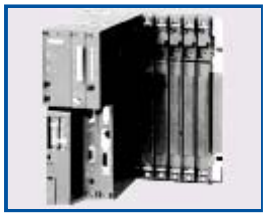
Scope of Supply

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

- Project Management.
- Basic and detail engineering.
- Supply of:
  - AC MCC Motor Control Centers.
  - Line Motors (kinematics).
  - IGBT's DC-Bus Rectifier (AFE 400Vca 817A).
  - Main AC drives (MASTERDRIVE & MICROMASTER).
  - Auxiliary AC drives (MASTERDRIVE & MICROMASTER).
  - Thyristor Equipment for Furnace Resistances (TEAM,S.A.).
  - Field sensors.
  - UPS and voltage distribution.
  - Control desks and local panels.
  - Integrated control equipment (SIMATIC S7-400).
  - Distributed periphery (ET-200-S and ET-200-Eco Remote units).
  - Safety PLC (FAIL-Safe S7-300F).
  - Control and supervision equipment (IN TOUCH).
  - Miscellaneous (TV System)
- Programming.
- Electrical installation supervision.
- Commissioning.



SIMATIC S7-400

ET-200-Eco

ET-200-S

InTouch - HMI

MICROMASTER

After-Sales Services

- 24-hour / 365-day Hotline Service.
- Spare parts in 24 hours.
- Technological improvements.
- Direct line with our technical staff.
- Remote communication from our offices to the factory automation network.

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Ingeteam

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Bright Annealing Line

OUTOKUMPU Långshyttan (Sweden)

Ingeteam
Industry

Project Description

Chugai-Ro, a company of the MITSUBISHI CORPORATION (Japan) awarded in May 2005, to Ingeteam Power Technology, S.A., Industrial Systems Division, an order for the supply, programming, documentation and consulting services for the installation and commissioning of the electrical and basic automation equipment of **OUTOKUMPU's** new Bright Annealing Line in Långshyttan (Sweden).

Commissioning will be carried out during the second semester of 2006.

The processing line comprises:

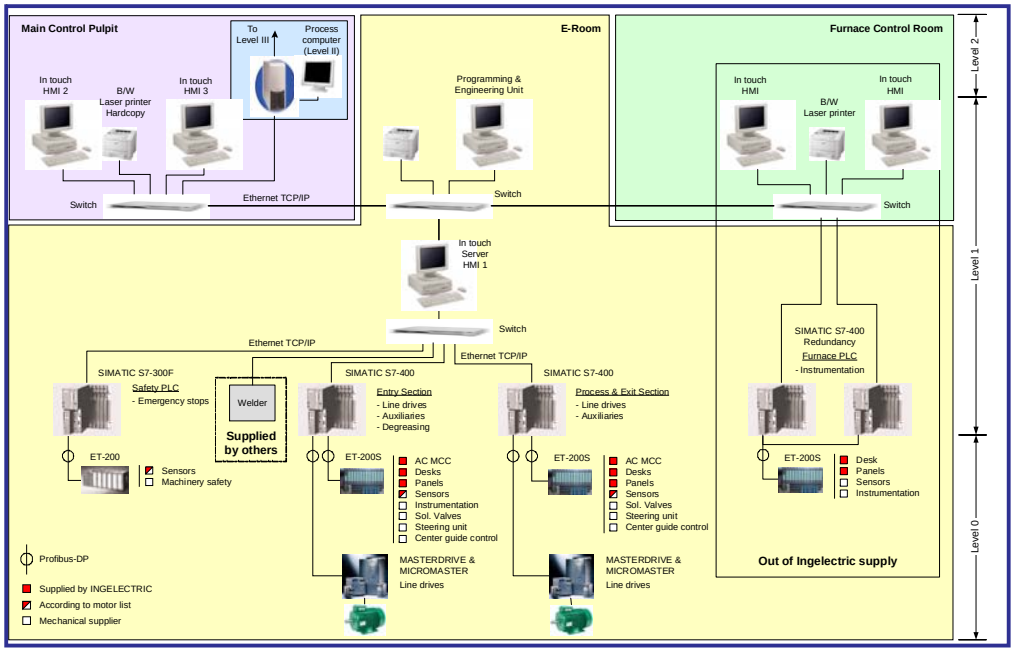
- An entry section with double Pay-off Reel, shear, welding machine, spinning machine and degreasing section.
- Entry accumulator.
- Vertical annealing furnace:
  - Stamping section.
  - Electric heating section.
  - Slow cooling section.
  - Final cooling section.
- Exit accumulator.
- Exit section with shear and Tension Reel.

Line Drives are controlled by one single DC-Bus divided into two sections and powered by an Active Front End (AFE) rectifier based on IGBT's at 400Vca.

