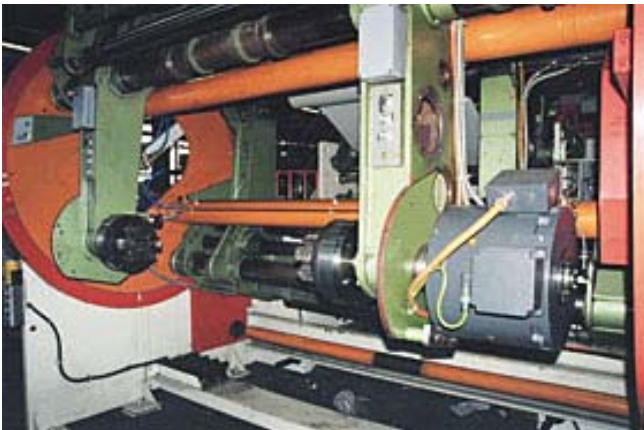


Novelis Deutschland GmbH; Göttingen (Germany)

Coilers fit for the future

To replace the large, fault-susceptible acceleration motors and the complex electromechanical brakes, Novelis has had an existing coiler for paper webs at the Lüdenscheid works retrofitted by the system partner Unitechnik in Wiehl. The heart of the technical solution are the torque motors 1FW3 which provide not only the necessary drive-technical services but also get by with very little installation space.



With 13,000 employees at 38 locations, the Canadian Novelis Group is considered the world's biggest manufacturer of aluminum rollings for the further processing industry. The company's range of products includes drink cans, sheets for the automotive industry, roof and facade elements, lithographic plates, foils for packing etc.

The Novelis Deutschland GmbH with its headquarters in Göttingen has five production sites. The Refining and Foil Rolling Mill divisions are concentrated at the Lüdenscheid/Westphalia works. The foil rolling mill, specializing in aluminum foil, manufactures top quality foils for flexible packings. The factory also produces bare and coated bands for pipe and cable applications and metallized paper for bottle labels.

Precision handling without interrupting the process

The material for bottle labels is varnished on a polytype varnishing machine with roll-on and roll-off by Monomatic. The tension in the web in the decoiler was previously achieved by an electromagnetic brake which proved to be very maintenance-intensive and prone to faults. For years, an integrated drive solution was sought which solves both the acceleration and braking processes equally and also allows continued use of the existing system part. The aim was to solve the space problem. Since the previous brakes were relatively compact, conventional drives with gears did not fit into the system.

A little while back, the Unitechnik company, a longstanding partner of the Lüdenscheid factory for automation and system update projects, brought in the idea of torque motors. "Like so often in life, this was thanks to coincidence. We came into contact with torque motors for a quite different project and then had the idea that they might hold the long searched for solution, Christian Neuhaus, Project Engineer at Unitechnik in Wiehl reports.

Better direct

Because of the considerable optimization potential offered by the direct drive systems, linear motors and torque motors are becoming increasingly important. A torque motor can be considered in simplified terms as a "linear motor bent in a circle". This motor which is also known as a "direct drive" is distinguished by high torques at a comparatively low speed. Complicated, mechanical transmission elements which are common in conventional drives can therefore be dispensed with - i.e. you won't find any toothed belts and gears in torque motor solutions. In this way production machines are often made faster but in any case more exact and reliable, that is on the whole more economical.

Siemens offers its torque motors in two versions: as complete motors for production machines as they are used in the coiler of the Novelis company and as built-in motors which are very popular in machine tool construction. The torque range of the permanently excited completely synchronous motors of the 1FW3

series ranges from 100 to 20.000 Nm. This guarantees a wide range of application. The optimum performance is achieved by the Simovert Masterdrives MC or Simodrive 611 universal converter family. To guarantee an effective and optimum cooling, the 1FW3 torque motors are water-cooled. The effect of the temperature on the interfaces of the machine construction is then only insignificant.

Optimum coiler application

Since the customer requires a continuous roll-off, the implementation of the application using a reverse coiler by means of two torque motors posed a special challenge for the technicians. The signal and energy data had to be transferred to the rotating inverters of the torque motors via slip rings by means of a reversing cross. Another special feature was in the coiler application itself: On the one hand, a high torque is required in the lowest speed range but, on the other hand, a wide speed range must be covered. This means the motor can normally be operated with a rated speed of 250 rpm at a field attenuation up to 500 rpm. This was not enough in this case. Unitechnik therefore suggested testing whether a field attenuation of 1:3 would be possible to achieve a speed of up to 800 rpm. After the experts at Siemens headquarters for torque motors in Bad Neustadt/ Saale had got positive results, therefore was nothing else stopping the retrofitting of the coiler. The motors were dimensioned based on the most important parameters web tension and maximum coil sizes. The result was the development of two motors 1FW3 203 with a nominal torque of 750 Nm and a maximum torque of 1390 Nm.

"Once the dimensioning of the motors was decided, we made the necessary mechanical modifications here at the factory," Novelis Works Manager Jens Barwich reports. All electrical conversions were made by Unitechnik. The most important basic condition was that the whole system had already been converted from analog to digital technology a few years ago. A Simatic S5-135 PLC serves as a main controller.

The coiler has now got its own Simatic S7-300 controller, the torque motors were controlled by Simovert Masterdrives MC converters. Christian Neuhaus: "What we saw as a problem at the outset of the project, namely the cooling water supply to the rotating coiler, turned out to be fairly easy to solve." The rotary through-bearings operate reliably." After the necessary technical preparations, the modernized coiler was put into operation at the end of June 2005. It has been running 24 hours a day since without any problems. Jens Barwich sees the basic advantages in the desired fulfilling of the functions but also in the higher productivity of the system. The system is no faster than it was before but the downtimes are a lot less. "We really do recommend torque motors for system modernizations," the works manager confirms.

Torque motors

Torque motors are liquid-cooled, high-pole permanently excited three-phase synchronous motors with hollow shaft rotors for direct integration in the machine design. Torque motors are available as:

- ? Ready assembled complete motors (1FW3) and as
- ? Installation components (1FW6)

Highlights of the torque motors 1FW3

- ? Extremely compact structure with a high power density
- ? Flexible design and maintenance concepts by hollow shaft
- ? High continuous torque by integrated water cooling
- ? Maintenance friendly because no gears or toothed belts
- ? Torques of 100 to 7000 Nm

Advance 4 / 2006