



DIRTY
ENVIRONMENT



EXTREME
TEMPERATURE



ROTARY
MOTION



LOW MAINTENANCE

PLASMA PIPE CUTTING

Manufacturing - Cutting

HDRT Optimizes Demanding Production of High-pressure Steel Cylinders

THE CUSTOMER & APPLICATION:

Eurocylinder Systems AG is a medium-size company and a leading manufacturer in the metal processing industry. Eurocylinder produces high-pressure steel cylinders for the storage and transportation of compressed, liquefied and dissolved pressure gas used in technical, fire protection, diving, beverages and medical applications.

The high-pressure steel cylinders are made from steel tubes. The steel tubes are cut into casings of the required length, between eight to twelve meters. The wall thickness varies from three to nine millimeters, with six different diameters – 140, 172, 78, 204, 229 and 267mm. At the plant, around 1000 casings are cut per day. Every year, Eurocylinder Systems produces approximately 500,000 high-pressure steel cylinders. The plant is predominantly operated in rolling shifts or in three-shift operation and is in operation for over 300 working days per year.

CHALLENGE:

Historically, the cutting of the casings was done using two bandsaws. For this, the supplied tubes were cut into casings of the required lengths with vertical cuts (perpendicular to the tube axis). This was a lengthy process that took up to five minutes per cut. Eurocylinder Systems wanted to optimize this complicated and long process.

Due to the technical conditions of the plasma cutting process, large amounts of combustion residues and contamination are produced during this production step. During the cutting process, the burnt material is carried into the interior of the pipe casing by the plasma jet, which causes problems later on in the processing. The casings must therefore be cleaned following the plasma cutting. Rails and guide systems also become polluted with slag splashes and fine dust deposits from the plasma fumes.

REQUIREMENTS:

To guide the plasma cutting heads along a prescribed circular path, a ring-shaped high-performance guide system was required that can meet the required operating times free of faults. The main requirement was to install a guide system that can be wear-free and low-maintenance in operation. In addition, the rings need a high load-bearing capacity to support the entire cutting head (approximately 150 kg in total) and operate at the required rates. The plant is in a hall subject to ambient temperatures. The guide must therefore be resistant to contamination arising from the production process and withstand the external influences – in particular, the temperature variations. This means that the plant and the guides must be operable with minimal downtime during any weather, in any season, with temperatures between -25°C and +40°C.

SOLUTION:

The bandsaws were replaced by a plasma cutting machine. The cutting head of the plasma system has two plasma torches. They are placed opposite each other and rotate during the cutting process on a circular path 180° around the steel tube. One cutting head is responsible for the upper half of the pipe, the other for the lower half of the pipe. A complete pipe cut takes between five and ten seconds, depending on the tube diameter and thickness. The holding and guiding of the whole cutting head is done by two HepcoMotion HDRT guide systems.

Two heavy-duty ring systems provided the durability needed in the extreme environment. These rings feature vee guide technology that delivers a self-cleaning action, which means that any contamination is wiped away by the vee bearings as they run along the rail.

In this application, each ring has a diameter of 786 mm and is made from hardened high-quality tool steel. The HDRT running surfaces are precision-ground. The two parallel rings each use four 95mm diameter eccentric vee bearings for the high loads. Lubrication is provided by four lubrication blocks (two per HDRT ring). The blocks are made of impact-resistant plastic including a spring-tensioned, lubricant-soaked felt wiper for low-friction lubrication as well as high load capacity and lifetime. The lubrication blocks have now been in service for seven years without being refilled.

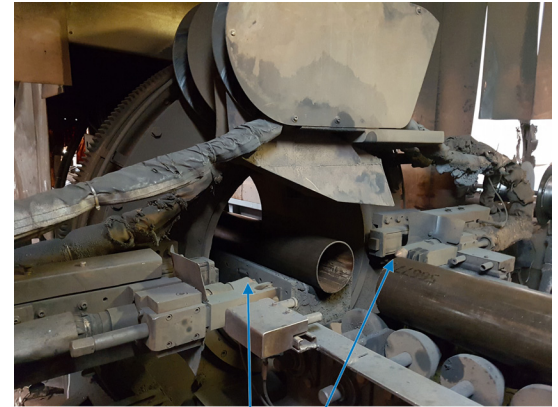
Eurocylinder Systems also installed a special housing with a felt ring seal for the HDRT rings that protects the HDRT rings from external influences such as dirt and dust.

RESULTS:

The main aim of Eurocylinder Systems was a major optimization of their plasma cutting process while at the same time accelerating and automating the cutting process. Eurocylinder Systems is very impressed with the new solution – in particular with the HDRT rings for fully meeting the requirements. Using the bandsaw, up to four pipes were cut simultaneously, depending on the diameter. The bandsaw required five minutes for the cutting. An overall cycle time of about six minutes means 90 seconds per casing. The plasma cutting system only needs ten seconds for one cut, or about 30 seconds per casing. The time saving is therefore about 60 to 70%, if the tube length, diameter and wall thickness are the same.

The system has been in use since 2009, and the HDRT rings at the cutting head of the plasma cutting system have not required any maintenance. The entire system and the HDRT rings have run without any errors or faults, demonstrating how strong and resistant the HDRT guidance system is. The HDRT rings are highly tolerant of dirt thanks to the geometry between the vee guide and the vee bearings which has a 'mill stone effect' caused by the different peripheral speed inside and outside the vee form. The difference in speed causes particles of dirt nearer the center to move outwards towards the periphery, and to be expelled.

HDRT is available from Bishop-Wisecarver, the exclusive North American distributor of HepcoMotion products since 1984.



Plasma Cutting Heads



HDRT heavy duty ring system with gear cut and pinion

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