Application Report

Aberle Robotics

- AR Robo Cell -

With the Monitoring System

Toolinspect

3 – Key - function

Machine:	**AR Robo Cell**
Spindel drive:	**12KW**
Data transfer:	**Digital**
CNC control:	**Fanuc 31i**

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Das Werkzeug- und Prozessüberwachungssystem **Toolinspect**® entwickelt werden, das für die Produktion von Serienteilen folgende Vorteile aufweist:

- At the NC program only minimal modifications are required.
- A brief instruction held by the operator is sufficient for Toolinspect
- An auto-optimised working monitoring algorithm helps to reduce machine set-up times and running-in periods and adapts the monitoring parameters automatically to the different operating conditions (temperature, tool wear, etc.).
- The system is at different **Aberle Robotics GmbH** – Roboter with CNC-machines with different chipping processes (rotating, milling, drilling, galling, winch etc.)
- Toolinspect can be carried out with the current CNC controls.
  (**Siemens, Bosch Rexroth, Fanuc, Indramat, Bosch, Heidenhain**)
- **Automatically system protection and data protection** on a extern CF card.
- Extern modul with an own mobile processor.
- Automatically cognition of tool change through the tool magazine and therefore no service necessary.
- **Adaptive regulation of chipping processes.**
- Turning moment data are read-out of the CNC control.
  Hereby higher machining speeds can be achieved.
- Selection of processing in three single segments. Hereby can be guaranteed an exact monitoring:

Contact of material (fluctuations)
Principal chipping (processing remains the same)
Final processing (possible fluctuations)

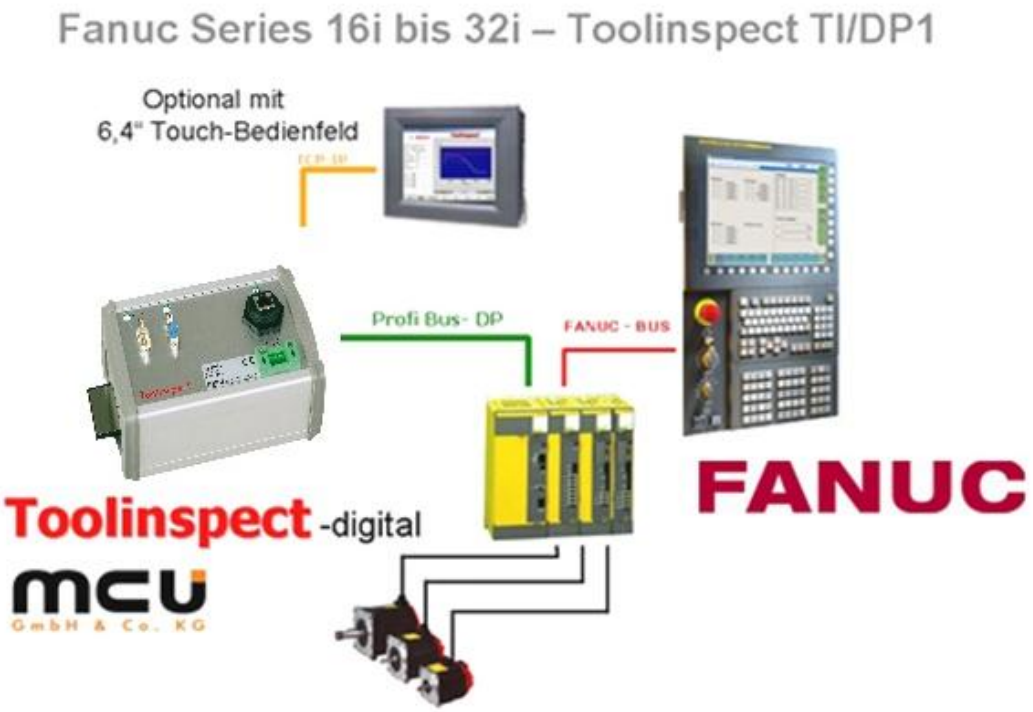
Further information at: www.mcu-gmbh.de

- Fluctuations at the process are recognized automatically and the monitoring boundaries adapt themselves to the modifications without the operator's intervention.
- **Diagnosis tools for the optimization of processes** are available through Standard-Office programs.
- Processing's with really short process times <0,2s can be monitored.
- The computer's resources of the CNC control are strained only slightly.
- An expansion for the allocation of MDE/BDE data from the SPS is possible.

