

## DC to AC Conversion of a tubular strander significantly reduces downtime and increases production at Willington Quay site



**A £150K Variable Speed Drive AC conversion project replaces an existing troublesome DC control system and both reduces machine downtime and increases production on a Tubular strander.**

Bridon-Bekaert Ropes Group is the world's premier supplier of mission-critical advanced cords and ropes. As a leading innovator, developer and producer of the best performing ropes and advanced cords globally, the Group provides superior value solutions to the oil & gas, mining, crane, elevator and other industrial sectors. Bridon and Bekaert, two of the most enduring wire and rope pioneers joined forces in 2016 to make this ambition real. Bridon-Bekaert Ropes Group has a global manufacturing footprint and employs approximately 2500 people worldwide.

The Willington Quay plants, located on the edge of the Tyne near Newcastle, manufacture wire rope for a myriad of applications including oil & gas, mining, hoisting, lifts, moorings and many others.

Drives and Automation were asked to look at replacing the existing obsolete DC drive system with a full AC conversion, as reliability was becoming an issue. The DC drives were at the end of their useful life after many years of service, spare parts were unobtainable and the drive second processor cards were obsolete. The existing PLC was also obsolete which further compounded matters.

The machine is a multi-wire strander; the original installation had four digitally locked DC motors on the Capstan, Rotating Fly, Tube and Chuck drives.

Additionally, the system incorporated separate Take up and Traverse drives.

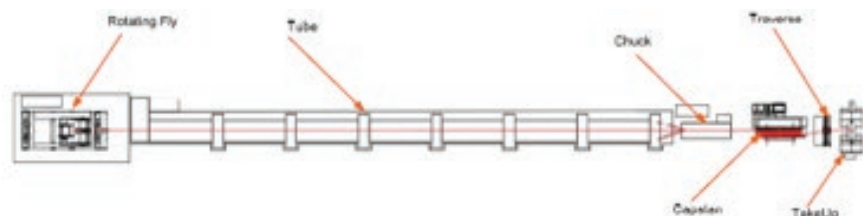
The Tube motor is the master drive in the system and can hold up to 18 individual bobbins containing strands of various diameters to make up the final rope. The tube spins the strands to make the twist in the rope and the capstan pulls the rope through the machine. The speed relationship between the tube and the capstan dictates the "lay" of the rope.

The Take up is used to wind the rope onto the final bobbin. The Traverse lays the rope on the Reel drum and runs at a speed relationship to the Take up. The tension of the reel is set by the operator and can be adjusted on the fly.

If a "flat lay" rope is being produced, then the Rotating Fly and Chuck are used. The Fly and Chuck run at the same speed and the twist of the flat wire is controlled by the speed ratio between the two drives and the Tube.

### Technical Details

- Siemens S120 based regenerative drive system with SmartLine technology
- Sicme High Performance Square Frame AC Motors
- Siemens S7-1500 Safety PLC processor
- Siemens S7 ET200 Remote I/O
- Siemens TP1200 HMI



Drives and Automation Ltd provided the complete drive solution comprising of an air-conditioned control panel suite, local operators control station and motors. Wiring between the main panel and operator station was kept to a minimum by using a single Profinet cable rather than conventional control cables.



Sicme moto in-situ



Siemens S120 inverters



Siemens S120 SmartLine

Sicme Motori high performance square framed AC motors were also supplied by DnA (the UK Agent). These new square frame AC motors offered the advantage of directly matching the shaft height and diameters of the existing DC machines they were to replace - something conventional AC round frame motors could not achieve. The result was that the DC to AC motor conversion took very little time in comparison to the alternative.

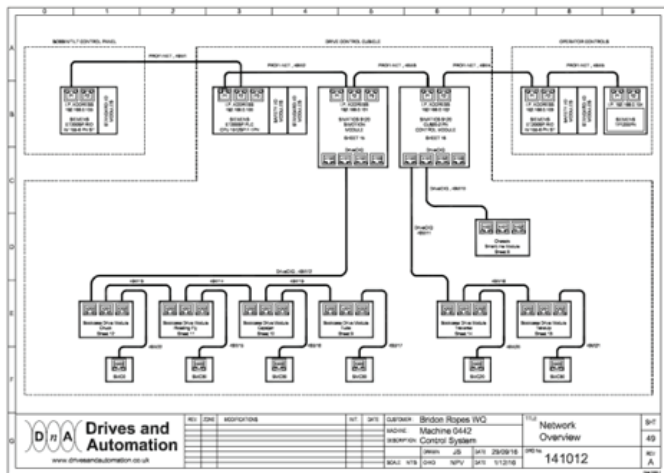
The drive control system selected was a Siemens S120 based regenerative drive system utilising SmartLine, regenerative common DC bus technology. All braking energy was circulated within the DC link and exported back to the mains if required thus making for a more efficient control solution. This removed the need to install dynamic braking resistors to absorb the braking energy.

A Siemens TP1200 HMI panel provided the operator interface to the machine's control system, providing set up information, grease temperature control, wire break detection, fault finding and machine diagnostics.

project within budget and on time with only minor disruption to production. This couldn't have been achieved without the help of everyone involved including Drives and Automation Ltd and our team of site electrical and maintenance engineers."

Graham Foster, End User Account Manager, Siemens Digital Factory and Process and Drives Division stated, "Drives and Automation, part of our Solution Partner network delivered a timely retrofit over the shutdown period for Bridon, enabling production to re-start unhindered. Siemens and the partner network both invest in training and competence to ensure our partners have the correct skill set to enable them to be as self-sufficient as possible."

Drives and Automation (DnA), based in Chesterfield, provide a comprehensive system design, control system manufacture and project management service for new and retrofit control systems. Working alongside machine builders or end users, we provide systems encompassing AC and DC drives, PLC systems and turnkey project solutions.

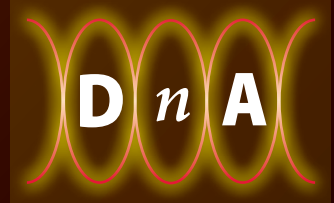


**Siemens Drive Topography**

The S120 drives features the Simotion D425-2 PN/DP module and CU320-2 PN, programmed using Simotion Scout. The D425 has an in-built CU320 and is used to control 4 axes; Tube, Capstan, Rotating Fly and Chuck. The other CU320 controlled the Infeed, Traverse and Take Up drives.

Ben Pippin, Site Electrical Engineer, said: "We were really pleased that we managed to complete the

- Problem Solved**
- Brush gear maintenance on the DC motors
  - Control system obsolete and unreliable
  - No spares available
  - Extended downtime and loss of production
  - Expensive to maintain
- Solution**
- More efficient AC drive solution
  - Machine safety improved
  - New maintenance free AC motors
  - Control system reliable and supportable
- Benefits**
- Updated PLC Control
  - Improved machine diagnostics
  - Comprehensive documentation provided



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