Accurate Sensors Technologies

Special Low Temperature Pyrometers For Aluminium Cold Rolling Mill

FR 3000

100°C...600°C

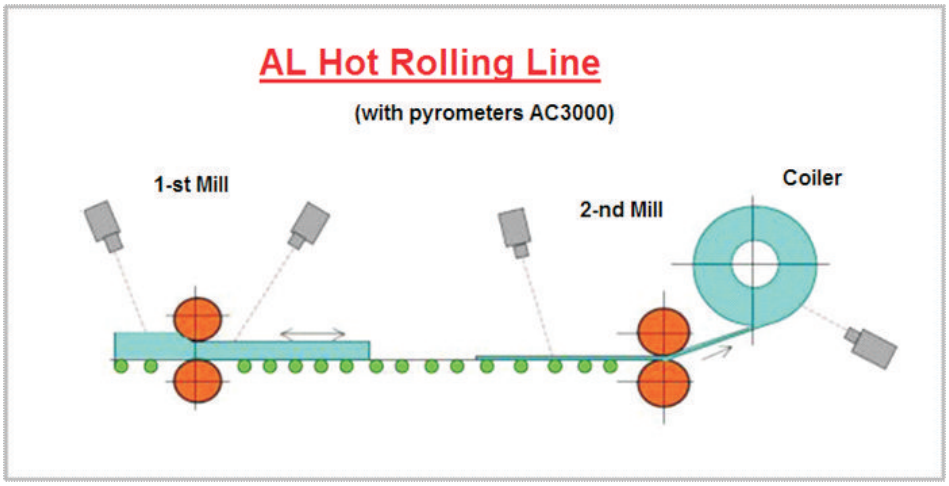
Importance of Temperature Measurement in Aluminium Cold Rolling Mill

Non contact measurements are important because it is not possible to touch with a thermocouple the metal moving continuously at a high speed during the rolling process. Moreover, even if it is possible to interrupt the rolling process for manual measurement of the slab or thick strip, this cannot be carried out during the final passes and coiling due to the process specification. Even when it is possible to stop the strip, there is a delay in the process and a reduction in the line productivity. For example, in order to monitor the slab or strip temperature at the start of the process the mill has to be stopped and the thermocouple mechanically positioned. At least 10 sec will be needed for the measurement. This results in at least a delay of 20-25 sec. However, the temperature needs to be measured and the optimum choice for this application is the non-contact infrared thermometer.

Infrared sensors have been tried many times but with only limited success on aluminum because of the low and variable emissivity. The Accurate Sensor Technologies, Israel have successfully developed an infrared temperature measurement system that uses multiple wavelengths and complex algorithms to accurately measure the temperature in the Extrusion and HotRolling of aluminum alloys. The AST pyrometer has the option to store different calibrations in different groups in the processor memory and it is possible to switch between groups by a signal from an external PLC.

Cooling Temperature :

Allows the absolute temperature value and the temperature distribution along the strip to be recorded. This recorded temperature can be used to both: modify the next Slab setting based on previous stage and, most importantly, to adjust the coiling speed and cooling and thus to obtain the correct conditions for defined metallurgical properties. These metallurgical properties can be achieved either by expensive special aging processes in a furnace or by adjusting the coiling speed and cooling rate to produce the correct structure followed by natural aging.



