

Varel Europe

# Product optimisation with 3D digitisation

Thanks to the 3D digitisation of its drill bits, Varel Europe can compare the theoretical models to the parts actually produced and then assess the impact of the position of the cutting elements on their performance.



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## OUR CUSTOMER

**Corporate name**  
Varel Europe

**Business activity**  
Varel Europe is an entity of Varel International Energy Services. The company, established in 1947, designs and manufactures drill bits with polycrystalline diamonds for the mining, industrial and oil & gas sectors. Its French factory, located in Ibos (65), employs one hundred people and produces approximately 1,500 tools per year, mainly for the export market.

The process implemented by Varel Europe to manufacture its drill bits within its factory in Ibos (Hautes-Pyrénées, France) is now well established and even though it meets the quality requirements, it is still continuously improved by the company. The drill bits, with diameters ranging between 120 and 660 mm, are produced using an infiltration process. The body of the drill bit is made of tungsten carbide and cutting elements made of synthetic diamond (PDC) are welded to the blades of the body (up to 200 for a drill bit with a diameter of 660 mm). Although the dimensional checks

of the drill bits are carried out during the production stage, the positioning of the cutting elements is not measured afterwards. *“Before considering the implementation of in-production inspections, we wanted to determine whether accuracy had an impact on the drilling performance”*, explains Bruno Cuillier, Product Engineering Director with Varel Europe. To that end, it is necessary to have a numerical model of every drill bit actually produced, in order to compare it to the theoretical design model. The digital file containing the actual positions of the cutting elements can then be used by the simulation system. The next step will be to determine whether the deviations found in the positions of the cutting elements can affect the performance of the drill bit during the drilling operations.

## Eight drill bits scanned and analysed

The first step of this large project, namely the 3D digitisation of the drill bits, was entrusted to Cetim Sud-Ouest. Eight drill bits of different dimensions were scanned with an optical camera system. The collected meshed scatter plots (in STL format) were then processed in order to obtain a colour mapping showing the deviations of the actual dimensions from the theoretical dimensions and obtain 3D models in standard STEP format reproducing the actual shape of every cutting element of the drill bits. Varel Europe will then use these representative 3D models of the produced drill bits to assess how much the accuracy of the positioning of the cutting elements can affect the drilling performance.

## Cetim's asset



Cetim has the required hardware and software resources to perform the digitisation and 3D redesign of parts made from any material, without dimensional limits. With its different scanners, Cetim can adapt to the expected level of accuracy and to the size of the equipment or component to be digitalised.

