STEP-NC – New data interface for NC programming

Up to now, part programming for NC machine tools is normally done by using ISO 6983. This standard dates back to the time of punched cards and does not cover the demands of modern NC technology. Within several research projects, such as OPTIMAL and MATRAS, European industries and university institutes have developed a new STEP-compliant programming interface which is based on an object-oriented data model.

The main characteristic of the new interface presents higher level of information. Whilst a part program according to ISO 6983 describes movements (G1, G2, G3) and switching instructions (M3, M8), the new language covers manufacturing tasks (so-called “features”). Such a task could be, for example, roughing of a pocket. All operations which are necessary to produce the finished part from the raw piece, can be described by a sequence of such manufacturing tasks.

Since the data model describes tasks, the part program supplies a higher quality of information to the shop floor. Therefore, modifications at the shop floor can be saved and transferred back to the planning department which enables a better exchange of experience. Through the fact that geometry of raw piece and finished parts are described by using the STEP syntax, a direct exchange of information between CAD/CAM and NC can be realised. Geometry data can be imported directly from CAD systems. Thus, only technology information has to be added in order to generate the part program.

More Information? Specific Questions?
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The new data exchange format has been implemented as prototype for both 2½D and 3D machining into controllers of Siemens and Fidia as well as into the European open architecture OSCA NC controller and its performance has been proven in laboratorial environments. It will be a cornerstone for a truly open manufacturing environment.

Standardization

The new data model was introduced to a ISO Working Group and is currently under final deliberation for Draft International Standard (DIS), called ISO 14649 by ISO TC184/SC1. The standard aims to replace the current used ISO 6983 with the new data model. For the first stage, the general work for milling, including structure and data model was finished.

European Project and International collaboration

In order to validate this interface, the European project STEP-NC has been launched. Implementation of the existing data interface for milling will be undertaken as well as extensive tests by end-users. The project started on January 1st 1999 and will continue until December 31st 2001. In total 20 industrial and academic partners with high experience in the fields of CAD/CAM, control, and machine tools in Europe are joining this project.

The results of these tests and a collection of user demands will then form the basis for the development of a new data interface for turning, grinding, EDM, rapid prototyping, wood and glass cutting.

For further exploitation of the results, an inter-regional collaboration with Europe, Switzerland and Korea with the scope of Intelligent Manufacturing Systems (IMS) is planned.