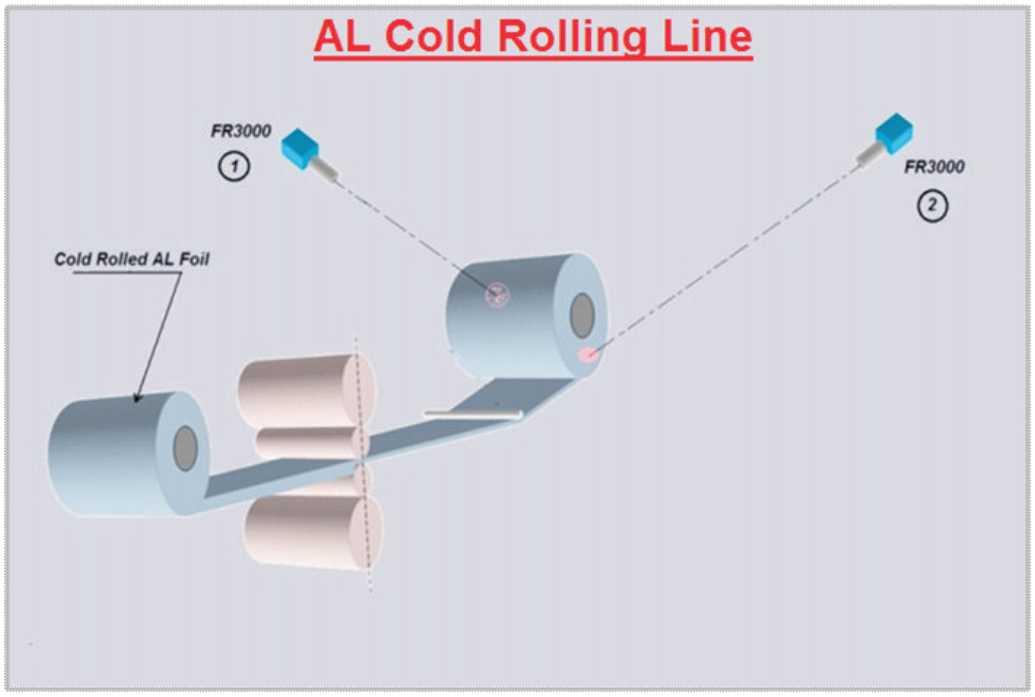
FR 3000 - special low temperature pyrometer can measure temperature either at position (2) or at position (1)

At position (1) it is possible to get more technical information about process. At this position temperature distribution is along the strip in center line, so measurement can be achieved from the very first moment when the strip comes to the coiler.

We measure accurate temperature in extreme conditions

However due to very shiny surface and very low emissivity, to avoid influence of external natural or artificial lighting, temperature has to be measured with the conditions deep shadow. Reflected light energy may be even higher than energy emitted by low temperature target.

At position (2) surface has higher emissivity (refer temp v/s emissivity table referred below) and with proper shadow, temperature can be measured from 100°C and higher.

