

# ALUMINIUM ENGINE BLOCK - CNC MILLING WITH A 5-AXIS MACHINING CENTER

## Blog post

*This month our focus is entirely on 5-axis machining of an engine block using AdaptiPath™. This is one of the advantages of the WinMax control.*

Pliening, Germany, Dezember 2019:

Hello friends of metal cutting manufacturing,

my name is Sebastian Herr. I am the head of HURCO application technology.



In the following post, I'll give you some supplementary information to our "Engine Block" video.



In the video we show the production of an engine block made of an aluminum alloy (AlCuMgPb) in a 5-axis machining we show the production of an engine block made of an aluminum alloy (AlCuMgPb) in a 5-axis machining. With this example, I would like to explain to you, among other things, the advantages of the *AdaptiPath™* option of our WinMax CNC control.

## AdaptiPath

AdaptiPath stands for Adaptive Trochoidal Milling. We use this option in particular for groove and pocket milling as well as for exposing contours, because it allows a lot of material to be removed in a short time. Unlike the conventional milling pattern, the tool in adaptive trochoidal milling advances



in a circular movement. Ideally, cutting takes place along the entire length of the cutter and the cutter is fully immersed in the workpiece.

In addition, with adaptive trochoidal milling, the feed rate does not follow a fixed programmed value. Instead, it is continuously adapted to the current

milling path, which is continuously adapted to the contour of the component by the WinMax control. Depending on the specified chip center thickness, the software recalculates the pressure angle at every moment. AdaptiPath™ thus enables efficient high-speed machining with constant load on tool and machine. The advantages compared to conventional machining are obvious: shorter machining times due to the highest metal removal rate, more process reliability due to less wear on the tool and machine, and ultimately lower costs per component.

### **Solid Model Import Option**



The complete program for the engine block was programmed on the machine – our 5-axis CNC machining center HURCO VMX 60 SRTi with rotary table configuration. For this we used the Solid Model Import option of WinMax. With this option it is possible to read STEP files directly into the control. This shortens the programming effort considerably. You can select the entire product or only contours, pockets and other details on the solid model and then only have to define the technology data. In addition, the Solid Model Import option supports you in error checking: The machining simulation of the written program and the solid model are shown together in one view on the HURCO monitor. In this way, you can immediately see whether your

programming fits the desired component. STEP stands for “standard for the exchange of product model data”. It is an international standard for the exchange of geometry and model data between different computer-aided software systems.

## Automated pallet loading



The automatic loading and unloading of the HURCO VMX 60 SRTi was carried out by the EROWA Robot Compact 80 pallet automation system from our Swiss cooperation partner EROWA. Here, the software of the ERC80 takes over and processes the production orders on the HURCO processing portal.

However, it also works the other way around, namely that the external loading systems are directed via the WinMax control system. The former runs via the DNC interface. The EROWA Robot Compact 80 can thus operate up to two CNC machining centers that are docked to the right and left of the loading system.

Now I'll say something about the hardware used and the partners we worked with here: The tools you see are from **WNT**. The company, which is based in Germany, specializes in precision tools for the machining industry and has an international presence. For the tool holder, we used powRgrip from RegoFix. The Swiss company offers quality tool holders integrated into a coordinated overall system. Not to be seen is the modular zero-point clamping system Zero-Point K 02 from AMF. It is hidden in a specially adapted clamping interface on the pallet and helps to clamp the blank quickly and precisely.

### Partner

Automation: EROWA

Tools: WNT

Tool holder: Rego Fix

Clamping system: AMF

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