

# **Electric drive of tensioning device at tension-leveler of electrolyte tinning line**

**Customer:** Karaganda Metallurgical Plant JSC “ARCELOR MITTAL TEMIRTAU”

## **Tecnological process specification**

Tension-leveler needs for aligning of steel cold rolling strip before tin coating process. Aligning operation is carried out by strip sequencing through the aggregate of tension-leveler, consisting of 4 flexure devices and through the regulated multiroll device. Tension is provided by means of tension bridges, which are situated near entrance and exit of the tension-leveler. Both tension bridges are mechanically connected between themselves and they are brought into action by the reduction gear unit.

Supply of the mechanical equipment and control flattening system is carried out by SIEMENS VAI (France). “RVSA”, Ltd., carried out the project and implementation of electric drive of tensioning device. Electric drive of tensioning device consists of two parts: the main drive and the drive of stretching mechanism (exhaust).

The main drive regulates speed of outlet rolls, allowing to support tension on the tension-leveler in accordance with given value, saving preset strip pension on the all tensioning device.

The drive of the stretching mechanism regulates speed of inlet rolls, permitting to make difference between strip speeds in input and output of the machine for achievement preset stretching value within the tension-leveler. During aggregate work with the help of stretching mechanism drive, tension inside tension-leveler should be supported between upper and lower threshold limit values.



## **Requirements to control system**

- Connection with technological part of tension-leveler control system.
- Connection with electric drive control system for electrolyte tinning line.
- Analogue signal reception from tension transducers inside and at outlet of the tension-leveler
- Calculation of speed calibrated value for the main drive on the basis of aggregate speed, considering compensation for roll diameter change for the tension-leveler
- Calculation of stretching drive speed calibrated value based on aggregate speed which is relative to required exhaust, considering compensation for roll diameter change for the tension-leveler.
- Providing of strip maximum working speed to 7,5 mps.
- Speed jogging control to 0,5 mps.
- Strip tension support at machine outlet, which equals desired value.
- Tension support within the tension-leveler in acceptance limit.
- Providing of strip preset relative elongation from 0 to 1 per cent.
- Carrying out of necessary blockings

## **SOLUTION AND AUTOMATION SYSTEM CHARACTERISTICS**

Induction motors of the firm SIEMENS with inbuilt pulse sensors (encoders) and forced-air cooling system are chosen the main drive of the tension-leveler and for the stretching drive. Motor power of the main drive is 95 kW, stretching drive is 11 kW.

Frequency converters MICROMASER 440 are used for motor control, which allow regulating drives speed with required accuracy.

Electric drives and tension-leveler oil system control is carried out from the programmable controller SIMATIC S7-300 CPU 315-2DP.

Connection between the controller and the frequency converters is carried out through the communication processor CP341 according to USS protocol.

Connection between the drive controller of the tension-leveler and technological part (SIEMENS VAI) control system is implemented by Industrial Ethernet.

Connection between the drive controller of the tension-leveler and the drive controller of the tinning line is carried out by Profibus DP.

Drive implemented control system of the tension-leveler is suited to all submitted technical requirements. In addition it was developed and implemented strip tension regulator at outlet of the tension-leveler. All information about drive condition of the tension-leveler is displayed on the personal computer of tinning line (WinCC) operating staff.

## **Project implementation period**

Project implementation period is 4 months, commissioning is December, 2007.

