

Application report

from an

EMAG VSC 7



of the monitoring system

Toolinspect

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**Data communication:
CNC-control:**

Removed material:

**digital
Siemens 840Dsl with TCU
(without visualization)
high quality steel**

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Technical modifications reserved.

Advantages in connection with the tool- and process monitoring system **Toolinspect[®], in series production.**

- Minimum modifications to NC program necessary.
- Only brief instruction of machine operators required.
- Simple operation via **3-function keys**.
- Optional extension: **adaptive control** of machining processes.
- Automatically system- and data storage with **SAFECARD**
- Diagnostic- tool for **process optimizing** is available. (data analysis with standard office programs)
- Toolinspect is compatible with various CNC controls such as **Siemens, Bosch, BoschRexroth, Fanuc, Heidenhain and Indramat** control.
- Self- optimized working monitoring algorithm helps to reduce setting-up and production start-up time. The system adapts automatically to various operating states of the machine (wear, changes in temperature, etc)
- Cuts with process times <0,2sec can be monitored.
- Computer resources of the CNC control were not charged.
- Optional extension for supply of MDE/BDE data from the PLC is possible.

Monitoring system:

The **Toolinspect**[®] device is used to monitor tools on metal-cutting machines. The data, necessary for this task are normally transmitted to the device by a CNC control via a Profibus-DP interface. The monitoring strategy is automatically selected by the integrated software, according to the tool or machining process. The necessary parameters are determined and entered individually for one machine type by the machine tool manufacturer. No changes or adjustments are then necessary in the NC program or via the visualization interface.

Pic. Siemens 840D and 840Dsl with TCU (without visualization) / GE Fanuc Series 16i-30i Integration



The visualization on external Windows Computers (from Win98) gets connected via a TCP/IP or RS232 interface with the Toolinspect hardware. Alternatively the visualization can be displayed on an extra operating panel.

The company EMAG Salach Maschinenfabrik GmbH:

The Pick-up turning center, which was introduced in 1992 and the advancement to multifunctional production centers are absolutely necessary for today's challenging serial production, in particular at the automotive industry and its subcontractors. EMAG is the most significant manufacturer of this new generation of machines, worldwide.

We accomplished something that belongs together:
Automatization + turning integrated in one machine, realized on smallest space. The VL 3/5-line and the VSC 7 features high efficiency, extreme high constancy accuracy, very high reliability and good operability

Modern CNC-machines are often comparable concerning the primary processing time. At the VL / VSC 7 the principle of the shortest way was consequently realized. This leads to a real profit because the non-productive time is reduced. Complex loading and unloading is not needed anymore. The Pick-up-spindle as a part of the portal sliding carriage carries over to grab and to deposit the workpiece. The result: short charging ways and high acceleration allow short charging times.

Turning + Automatization = VL / VSC 7, the system with a lot of advantages

Automatize workpiece change in a short space of time.
Integrated automatization, low investment costs
Short ways for processing and charging
High availability

Test result:

After the installation, the machine processed flange- workpieces out of high quality steel. Over the Toolinspect system, turning, milling, drilling from 3.0 mm and threading from M8 could safely be monitored.

The operator does not need a visualization to set parameters or limits, this part is done automatically from the Toolinspect module.

All information is shown at a text display. The machine operator only requires 3 function keys (at the Siemens 840Dsl control) to run Toolinspect.

Basic conditions:

In general, there is diversity in all machining processes, concerning torque values and other process specific data.