Monitoring system:

The device Toolinspect® serves as a monitoring of tools and chipping machines. The data that is needed for this task are transferred over a Profibus-DP interface. The monitoring strategy is closed self-dependently through integrated software. The required parameters are detected by MCU GmbH & Co. KG once or by the tool machine manufacturer and are then inserted.

Pic. Fanuc / 16i – 32i



The hardware communicates with the CNC control through Profibus-DP or also through analog signals. The visualization on the control panel is connected through a TCP/IP or RS232 interface with the hardware.

Aberle Robotics:

Aberle Robotics is a guarantee for your automation at the production to become even more efficient and capable.

Our TOOL- your success.

"Intelligent roboters that see, recognize, conceive to take hold in the right moment! "

We minimize the ancillary time and help for a higher productivity and therefore for a bigger success. We offer advanced technologies with a efficient construction, process management and after sales service. And all that from only one source. The communication with your central computer, SAB or other hosts is a standard for us today.
Aberle Robotics offers as a system partner of FANUC Robotics Key Solutions a high process capability with an elaborated conception and an open architecture with a high level on design.

The application areas:

- Special machines
- Machine tools equipment and handling tasks for following operations
- Assembly line and Pelletier solutions at primary and secondary food area
- Factory automation
- Junction to manufacturing logistics and SAP systems

Automatisation of machining centers AR ROBO CELL

- Bonding of one up to several operations
- Handling weight up to 10 kg
- Memory capacity of 4 x ¼ euro pallet size
  Double drawer's technic with E power
- Time to change pieces under 12 sec
- Size of pieces max. 125 mm.

AR FANUC Robodrill Solution

Accessories and options:

- Vision IR qualified
- Simple backfitting to Flex-

  or Duo Cell

- Delivery system also as conveyor retrofit
- Highest security and wet operations quali
- Gauging station
- Oil whizzer
- Final gratstation modular
- Engraving technic

Chronicles:

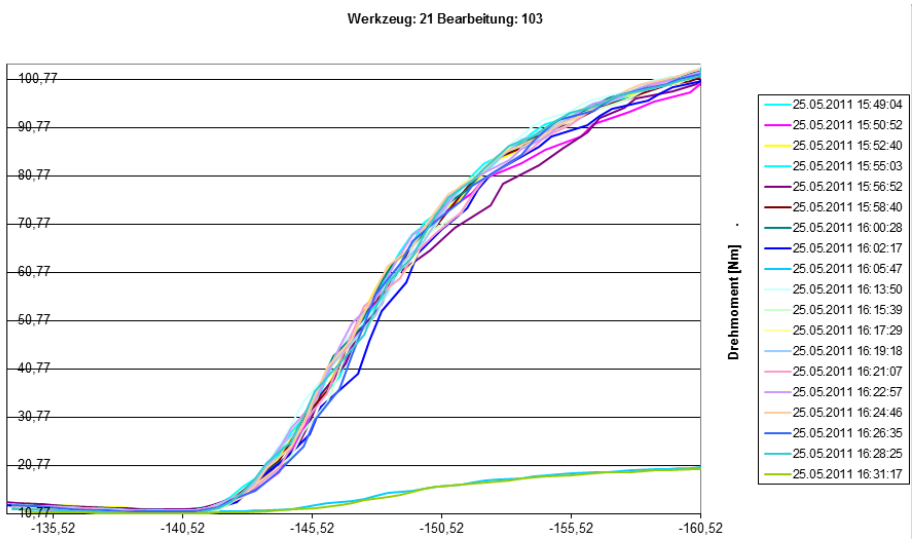
After the installation the machine was operated with work pieces. The Toolinspect System could automatically read out the frontiers and parameters for the chipping.

