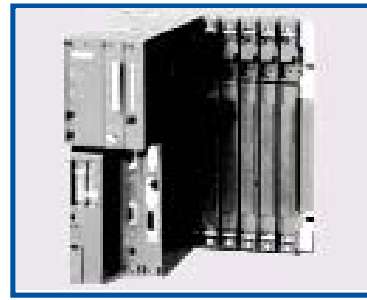


Scope of Supply

Ingeteam Power Technology, S.A, Industrial Systems Division, is responsible for the complete turnkey electrical project:

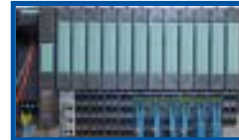
- Power installed: 7.000 kVA
- Project Management.
- Basic and detail engineering.
- Supply of electrical equipment, drives and automation:
 - MV / LV Transformers
 - Low voltage distribution centre
 - Main motors - manufactured by **(INDAR -Group Ingeteam)**
 - Main drives - MOTOCON MP-BT (**Ingeteam Power Technology S.A.**)
 - Auxiliary drives - Micromaster
 - AC motor control centre
 - Sensors.
 - Integrated control equipment S7-400.
 - Control and supervision equipment (HMIs) IN-TOUCH.
- Installation supervision.
- Commissioning.
- In addition to the above, the following systems are also supplied:
 - Thickness gauge control (First Control).
 - Flatness roll and control (Vollmer-BFI).
 - TCS sensors (MHI).



