reduction of the configuring and tuning time for the same level of dynamic performance (up to 50%).
2. Shortening of the part piece programming time, especially for difficult pieces (>50%).
3. Adoption of new technologies and interoperability with third-party applications.
4. Legacy data compatibility.

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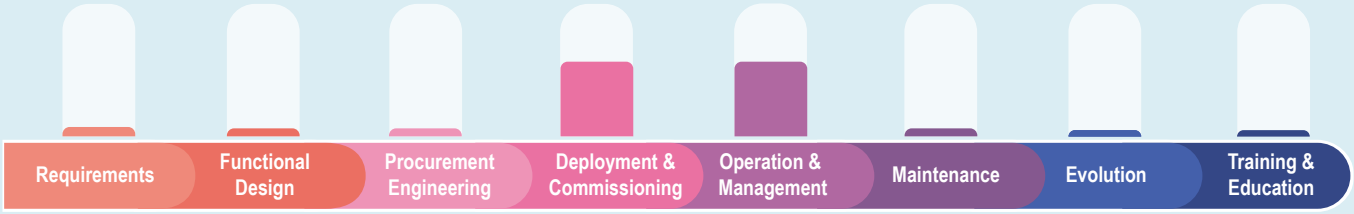
ARTEMIS Industry Association

Engineering Phases



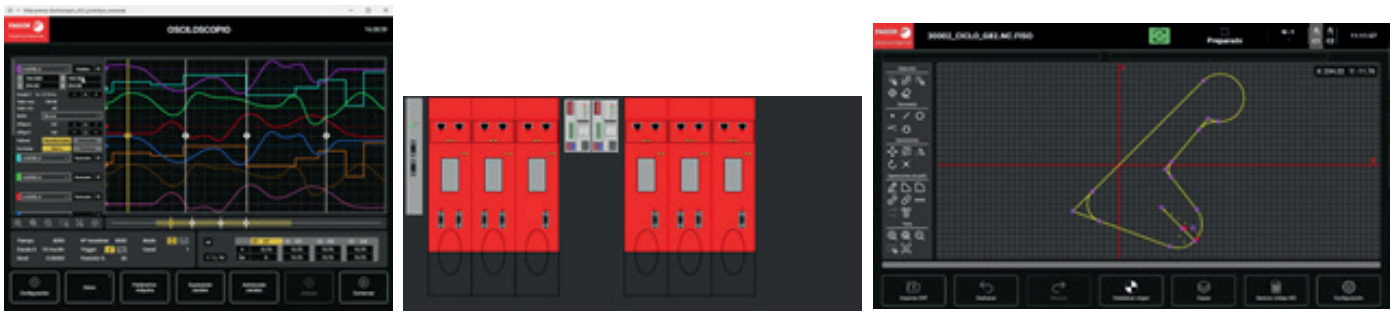
Results

The three expected applications are addressed to different users and have different exploitation patterns.

The topology and configuration editor will be integrated in the OEM dedicated HMI. In a first version this application substitutes the legacy counterpart while providing better interactivity and functionality but would be offered as the new interface.

The tuning tool includes a data plotting tool with some advanced functions but will be offered also as part of the standard distribution. But the tuning tool will include some modules offered as options and, as such, payed as licenses. These are the machine tool identification module and the control loop optimization module.

The geometric editor will be an option offered to the end user under a pay by license approach. Different plugins are expected to complement it in the future, addressing different machining operations (canned cycles) and optimizations.



* *The figures depict 3 examples of the expected applications, the tuning tool (scope), the topology editor and finally the geometry editor.*

Partner Data

FAGOR AUTOMATION

FAGOR AUTOMATION *is a cooperative enterprise born in Mondragon (Spain) in 1973 within the FAGOR group and consolidated as an autonomous company in 1980. It is dedicated to the manufacturing of automation equipment and systems for industrial machines. It is integrated into the Industrial group of Mondragon Cooperative Corporation and, from its very beginning, has made special emphasis on R&D investment, and on the internationalization of its activities.*

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