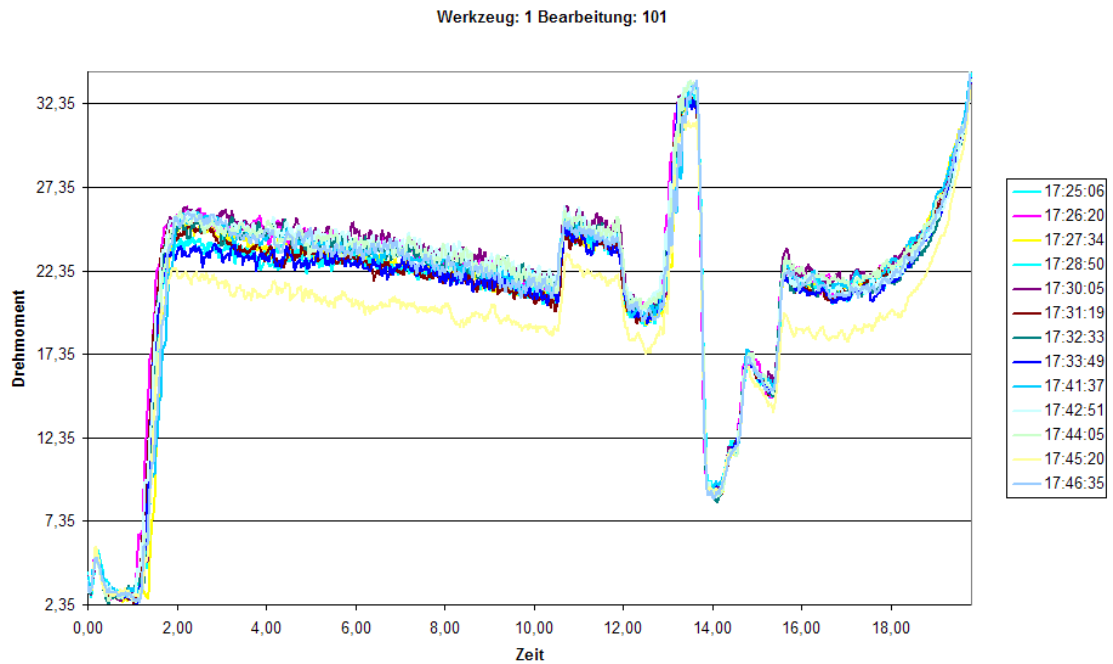
At this machine 2 Toolinspect- Channels were applied.

