



The application of the SMARTTECH 3D scanner to the reconstruction of manufacturing moulds.

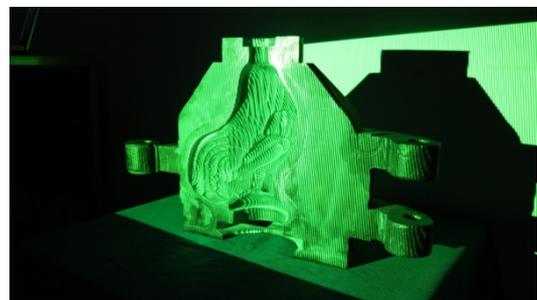
Industry: glassworks

The company Edwanex manufactures glass products using traditional blowing methods. The molten glass is uniformly distributed at the end of the blow tube which is closed in the mould. By inflating the molten glass into a mould the glass is uniformly distributed in the mould, which determines its shape as well as retains the required thickness. Using this method of production the company focuses mainly on limited-edition production or production meant for special occasions. This way the company can focus on creating products of the highest quality and durability and make them truly one of a kind.



At the request of his client, the glassworks Edwanex manufactured 500 pieces of occasional glass bottles which design was not used in the bottling plant for over 20 years. The unusual shape of a rooster was supposed to be achieved on the basis of an old mould that was unsuitable for use due to corrosion and nicks. By using the 3D scanner from SMARTTECH it was possible to quickly recreate the original, unique shape.

The 3D measurement technology from SMARTTECH is based on the digital analysis of the image of the scanned surface. Through the use of structured light the device projects a series of fringes on the measured object, which are deformed on the object. A detector that is installed in the measuring head provides a digital image to the software which, based on the deformation of the pattern of fringes, calculates the point cloud. That result of the measurement is a precise reflection of the geometry of the scanned object.



A worn-out mould during the scanning 3D scanning process.

Because the mould was made out of shining steel it was firstly covered with a matting agent. The solution in the form of a spray is applied evenly on the surface used for scanning. Once applied, the layer is just 0,007 mm thick and because of that it doesn't affect the geometry of the measured surface.



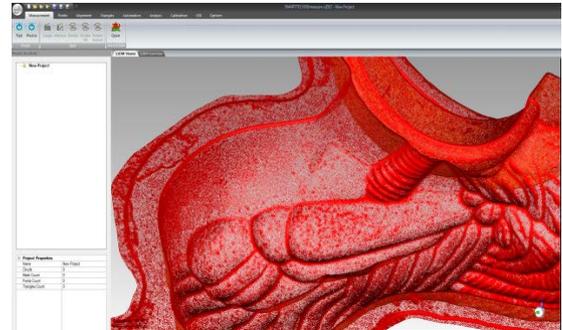
SMARTTECH 3D scanner SCAN3D surface.

The 3D scanner that was used for the reconstruction of the described form was SCAN3D surface with 5 MPix detector and 400 x 300 x 310 mm field of view. The resolution of the detector corresponds to the number of points that we can obtain during a single scan and thus in this device we can

obtain 5 million points with a 0,06 mm of accuracy and density equal to 41 points per square millimetre. That amount is more than sufficient to reflect the small details of the mould.

Due to the irregular shape of the object it was necessary to perform 12 scans on both sides of the mould. Thanks to the use of a rotary stage the scans were initially aligned giving a clear view on the complexity of the measurement.

After finishing the scanning process we could proceed with further processing of obtained data. First, we removed unnecessary parts and the so-called noise created during the scanning process. The multithreaded algorithms that are used in the software SMARTTECH3Dmeasure allowed for the quick performance of this operation. The intuitive interface that uses sliders to adjust the parameters provides the user with a preview of the selected elements of the scans.