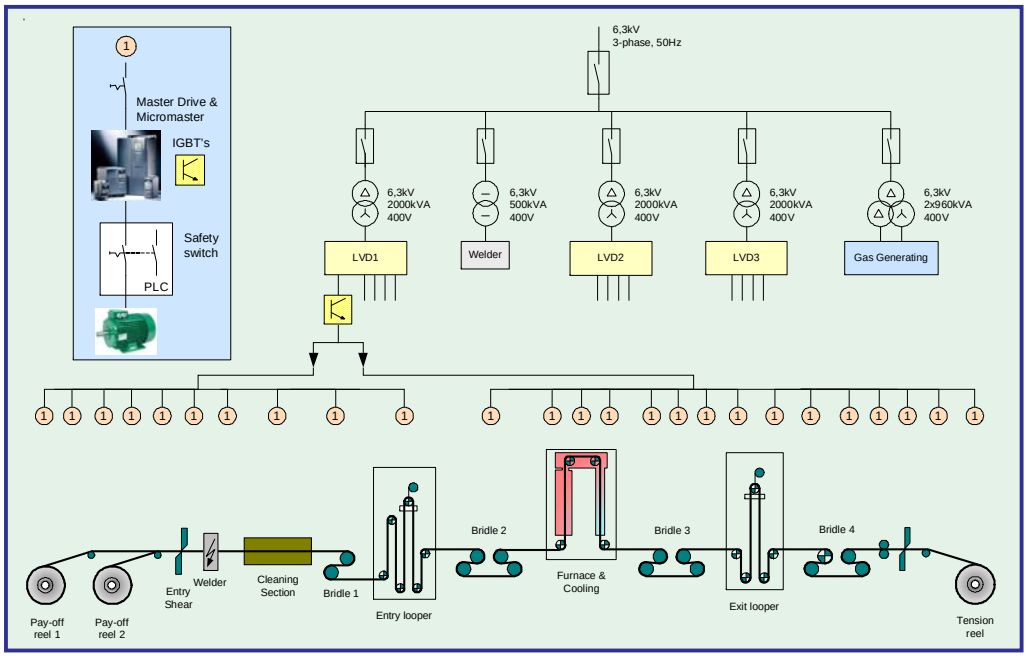
Technical Features

Process Type:	Bright Annealing.
Production capacity:	80,000 Ton/year.
Material to process:	
- Material type:	
Stainless steel:	Series AISI 300.
Strip thickness:	0,1 to 1,0 mm.
Strip width:	500 to 1050 mm.
- Extensible force:	
Before Annealing:	1.600 N/mm² máx.
After Annealing:	700 N/mm² máx.
- Production force:	
Before Annealing:	1.280 N/mm² máx.
After Annealing:	550 N/mm² máx.
- Coil dimensions:	
Int. diameter:	610 - 850 mm.
Ext. diameter:	1000 to 2000 mm.
Max. weight.:	18 Tons.
- Spool:	
Entry:	610 - 850 mm.
Exit:	610 - 650 mm.
Width:	1070 mm.
Line speed:	
- Threading:	25 m/min.
- Entry Section:	5 - 90 m/min.
- Process Sec:	5 - 70 m/min.
- Exit Section:	5 - 90 m/min.

Control Diagram



Power Distribution / Line Flowchart



Automation Equipment

From a control point of view, the Line is divided into two sections: Entry section and Process and Exit section, being the entry accumulator responsible for determining said division.

Each section is controlled by a PLC Simatic S7-400 with two CPU's (416-2DP): one controlling the kinematics and the other the auxiliary equipment of said area.

The collection of I/O, signals, is fully decentralized and based on two types of remote units:

ET-200-S: These remote units have the advantage of being very modular, thus allowing for its installation in AC-MCCs, concentrator boxes, and inside control desks and small control panels.

ET-200-Eco: Incorporates an IP-67 protection and therefore does not need to be installed inside boxes. These are connected directly by means of special connecters, and may also be installed in columns, profiles, etc. Said units are used to control all electrovalves.

ET-200-Eco

Profibus-DP is the field bus that communicates the central PLC with the various types of remote units.

Safety

With the aim of equipping the line with highest level of safety possible, against electrical or physical accidents that may cause injuries to operators, **Outokumpu** in keeping with their safety standards implemented the use of:

- Safety Switches in all motors with less than 90kW.
- Pushbuttons to give instructions to the PLC to stop/ start motor for all motors with more than 90kW.
- Access to high-risk operation areas, by implementing protection measures such as safety doors, fences, bridges, etc., by means of limit switch sensors.
- Emergency power supply in order to maintain the UPS and the rest of consumers powered, whenever required.
- FAIL-SAFE safety PLC where all the I/O data, related to safety elements, doors, emergency arrows, etc., is stored.

Voltage Drops

As Sweden may experience frequent voltage drops of approximately 40% in the power supply, during 150 milliseconds, in order to prevent the line from stopping, we have opted to install a rectifier based on IGBTs 400Vca (AFE), capable of amplifying the DC Bus voltage during voltage drops, thus being said voltage drops hardly detected by the line drive inverters.