



MANUFACTURING CAVITY PRESERVATION NOZZLES

Premium car maker BMW successfully relies on CENIT's offline programming solution FASTTRIM for producing cavity preservation nozzles. The solution is customized to suit special requirements, guaranteeing faster, more standardized production.

- ▶ Chief Objective
Fully automated, template-based 3D programming solution
- ▶ Highlight
Less than 1 minute to NC program for all nozzle variants
- ▶ Solution/Services
Customizing of FASTTRIM
- ▶ Chief Benefits
Standardized approach
High degree of automation
- ▶ Why FASTTRIM?
At BMW, FASTTRIM is the standard CAM application for laser cutting processes.

▶ CAVITY CONSERVATION AT BMW

In auto production, cavities in vehicle frames and bodies that could take on

water or moist atmospheric air need to be sealed with an antirust agent. This substance should be applied evenly to all cavity surfaces to form a lasting, waterproof finish. To be able to conduct this so-called cavity preservation optimally, BMW continually needs to develop specially calculated nozzles.

These variant-rich nozzles consist of a tube with a large number of oblique boreholes, a welded end cap and a slotted groove. The nozzles are described via Excel lists.

At BMW, the cavity preservation nozzles are laser-cut and welded fully automatically using the TruLaser Cell 3010 by Trumpf, which processes the nozzles along 5 axes in combination with an external rotational axis. The tubes are attached to the rotational axis by means of a mobile tailstock and a tailstock tip.

▶ THE CHALLENGE

For its combined cutting and welding process, which always follows an identical step-by-step procedure, BMW wanted to implement virtual machine

integration. The car maker wanted particular attention paid to high-level automation on the part of the offline programming solution, so that the large number of necessary NC programs could be dealt with efficiently.

BMW thus wanted to introduce new technology for its nozzle production. No fully automated offline programming solution was available for BMW's combined processing technique. But there was a way out: Based on BMW's familiarity with the already deployed CENIT solution FASTTRIM and the associated know-how in the fields of CAA, VisualBasic and Excel programming, as well as its experience with CENIT's management of sophisticated software projects, BMW chose to assign CENIT AG with developing a solution.

▶ AUTOMATION FROM EXCEL DESCRIPTION TO ISO CODE

First off, the project team compiled a detailed list of BMW's requirements. The course of action was then determined in close cooperation between the two partners.



AUTOMATED PRODUCTION WITH FASTTRIM

In its CATIA V5-based offline-programming system FASTTRIM, BMW already had a high-performing system available for working with V5 component geometries, curves, surfaces and points. Thus the solution was to expand this system by an automation module. Thanks to this automation interface, the programming process is now largely automatic.

The nozzles described in the Excel data sheet are uploaded from the offline programming environment via a VisualBasic script. A process template specific to the respective nozzle variant is added automatically.

Less than one minute later, this standardized procedure has prepared the full set of 3D processing paths, including technical parameters.

Here one can witness the decisive advantages of CATIA's associative approach. It creates a parameterized nozzle model along with a process template. If the geometry should change because new Excel data is uploaded, all associated operations are adjusted automatically.

The required expansions to the standard FASTTRIM software were made according to clearly defined sub-segments. The first stage up for approval was the manually modeled process for the virtually integrated machine. Two acceptance tests for different automation levels

followed. By taking these verified development steps, it was possible to achieve fully automated offline programming without any problems.

► TOTAL CONTROL AND RELIABLE SIMULATION FOR BMW

Technical pre-investigations showed that when drilling the oblique boreholes, there was no need to follow the projected surface contour: A circular movement at a single plane would satisfy requirements just as well. Therefore, FASTTRIM generates 3-main-axes movements with a fixed revolving axis. This reduces the strain on plant kinematics and ensures constant velocity conditions by avoiding reorientation of the processing tool.

All of the possible technological settings were integrated into the dialogs, e.g. for different end cap shapes and feeds for sheath and cap drilling. This gives the user total control over the application.

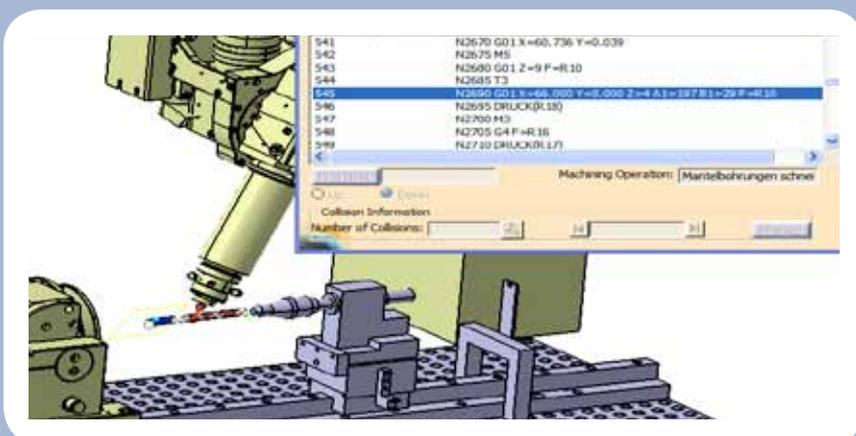
Before the ISO Code is transferred to the physical machine, the user conducts a detailed collision check in FASTTRIM. Since CENIT fully emulated the TruLaser Cell 3010 with respect to geometry and control, the ISO Code can be simulated reliably. This verification offers security and guarantees a rapid transfer of ISO Codes to the machinery.

► FASTER PROCESSES

Using this automated procedure, a nozzle tube can be created within approx. two minutes – as compared to approx. one hour for manual manufacture.

The entire ISO Code for a specific nozzle is generated within just a few minutes. The 3D offline programming is fully integrated with CATIA V5, and the NC programming is conducted on the basis of templates.

BMW profits from this standardized approach and the efficient, automated programming of the many oblique boreholes. Now its users can react quickly to different nozzle variants. While creating the NC program, the automation also saves 20 to 30 minutes of time per nozzle tube as opposed to manual programming with FASTTRIM. Furthermore, the automation of the process means maximum replicability, which likewise improves nozzle tube quality.



Simulation: Fully automatic generation of the NC programs; simulations and modifications at any time.

CONTACT

CENIT
Industriestraße 52-54
D-70565 Stuttgart

Phone: +49 711 7825-30
Fax: +49 711 7825-4000
E-Mail: info@cenit.de
Web: www.cenit.de/en/FASTTRIM