As machine tools evolve, we are seeing more and more physical components being added to them. Meanwhile, production time is becoming every day more important for cost impact and time-to-market pressure. The machine set-up time can be relatively long for particularly complex operations, mostly when there are a large number of components moving at once, or when axes movements can generate collisions among the various machine parts. The conventional methods by which the operator monitors for possible collisions are not the most efficient in terms of time or process reliability. For this reason, the use of collision check software packages is continuously growing. These tools simulate the cutting process of the machine that executes the given program; but this means that the collision detection is the result of an off-line simulation process, done by a stand-alone system, and this simulation can be more or less close to reality depending on how accurate is the machine modeling, with respect to the real one. Moreover, the simulation is performed under certain machining conditions and when any of them changes (take as example the tool length, origin shift, etc..), then the simulation must be repeated.

To answer these needs, Fagor Automation has introduced the Fagor Collision Avoidance System (FCAS). The FCAS performs real-time monitoring for all of the machine components at risk of collision. This monitoring is performed not only during simulation process, before running the execution, but also in manual and automatic modes, and also during movements done in tool inspections (when the execution is suspended by the operator, in order to verify the tool's cutting conditions, often moving axes for their position and then, moving them back to the interruption point).

The FCAS operation is very easy. First, the machine is modelled by defining both the machine's elements, the physical connections between them, and the «collision rules» in order to define which parts can potentially crash with others. This solution allows even to manage polymorphic machines, that means machines where mechanical parts can be, for instance, be mounted/unmounted (take as example an automatic head change device). All this setup is done in a configuration phase, that means, by the machine tool builder.

Then, from the operator's point of view, the use is very simple. The monitoring can be activated or disactivated, depending from the desired way of operation, and when active, the axes movements are continuously monitored: any positioning that would cause a collision, cause the machine to slow down the velocity, up to stop the movement before the collision occurs.

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