Basic conditions:

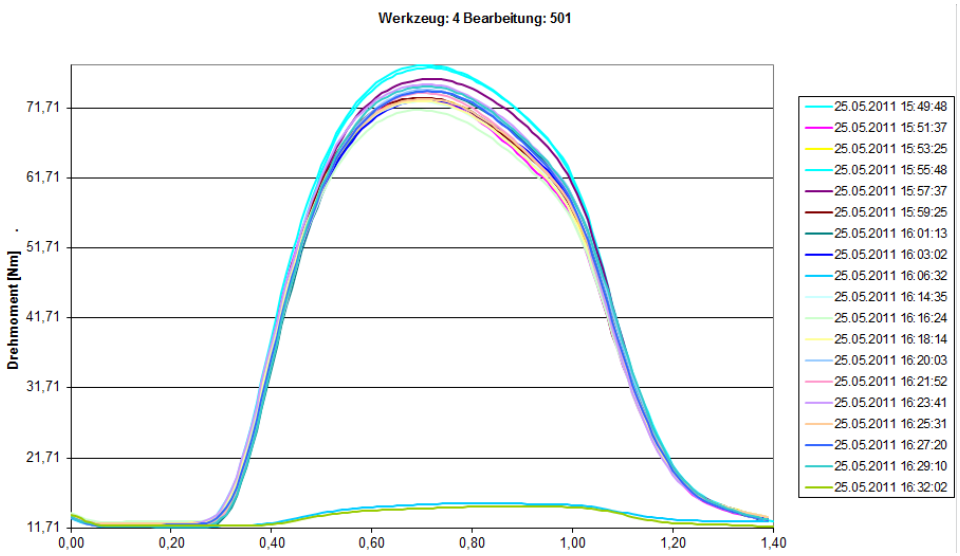
Basically there are very different processes with different turning moment values and process fluctuations when operating the pieces for the gasoline direct injection. The following pictures were drawn on the basis of the processing.

The digital turning moment and way is values were transferred out of the control to have an ensured monitoring of the processes and guarantee them.

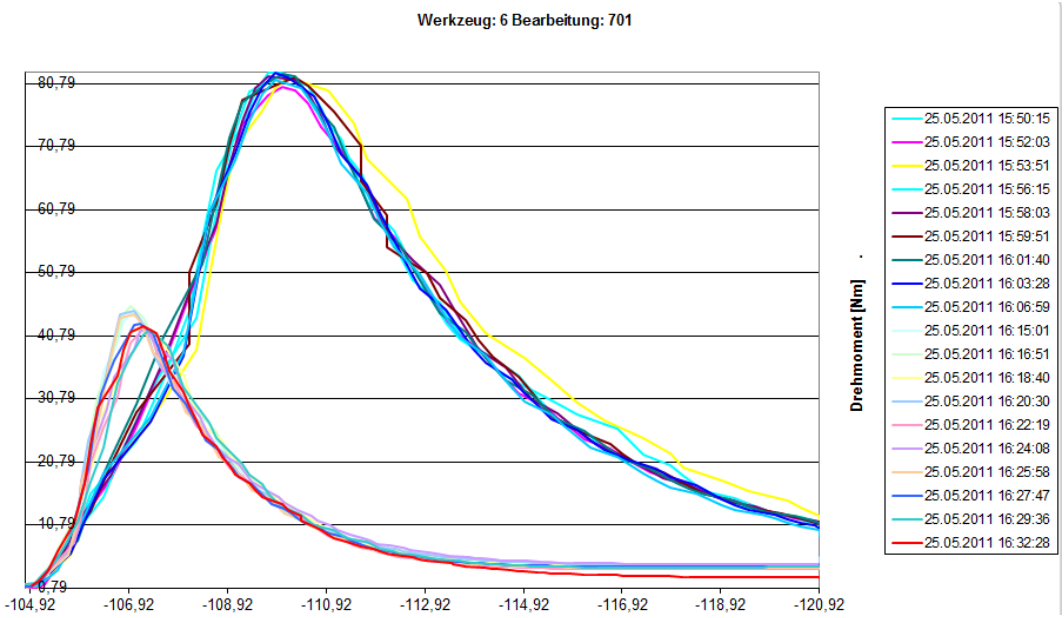
Pic.1 Drawing with the analysis tool from MCU at a VHM-drill of 3, 5 mm with the signal embodiment with processing and the double processing (no chip removal):



