AMC³ V2

Optimize machining with AMC3 solution

Make TMP in 5 min !

Move to

INDUSTRY 4.0

Arts Institute of Technology et Métiers

AM VALOR
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Optimization

Use an innovative solution to determine the optimal cutting conditions thank to Tool Material Pair method in 5 min.

Monitoring

Take advantage of wear care in order to guarantee an optimal productivity and a machine-tools data monitoring.

Capitalization

Benefit from an efficient solution to exploit cutting data and to capitalize on machine-tools and PC, and also through network.

Automation

Directly analyze cutting data online and insure automatic data treatment.

AMC3 solution is a multifunction software, integrated into CNC machine tools, which allows to determine optimal cutting conditions for tools as well as to allow for machining monitoring.

Tool Material Pair approach

The Tool Material Pair (TMP) is based on the idea that the lower the cutting pressure, **the lower the tool is constrained, the longer the tool life**. This approach, defined by the NF E66-520-1 to 8 standards, is useful to establish the **optimal range** of cutting conditions and thus to achieve **a reliable and optimized machining operation.**

The **TMP method** integrated in AMC3 is patented and allows the user to test the effect of **a cutting parameter on the specific cutting pressure** with a **continuous variation during a single tool pass**.
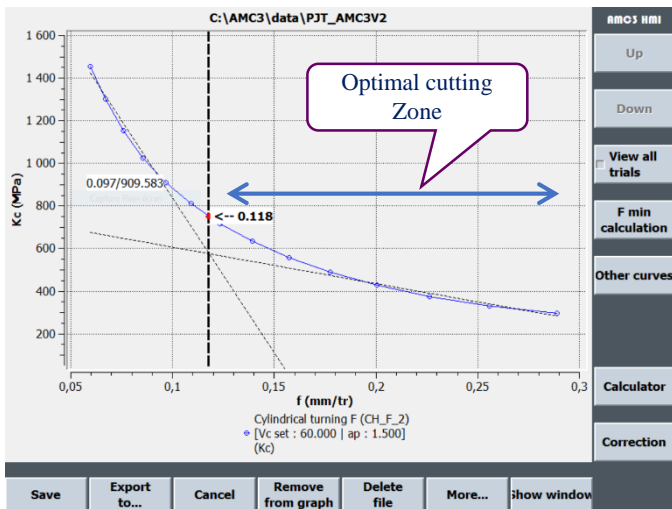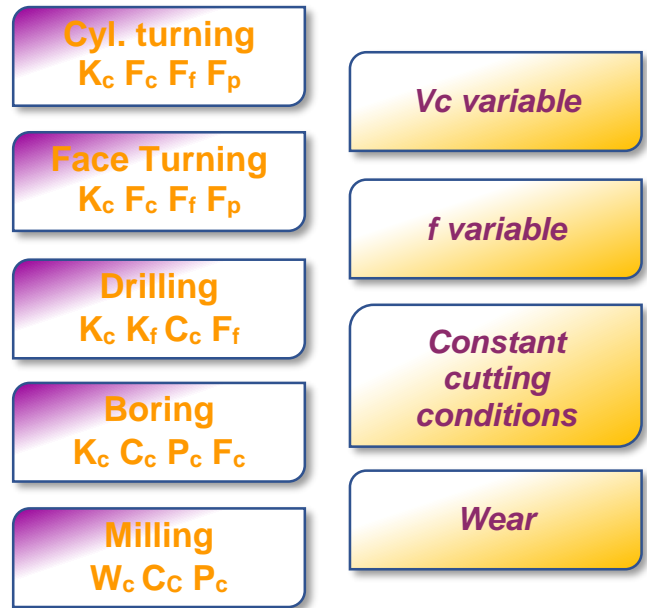

Cutting pressure obtained during one single tool pass and determination of the optimal cutting range (f_{min}).

> ### Demonstration movies of AMC3 in milling
> ### Clic here

User possibilities of AMC3

AMC3 offers a solution for each machining technique: **turning, drilling, boring** and **milling**. In addition to optimize cutting conditions, AMC3 allows to:

- Know the **power** and **cutting forces** needed to machine and therefore the spindle characteristic required
- Test the batch of material
- **Evaluate the performance** of a lubricant
- **Monitor** the evolution of **tool wear**

Cyl. turning
K_c F_c F_f F_p

Face Turning
K_c F_c F_f F_p

Drilling
K_c K_f C_c F_f

Boring
K_c C_c P_c F_c

Milling
W_c C_c P_c

Vc variable

f variable

Constant cutting conditions

Wear

Machining technologies and functionalities of AMC3 CNC cycles.

AMC3 – Efficient software to perform TMP

AMC3 is a NC software that provides the **specific cutting energy** (Kc, Wc, …), **cutting force**, **torque** and **powe**r, according to cutting speed and feed in only **two tool passes**, **through continuous variations of these two operating parameters**. Basic AMC3 setup uses current torque from amplifiers and works without additional sensor.