SIMATIC S7-400



ET-200-Eco



ET-200-S



InTouch - HMI



X-Ray gauge control



Pendant Panel



Main Control Pulpit

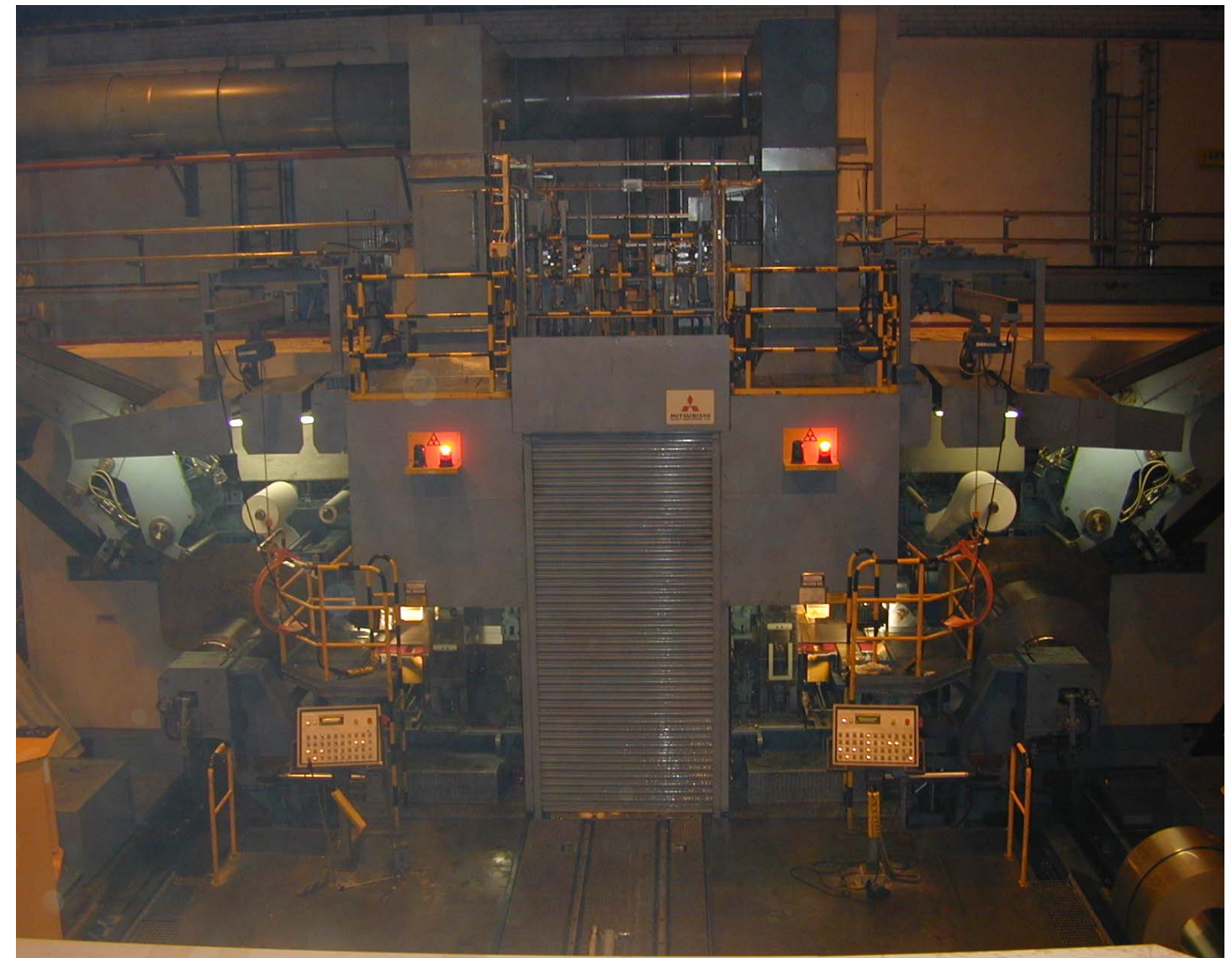
After-Sales Services

- Hotline Service.
- Spare parts in 24 hours.
- Direct line with our technical staff.
- Remote communication from our offices to the factory automation network.

Ingeteam

2 Reversing Cold Rolling Mill

OUTOKUMPU Långshyttan (Sweden)



Project Description

Mitsubishi Hitachi Metal Machinery, through its European subsidiary, awarded in the first semester of 2005 an order to Ingeteam Power Technology, S.A, Industry Division - Steel Solutions to undertake the electrical and automation equipment of a stainless steel Reversing Cold Rolling Mill, Cluster type, to be delivered to the client Outokumpu in Langshyttan (Sweden). This order served to consolidate our relationship with Outokumpu, initially established in 1996 with the supply of a similar type mill based on DC technology.

The mill, to be used for the reduction and elongation of coils of stainless steel sheets to obtain the required material quality, formats and thickness, comprises a Cluster-type Mill Stand with 12 intermediate, back-up and working rolls as well as two reversing coilers.

The equipment of the main drives is based on synchronous motors and converters at 690 Vac featuring IGBTs with digital control.

Ingeteam Power Technology, S.A, Industrial Systems Division is in charge of the mill's automation using Simatic S7 hardware as well as ET-200-S and Eco for distributed signals. The AGC system for roll force and thickness control is developed and supplied by the company First Control, while the AFC system for flatness control is developed by Vollmer-BFI, (including control and measurement roll) while Ingeteam Power Technology, S.A, Industry Division - Steel Solutions supplies the X-ray thickness measuring gauges.

The automation incorporates various process operation and display systems (InTouch), which make it possible to easily manipulate and maintain the mill.