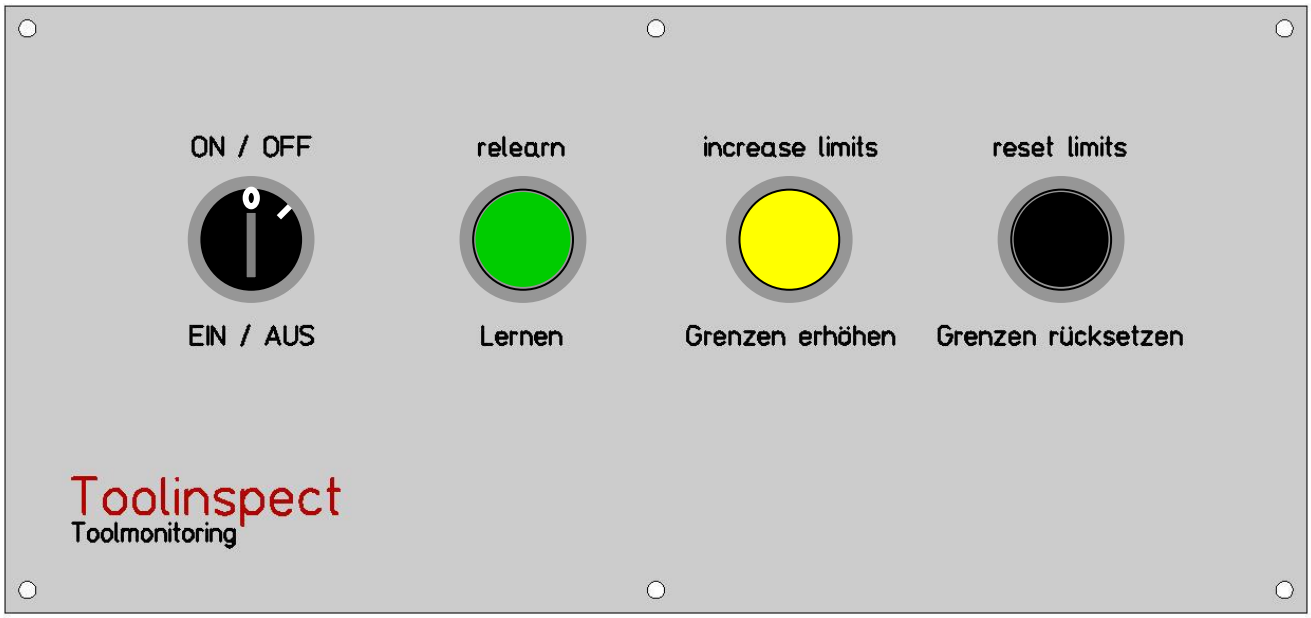
Pic.2 Drawing with the analysis tool from MCU at a cutter of 12 mm with the signal embodiment with processing and the double processing (no chip removal):



Pic.2 Drawing of a die M6 with the signal embodiment with processing and the double processing (no chip removal):