AMC3 offers **user-friendly interfaces** to set the conversational NC cycles and insert them into a regular machining programs.
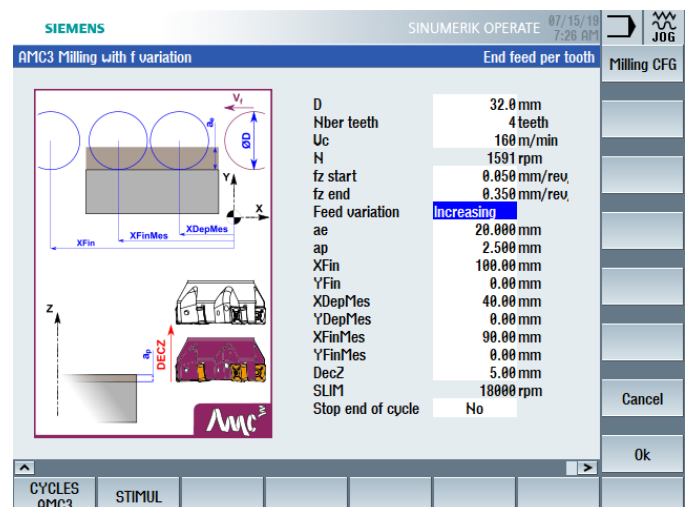


Interface of AMC3 cycle for milling with feed variation.

Automatic acquisition, data base & network managing

AMC3 HMI user interface proposes **manual** and **automatic functions** to collect measured data from trial. It allows to **record all achieved measurement into a data base** right after AMC3 cycle runs.

Thanks to TMP method, **optimal values for cutting speed and feed** can be **directly computed** and **used** by the NC program.

AMC3 capitalizes the **cutting data** into data bases which are easily accessible from a **machine-tools**, an **external PC** or a **server** with **the single HMI**.

Data can be exported directly to Excel file or into XML format. Then it help to **save production preparation time** based on **optimal cutting data** from **Tool Material Pair** approach.
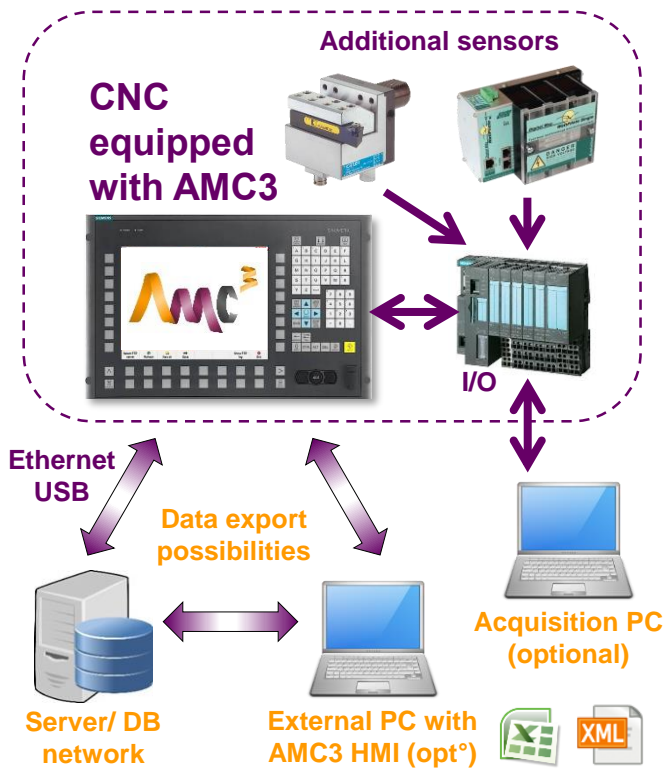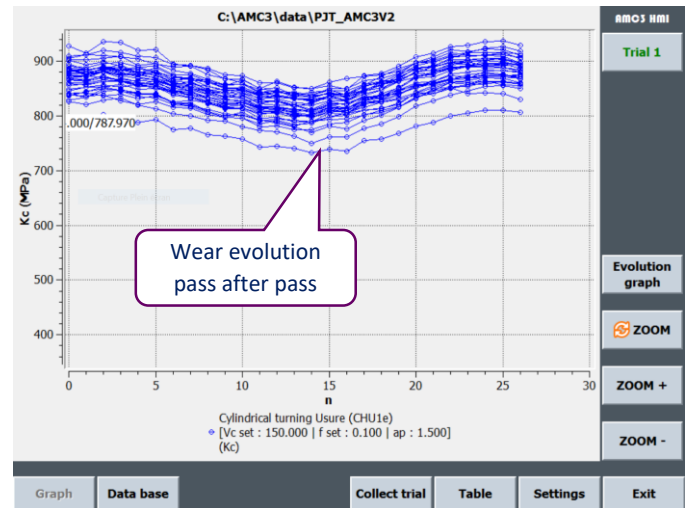

AMC3 data export, network feature & use of additional sensors.

Continuous tool wear supervision

AMC3 solution offers a **continuous measurement of cutting force and specific cutting energy**. This functionality allows to **care a tool wear on real time.**

The **tool wear supervision feature** also insures the **measurement recording** into a **data base**.


