

Static Cut Off Drives TATA Tubes, Hartlepool



Drives and Automation upgrade obsolete drive control system on the Static Cut Off machine at the TATA Tubes, Hartlepool Works.

Drives and Automation Limited provided a new control system on the Static Cut Off machine at the TATA Tubes Hartlepool Works in January 2007 to replace an existing Mannesmann system that had become unreliable and could no longer be supported.

TATA Tubes produced large steel pipes at the works up to 24 inches in diameter. The production at the plant was reliant on the operation of the Static Cut Off machine which provides test samples of the finished pipe produce for QA purposes.

The replacement control system comprised a Control Techniques Mentor II M350A cutter drive, two Control Techniques Unidrive SP 18.5kW servo amplifiers and new Control Techniques servo motors and cables. Each servo axis contained a Control Techniques SM Applications/CT Net module that would provide position control over each X and Y axis. Cutting profiles for each product were generated and stored on the SM Apps module, programmes were selected via a touch-screen. A Siemens S7 3/15 PLC and touch-screen was provided for operator control/menu selection.

Finished tubes are passed into the Static Cut Off machine via a set of in-feed conveyors. The pipe is gripped via a number of clamps. The circular cutter head with tungsten carbide tips

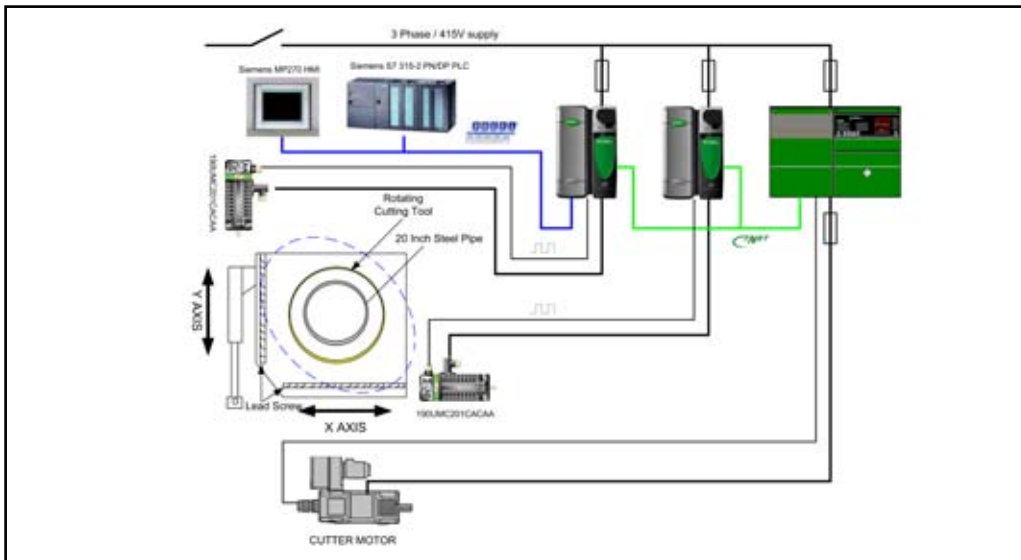
mounted on the inner diameter is rotated by the main cutter motor at a speed determined by the product. The X and Y axis move the rotating cutter blade via the two servo motors in an elliptical manner around the pipe thus cutting into the pipe and providing the sample required. Each profile differs for each tube diameter and wall thickness. A motion profile was pre-programmed for each tube. The whole cutting process takes a matter of seconds.

Interfacing to the existing machine wiring was fundamental to the success of the project as only two weeks were available to install and fully commission the system. As far as practical machine wiring was connected using a Harting plug and socket arrangement to correspond with existing plug and socket wiring thus reducing site wiring time to a minimum.

Technical Details

- Control Techniques Unidrive SP Servo Modules
- Unidrive SP SM Applications/CTNet Modules
- Unimotor SM Servo Motors and Cables
- Alpha SP+ servo gearheads
- Control Techniques Mentor II D.C Convertor
- Siemens S7 3/15 PLC System
- Siemens MP270 HMI
- Preventa Safety Relay System
- Cressall Dynamic Braking Resistors
- Sick Hiperface Multi-turn Absolute Encoders





The existing system used a P.C to store the NC programs. The replacement system utilised a touch-screen to store the basic data required for each program. The operator simply enters the required pipe size and depth of cut manually via the screen for each product, much simplifying the set up procedure.

The existing servo-motors were replaced with new. These motors were chosen as mechanically interchangeable and compatible with the Unidrive SP amplifiers and providing a similar speed and torque profile. Suitable pre-made cables were provided for both encoder feedback and power cabling to reduce installation time and to provide reliable connections. The system included the supply of sin / cos absolute encoders on the servomotors allowing a simplified datum routine to be carried out.

The project utilised some of the many power features of the Control Techniques Unidrive SP product including the Hiperface absolute encoder inputs, secure disable, CT Net Hi-speed communications and the single axis motion controller built into the SM Applications module. The system also utilised the new Control Techniques servomotor range Unimotor FM servomotor.

The system was successfully installed and commissioned in the allocated time and went into production, to specification and on time.

The Control Techniques Unidrive SP covers a complete drive spectrum from 0.37kW to 1.9MW. All drives share the same control interface and can be operated in either servo, closed loop vector, rotor flux vector, open loop vector, V/F control or regenerative control.

The Unidrive SP supports a wealth of communications options and powerful second processor solutions.

Mr Dave Watt, Senior Electrical Project Engineer at the plant, who was responsible at the time for the project commented:

“Drives and Automation provided a complete drive package to replace a very complicated obsolete control system. The equipment was provided on time and successfully commissioned within the shutdown. The system has run continuously ever since its installation and never missed a beat.”

Problem Solved

- Obsolete and unreliable system
- No support
- Reliability poor
- Software and documentation difficult to follow

Solution

- Complete re-drive and control package including new servo amplifiers, servo motors, D.C controller and PLC/HMI
- Intelligent drives utilised with adaptable algorithm to provide complex cutting motion.
- HMI to provide operator product selection menu.

Benefits

- Repeatable machine performance
- Simple operation
- Reduced downtime
- Maintenance easily undertaken
- Fault diagnostics
- Increased production
- Local Support
- Longevity of plant guaranteed



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