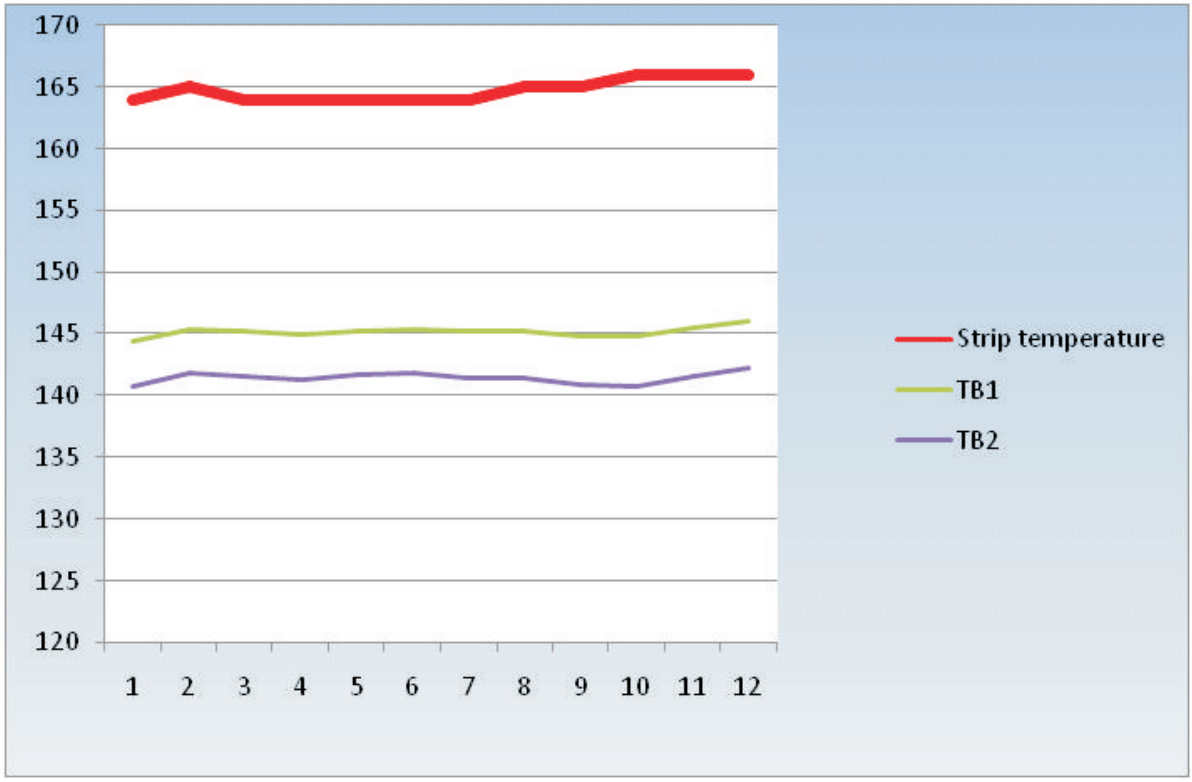


BENEFITS OF USING FR3000

- User can improve the productivity of machine.
- It can control the temperature of the aluminum sheet in order to give the mechanical strength. (Without accurate temperature control, while producing too fast, user may increase the temperature of the aluminum and then will not have the required mechanical hardness).
- Controlling the temperature at the exit of the machine with the pyrometer enable user increasing the production speed to allowed temperature limit.
- Setting process parameter with pyrometer along the first coil production enable us having repeatability for the same lots of production (thickness and alloys).

DATA OBTAINED FROM SITE

Date	Time	Temperature	Emissivity	T Brightness 1	T Brightness 2	DX	DY
9/19/2011	15:43:30	0	0			1.15	0.023
9/19/2011	15:44:42	164	0.49	144.4	140.7	1.15	0.023
9/19/2011	15:44:44	165	0.49	145.4	141.8	1.15	0.023
9/19/2011	15:44:46	164	0.49	145.2	141.6	1.15	0.023
9/19/2011	15:44:48	164	0.49	145	141.3	1.15	0.023
9/19/2011	15:44:50	164	0.49	145.3	141.7	1.15	0.023
9/19/2011	15:44:52	164	0.5	145.4	141.8	1.15	0.023
9/19/2011	15:44:54	164	0.49	145.2	141.5	1.15	0.023
9/19/2011	15:44:56	165	0.49	145.3	141.5	1.15	0.023
9/19/2011	15:44:58	165	0.47	144.8	140.9	1.15	0.023
9/19/2011	15:45:00	166	0.46	144.8	140.8	1.15	0.023
9/19/2011	15:45:02	166	0.47	145.5	141.6	1.15	0.023
9/19/2011	15:45:04	166	0.48	146	142.2	1.15	0.023
9/19/2011	15:45:06	0	0			1.15	0.023



Features	:	High accuracy in real world conditions Capable of measuring targets with variable emissivity Temperature range: 100-600°C / 212-1048°F Rugged design Full range of accessories Wide range of built-in functions Pointing laser source: Class II
Application	:	Forging, continuous casting, Cold rolling.
Performance	:	Tmin (Emissivity ε=1.0,blackbody)..... 100°C Response time: 0.1 - 10 Sec (Default value: 0.5 sec)
Accuracy (blackbody)	:	Above 300°C = ±0.3% of measured value 300-200°C = ±(0.3% +1°C) 200-150°C = ±(0.7% +1°C) 150-100°C = ±(1.0% +2°C)
Electrical specifications	:	Power supply: 24V AC, 50/60Hz 0.25 - 0.15 A Optional outputs: 4-20 mA, 0-20 mA, 0-10 V, RS-232, RS-422, RS485, Alarms, Profibus.
Optional	:	Display P110 monochrome single channel Scanning System PS3000.
Ambient condition	:	Operating temperature range: 0°C to +50°C Storage temperature range: -20°C to +70°C Humidity: unlimited for the sensor-head
Optics	:	Spot diameter: 1:50 (20mm from a distance of 1 meter) Various optics is available upon request.

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