*Example of wear monitoring and cutting pressure during Ti6Al4V turning with AMC3 HMI.*

Real time monitoring of cutting parameters

Thank to automatic functionalities of AMC3, **monitoring of machine-tools parameters** is possible continuously.

Values analysis of spindle power, cutting force, … are processing in real time by NC. An **alarm occurs** if there is any **unappropriated value and stop machining** if required**.**

The stop control is set for any measured error and allows to **avoid any technical problem** on machine tools.

Tool breakage   **Monitoring**   **Productions and machine-tools safety**
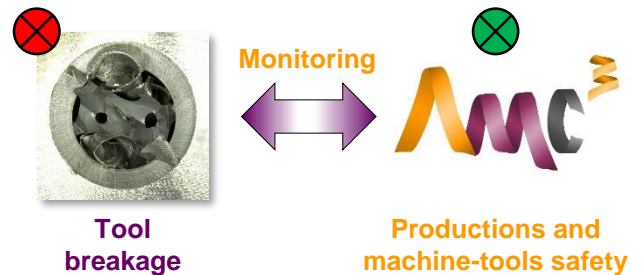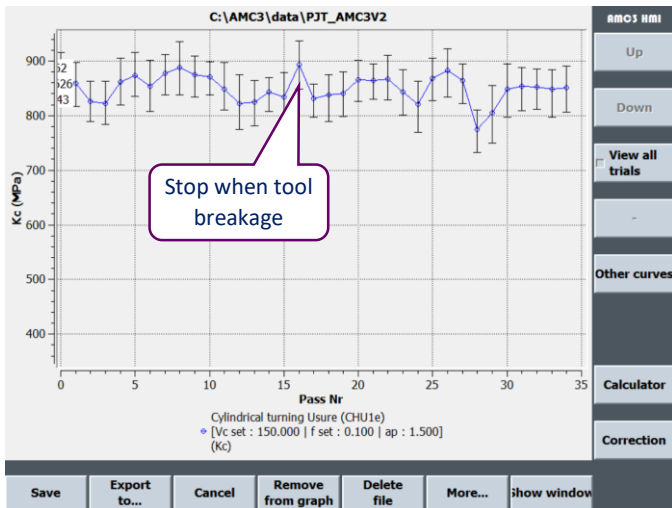
*Evolution of forces and control stop
when the tool break occurs.*

*Activation state of cycle alarms (AI) and stop control
(SC), analog input (AI) for additional sensors.*

Advanced functionalities

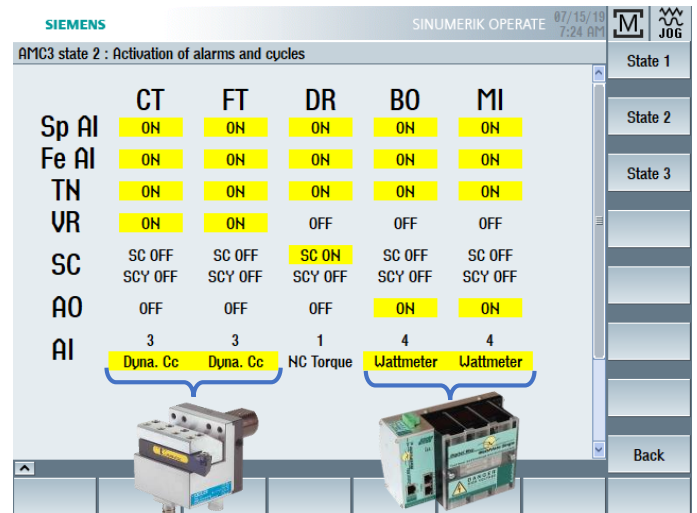AMC3 integrates several advanced functionalities including:

- **The ability to exchange data among cutting tool management software** (GEDIX, Tool Expert, TDM)
- The exportation of measurement signals to PC via analog outputs
- The integration of additional sensors for certain applications:
  - Wattmeter: Artis MU3, DigitalWay WP…
  - Dynamometer or rotating sensor: Kistler

The use of external sensor allows for given application to improve measuring sensitivity and precision compare to current torque, and to get additional force signal than cutting force.

New Human Machine Interface more efficient

AMC3 HMI now includes new user interfaces which are more **ergonomic.** They offer an **easier browsing** and a **better visibility** of the different options thanks to **renew setting menus**.

The whole **default curves** can also be **parametrized** among other possibilities with the **new version of AMC3 HMI**. It allows to visualize any useful data to supervise the machining tests.

Software compatibilities

AMC3 is a software solution compatible with Numerical Controller: ***Siemens Sinumerik 840D Solution Line*** (TCU et PCU) and ***Power Line***.

AMC3 HMI application can be used on machine-tool as well as on PC from Windows XP to Windows 10.

Several available languages

The functionalities and display of AMC3 are available in **3 languages:**

- French
- English
- German

They rely on AMC3 solution

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