

SMARTTECH 3D scanners in mining industry - reverse engineering application - Ekoglob Company

Ekoglob company is using SMARTTECH 3D scanner in order to create CAD documentation of parts of the machines that are being used in mining industries. Because of the age of some machines, reverse engineering is often the only option to renew pieces of equipment.



Mining as the oldest industrial sector

Mining is one of the oldest (if not the oldest) industries. The extraction and use of natural resources beneath the surface of the earth began with the beginning of the Stone Age. The oldest known mine dates back more than 45,000 years when prehistoric people have mined flint for weapons and tools as well as hematite to produce dyes which adorned the walls of caves.

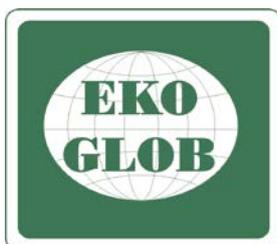
Along with discovering the new minerals mining grew. People driven by the need to discover they claimed on more and more inaccessible places breaking through harder rocks digging, more often and deeper. Using the new tools and methods mining industry developed. Hands were replaced with pickaxes, corfs with trucks and shovels with drill.

The problems that troubled the early miners are quickly solved by machines that are not only digging and transport mined ores, but also discharge water, provide safety and discover the next deposits. With the tunnel expansion the machines are becoming bigger. Mining is one of the areas which requires manufacturers the possibility of it's future expansion and open design. Therefore engine which operates more than 50 years is not an exception.



During prolonged use it is natural that some parts might be damaged. However it often happens that the machine was created in a single copy. Moreover the technical documentation for the particular part might be missing. Reconstitution of the sample rotor of a pump which was produced in the 70's of last century, can be very problematic.

EKOglob as a Reverse Engineering solution provider



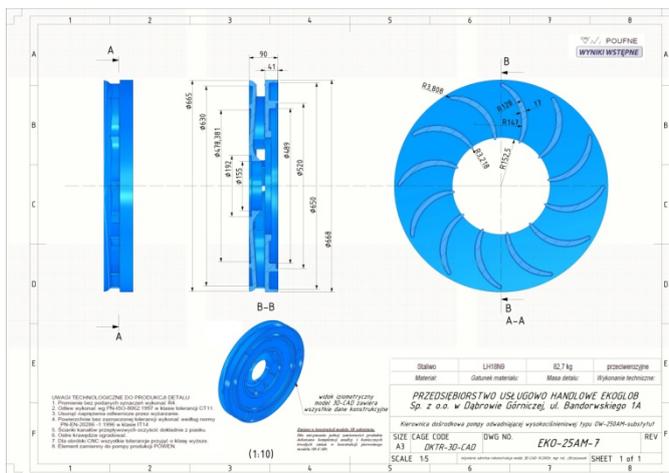
Complicated geometry and complexity of the part requires not only metrological knowledge but also mining experience in it's reconstruction. Ekoglob company with it's office in Dabrowa Gornicza in Silesia District in Poland, is specialized in the reconstruction of parts that were damaged during long-term use. Having SMARTTECH 3D scanner, they use the most advanced and innovate methods.

Within 3D scanner usage - Ekoglob carried out a series of works related to the measurements and reconstruction of geometry of the various elements with a high degree of complexity, such as shafts, bushings, rotor blade, vane steering, housings, bearings and gears. Those parts were digitized in order to receive their current geometry that was used for CAD modeling of existing model.



Having SMARTTECH 3D scanner scan3D surface 5Mpix - Ekoglob is able to receive 5 millions of points that describes measured surface within few seconds and with the accuracy of 60 microns. Scanner field of view is 600x400 mm, however they are not limited to this size, thanks to possibility of connecting single scans automatically using positioning markers. By sticking markers to the object we practically divide the surface to parts, that

will be captured by the 3D scanner. Finding five common markers on overlapping area allows single scans connect together automatically. Therefore scanning huge objects like mining drill goes easy, fast and accurate.