Channel 1: Spindle / Axis

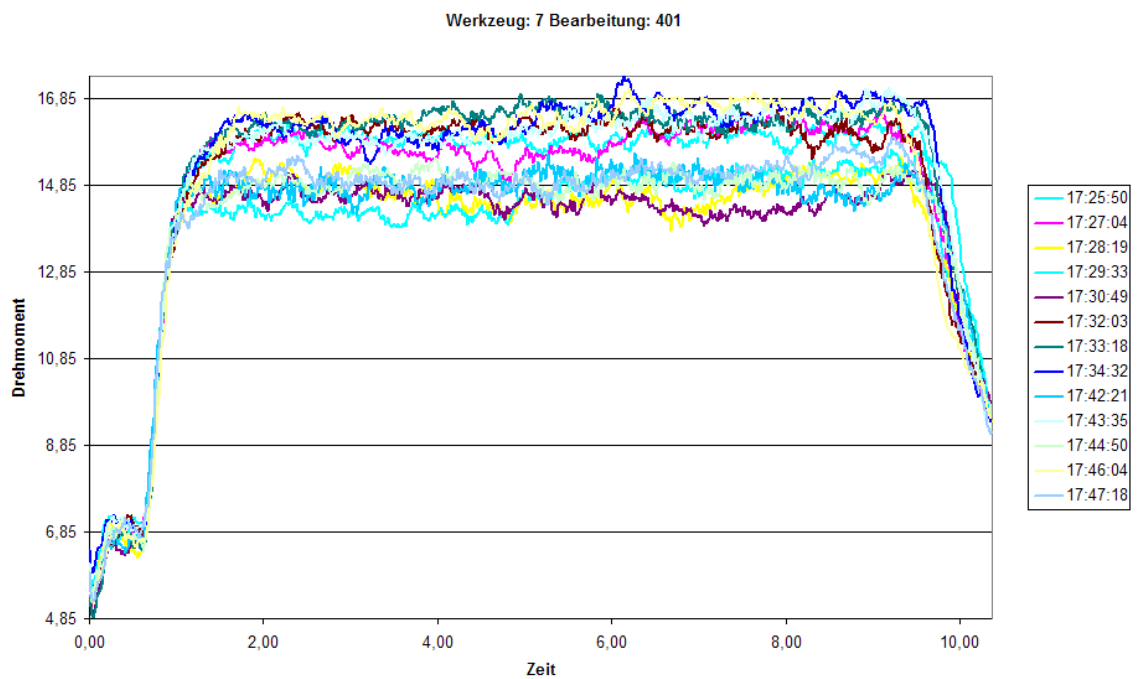
Channel 2: Lifetool / Axis

Data analysis at Microsoft Office-Pack

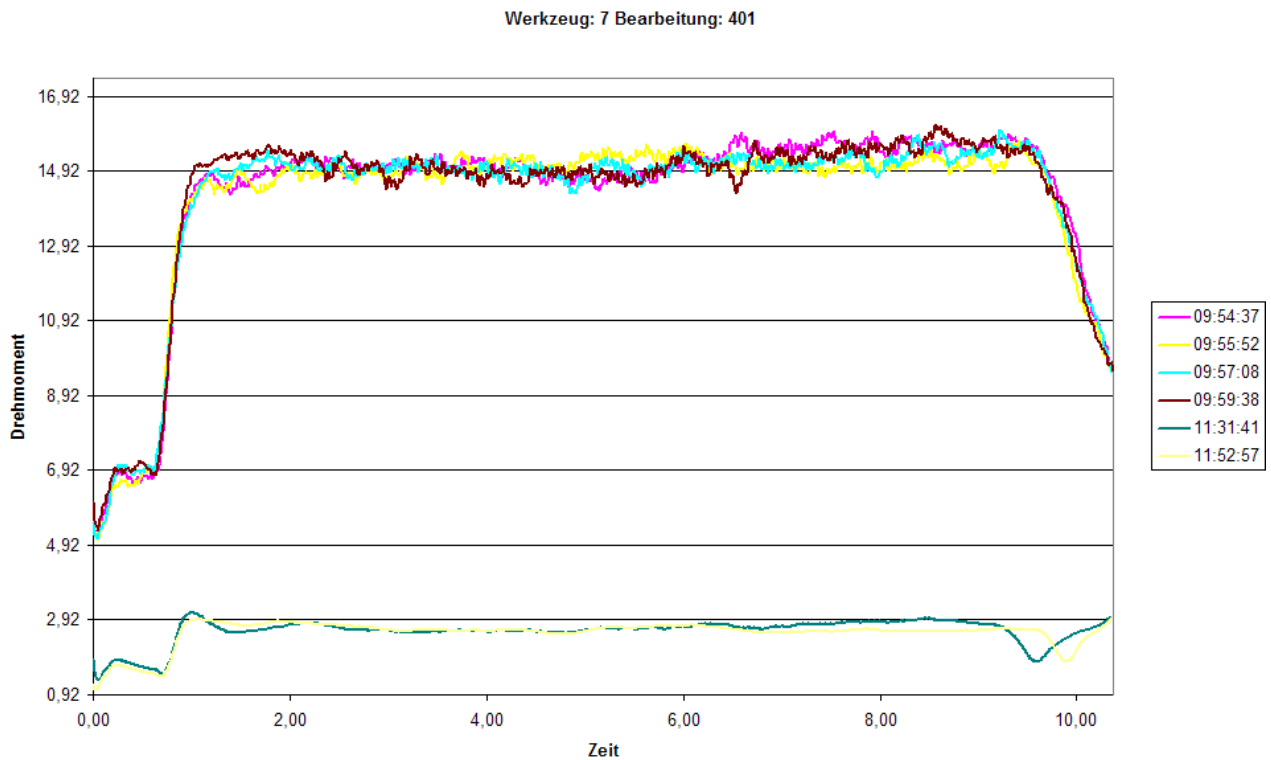
Pic.1 Turning T1 turning tool



Pic.2 Turning T7 turning tool with allowance fluctuations



Pic.3 Turning T7 turning tool with already machined workpiece



Operating instructions of Toolinspect via the keyboard of the TCU

Toolinspect OFF/ON:

This function is used to activate or deactivate Toolinspect generally. If Toolinspect is deactivated, no cuts were recorded and the whole monitoring system is inactive. Toolinspect is switched ON /OFF by using the + / - keys.

Toolinspect Learn:

This button is used to carry out learn. The program-specific data (increased limits) are not reset. The limits re-adjust automatically to the actual values in the following machine cycles. The function "learn" should be carried out every time process specific dates were changed (federate, rotation speed or number of cuts).

Toolinspect "Increase limits"/"Reset limits":

„Increase limits“ button

If a false alarm is generated by Toolinspect, the limit of the relevant fault message (switch threshold that generates a fault message) can be increased by pressing the button "increasing limits". If this step is reactivated with the next machine cycle, the increased limit is shown at the text display.

The pushbutton T8 works only, when there is an alarm generated by Toolinspect and the machine runs in the automatic mode. The screensaver should not be active.

It's possible to carry out "Increase limits" a second time, if an alarm is generated again.

„Reset limits“ button

This button resets the system for the active program to the original values and "learn" is carried out.

Summary:

The operation is imaginable simple and only a few modifications are required to the CNC program. The operator does not have to set any limits or parameters for monitoring. Not even at a change of the machined workpiece type or when new NC programs were written. The system adapts automatically to various operating states of the machine (wear, changes in temperature, etc) and selects the appropriate monitoring strategy automatically.

The installation was proportional easy. The modifications in the PLC program, the integration of Toolinspect into the control and the data transfer via Profibus DP is extremely flexible and well structured. It's also possible to connect **Toolinspect®** via TCP-IP or a serial interface with a Windows computer.

MCU GmbH & Co. KG:

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