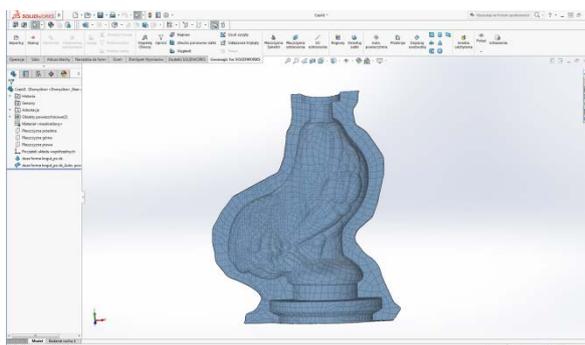


A point cloud ready for conversion to a triangle mesh.

The software SMARTTECH3Dmeasure also allows for a precise alignment of the single scans performed with a rotary stage as well as for the removal of overlaps (the common places for a few different groups of points). In other words, we reduced the amount of data in the point cloud while still retaining all the information about the geometry of the object required for further work.

The final operation performed in the software SMARTTECH3Dmeasure was the conversion of the point cloud into a triangle mesh with an STL format. The triangle mesh created based on the point cloud precisely reflects the scanned shape. This data can be used, for example, for milling or 3D printing.

The company EDWANEX wanted to create a mould suitable for further production by repairing the imperfections of the one they had in possession. That task required not only to obtain the geometry of the old mould but also to, on its basis, rebuild a CAD model.



Modelling based on the triangle mesh in Geomagic for SOLIDWORKS – automatic surface application.

For this operation SMARTTECH used the latest software Geomagic for SOLIDWORKS, which is a plug-in for the most popular software for CAD modelling – SOLIDWORKS. It significantly expands its capabilities by supplying it with tools necessary for reverse engineering. Thanks to the fact that the software is provided in the form of a plug-in the user can use a familiar interface and can at any moment use any of the available SOLIDWORKS tools, such as cross-sections, dimensioning or the creation of 2D documentation.

First, we imported the triangle mesh created in SMARTTECH3Dmeasure. An important feature of Geomagic for SOLIDWORKS, which made the further work substantially easier, is the automatic

detection of regions on the triangle mesh. The regions were then used to extract characteristic shapes such as cylinders, spheres and planes.

With a reference triangle mesh we recreated step by step the shape of the mould referencing the existing model. During the CAD modelling in order to retain the highest accuracy of the reproduction the created model was continuously compared to the triangle mesh. With the help of a clear, colour map of deviations we inspected and eliminated any imperfections.

After the completion of the modelling the obtained file was exported in an IGES extension format to a milling machine that milled a new mould ready for the production of decanters.



A decanter produced with the new mould.

Thanks to the use of 3D scanning technology the company Edwanex could quickly and inexpensively obtain the geometry and recreate the mould. The complex shapes were practically impossible to obtain using traditional methods. Using the measurement technology based on structured light the acquisition of complex information about the geometry of the mould's surface occurs in a quick way that does not require specialised knowledge.

Both the scanning process as well as the proper modelling of this free-form object were performed within a single day proving that designing on the basis of existing shapes can be performed in a swift and enjoyable way.

Using the plug-in Geomagic for SOLIDWORKS a former SOLIDWORKS user gains a range of tools providing whole new modelling capabilities on the basis of existing objects. The use of SMARTTECH 3D scanner together with the software Geomagic for SOLIDWORKS allows us to not only recreate the documentation of the scanned objects but also to design new solutions that will fit with the existing parts.

Information about the companies:

SMARTTECH – has been manufacturing and selling specialised 3D scanners for 16 years. SMARTTECH is continuously developing its products adjusting them to various sectors of the industry, such as heavy manufacturing, medicine or archaeology. With numerous distributors around the world the company has established a foothold on all continents from both Americas, through Europe all the way to Asia.

More at www.smarttech3d.com

Edwanex – since 1977 the company specialises in the production of decorative glass of many different colours. Due to the highest quality and the finest form of its products the glass factory employs over 90 people providing its products throughout the European Union.

More at www.edwanex.pl