Technical Features

Type: Reversing Rolling Mill, Cluster type

Mechanical Supplier: MITSUBISHI HITACHI METAL MACHINERY

Entry material: Stainless steel (AISI 301, 304, 316)
From hot or cold CAPL

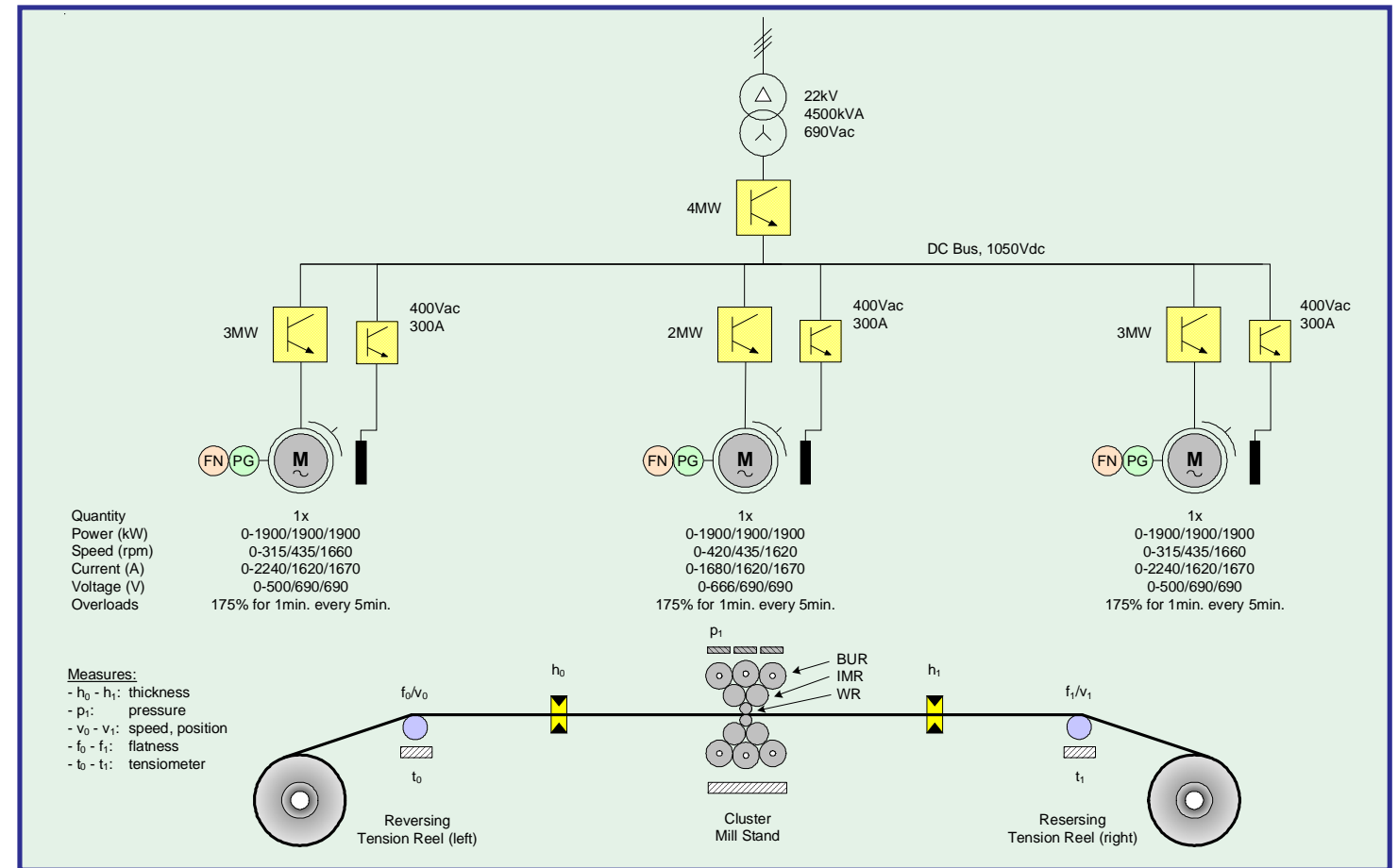
Operation:

Reduction:	Max. 15% per pass
Working rolls diameter:	60 - 80 mm
Intermediate roll diameter:	170 - 180 mm
Mill speed:	250 - 800 m/min
Threading speed:	20 m/min
Mill force:	5.100 kN / 520 ton
Strip tension:	Max. 350 kN Min. 15 kN