Toolinspect: Operation and Visualization without PC

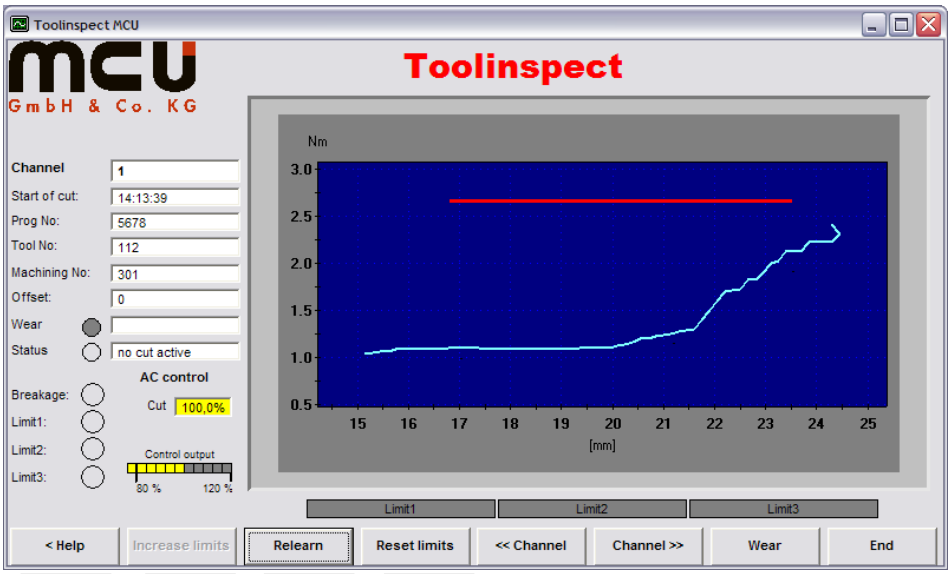


Button ,,learning new“
With this button learning new is accomplished. The data specific to the program are not restored. The Limits adapts themselves to the is values in the following machine tact’s. This function becomes necessary when modifications have occurred in the CNC program or when monitoring boundaries have to be calculated due to other reasons.

Button ,,raise limits“
If Toolinspect generates a false signal, the function ,,raise limits“ raises the threshold level permanently. By raising the limit value only the limit values for this step are affected, not the whole tool. The schedule shows the limit in a yellow color. If the alarm gets activated once more in spite of the raiment, then the button can be activated repeatedly. At the limits 1-3 this conducts to a deactivation (orange color). The breaking limit can be raised as often as wished and doesn’t get deactivated.

Button ,,resetting limits“
This button resets the system for the active program to the origins values and learning new is accomplished. Processing’s that were raised with the button „raise limits „are resented.

Operation with Visualization at a PC:



“Reset limits” button
This button resets the system for the active program (the program which is displayed in the interface under Prog. no.:) to the original values and relearn is carried out. Machining operations which have been increased via the “Increase limits” button are reset.

“Relearn” button
This button is used to carry out “relearn”. The program-specific data (increased limits) are not reset. The limits readjust to the actual values in the following machine cycles. This function is required when changes have been made in the CNC program or for other reasons all monitoring limits should be recalculated.

“Increase limits” button
If Toolinspect repeatedly generates an incorrect message during the same operation, the “Increase limits” function can be used to **permanently** raise the switching threshold that generates the fault message. Increasing the limit value only affects the limit value for this specific cut and not for the tool as a whole. The increase is indicated graphically by a yellow marking of the limit or in the tool table. If the alarm is still generated in spite of the increase, the button can be activated again. In the case of limits 1 -3, this leads to deactivation (orange colour). The breaking limit can be increased any number of times and will not be deactivated.

“Help” button
This button is used to call the Help function. A second menu page is activated. It is described in section 3.9.6 "Extra Functions".

Summary:

A monitoring of the tool with digital power data is guaranteed.
At the steel casting chipping, tools up to 3,5 mm drill caliber, progressive die, cutter heads and screw taps up to M6 can be monitored on a safe way.

The operation is very easy and only little adaptations are to be held at the CNC program. After the construction of new programs there are no adaptations to be made by the operator. The system adapts itself automatically to different operation situations (abrasion, temperature change, etc.)
The installation arranged itself easily. The adaptation at the SPS program, the integration in the control and the data connection through Profibus-DP or TCP/IP is extremely flexible and clearly structured. Alternatively, Toolinspect® can be connected also through a serial interface with the computer.

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Information’s to the data paper

The pictures of machines, controls and modules are each copyrighted by the control manufacturer.

The given data serve to information.

Subject to alterations!