For CAD modeling Ekoglob is using SPACECLAIM that allows not only to provide rapid CAD modeling based on data from 3D scanner but also, thanks to different modules it can be used to prepare model under 3D printing requirements, as well as to make dynamic simulations.

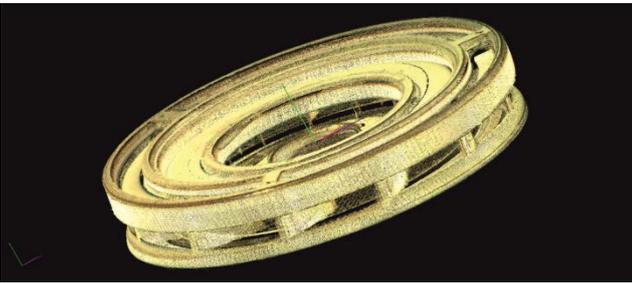
One of the biggest advantage of reverse engineering is the possibility of accurate recreating interior of the machine and it's complex structures where engineer can become familiar with machines workflow without it's disassembling that assures the security of the engineer and of the machine. It has a significant advantages in mining industry. Where detachment of important part sometimes would require complete machine disassembling. 3D scanner can be easily carried on customer site and work in different conditions. Due to constantly calibrated parameters scanner can work directly after taking it out from the case - without providing time consuming and difficult calibration process.

Reconstruction process of damaged parts

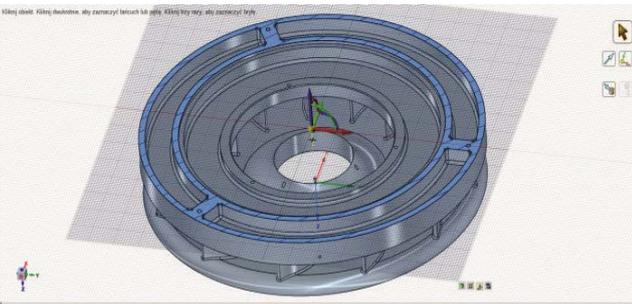


The reconstruction process can be described by following chapters:

1. 3D scanning - Using appropriate method of gathering point cloud that describes damaged object. Thanks to the possibility of capture also the real color of scanned object we can define the places damaged by corrosion.



2. Point cloud processing - Next stage is a transformation of point cloud to a triangle mesh, that represents complex geometry of scanned object. Triangle mesh saved in STL data extension can be done SMARTTECH software which is delivered with the 3D scanner.



3. CAD Modeling - having a triangle mesh we are able to export it to appropriate CAD/CAM software. This procedure allows to take a further step to create a model of spatial 3D-CAD and complex documentation of flat 2D to which we add all the design intent, necessary for the production of substitutes.



4. Production - CAD model is being used in appropriate production processes - in moulding or production with CNC machine. Method of production also describes previous activities like rescaling, considering contractility of metal in casting.



5. Inspection - The last stage is the inspection provided by 3D scanning where we can compare the real object with digital CAD model. Complex inspection sums up the all previous actions and helps to define supposed stages on which possible errors could appear.

Conclusions

One of the most important factors determining the success of reverse engineering is a type of used machines to provide measuring process.

Using an accurate 3D scanner and the most advanced software for 3D data post processing, can guarantee us, drastically time reduction spend on CAD modeling ,analysis and production processes.

SMARTTECH measurement systems are the answer to high requirements from the companies that want to use fast, innovate and the most accurate methods of production.

The Ekoglob company is using SMARTTECH 3D scanner for several years and, dealing with obtained data, received decisively progress in the production of substitutes of spare parts in mining machinery by reducing the time of reconstruction and increasing the accuracy of measurement. In result, Ekoglob is currently the biggest supplier of spare parts for machines with missing documentation in Poland and one of the head companies of reverse engineering eastern European market. Currently Ekoglob was taken over by Geopomp Company that continues its activities.

Visit Ekoglob website: www.geopomp.com.pl

Visit SMARTTECH website: www.smarttech3d.com