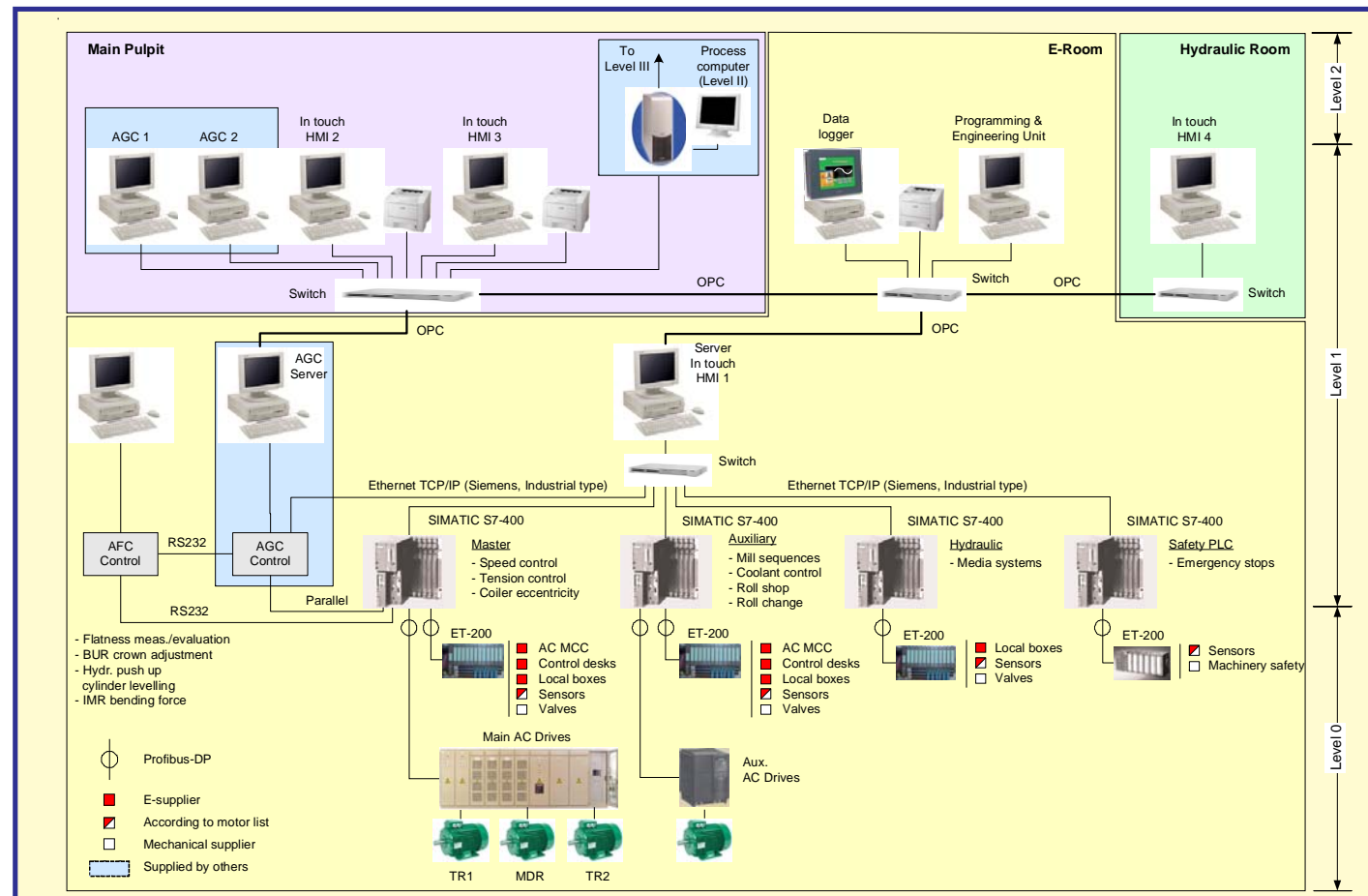
Coil characteristics:

Coil width:	400-1.100 mm
Entry thickness:	0,15 - 3,5 mm
Exit thickness:	0,1 - 2,0 mm
Inside diameter:	500 mm
Outside diameter:	2200 mm
Maximum weight:	Max.: 17,5 Tn

Mill Lay-Out



Control Diagram



Main Motors

Due to the wide weakening range that needed to be complied with and in order to avoid increasing the size and inertia of the motors, we opted for the Synchronous motors solution, improving the tension control, $\cos \phi$ by 15%, and reducing Inverter rating.

Even though the mechanical torque and speed needs are different from those of the main motors (Coiler/Uncoiler and Mill Stand), we have opted for identical Synchronous motors, able to operate in accordance with the different needs, and thus minimizing spare parts stock.



Motors are cooled by Air-to-Water exchangers (ICW37A86), and are equipped sleeve bearings, with forced-feed oil lubrication.

A common baseframe houses the motor with a second shaft for connection of pulse generator and speed switch as well as disc brake capable of stopping the mill in <7 seconds.

Main Drives

The main motors are controlled by **MOTOCON AC MP-BT** modular equipment developed and manufactured by Ingeteam Power Technology, S.A.

Each module is composed of 2 withdrawable and interchangeable, stacks with a power of 1 MW, and interconnected by means of optic fibre. Said power stacks are in this case water-cooled.



Within the 690Vac product family, by placing 2, 3 and 4 stacks in parallel it was possible to attain the power ranges of the Coilers/Uncoilers (3MW), Mill Stand (2MW) and AFE Rectifier (4MW).

The Control Architecture makes it possible to add on I/O modules, different Communication options, integration of PLCs and HMIs as well as making available a parameterization, configuration and monitoring system which can be easily handled by the operator.

