



HEIDENHAIN



iTNC 530

New Functions with
NC Software 34049x-05

— Improving Machine Accuracy with KinematicsComp (Option)

As the requirements on the workpiece tolerances become more stringent, constantly increasing demands are placed on the machine tool. However, machine tools are necessarily subject to errors arising both from the production process and the machine design. For example, according to ISO 230-1, a linear axis can have six types of error, and a rotary axis can have even more types of error. These include not only familiar errors, such as positioning and angular errors, but also pitch, yaw and roll as well as the wobble of an axis of rotation. This means that the more axes a machine has, the larger the number of error sources. The use of mechanical means to cope with these problems requires considerable effort, particularly in the field of 5-axis machining, or if large machines with parallel axes are involved. The axes are also subject to drift, usually resulting from inhomogeneous

temperature distribution in the machine parts. The drift becomes apparent in the form of both linear movements (translations) and, quite often, rotational movements (rotations).

The new KinematicsComp function of the iTNC 530 enables the machine manufacturer to save a comprehensive error description of the machine in the control. In the kinematics model, the manufacturer describes the machine's degrees of freedom and the position of the rotary axes. Up to now it was only possible to define the nominal geometry of the machine. The actual behavior of all axes can now be integrated in the current kinematics model. KinematicsComp can even be used to define position-dependent temperature compensation. The required data is supplied by several sensors located at relevant points on the machine.

Some of the measurement methods that are necessary to isolate these errors are already used for the calibration of measuring machines. For example, laser tracer systems, which are capable of high-precision measurement of spatial errors of the tool tip, can be used for such a task. But the iTNC 530 also has features, such as KinematicsOpt, to enable the machine manufacturer to isolate the existing machine errors for a detailed analysis.

KinematicsComp is capable of significantly improving the manufacturing and contour accuracy, especially on large machines. The long distances traversed and the large moving masses cause relatively large errors. Because the use of mechanical means to reduce these errors requires a lot of effort, the economic benefits achieved by KinematicsComp are especially significant for these applications.

