



## RFM 45-degree Holding Furnace Thermocouple Assembly

### ALUMINIUM PROCESS

Primary Casthouse, Aluminium Ingot Casting and Rolling/Plate Mill

### APPLICATION

Tilting Furnace

### OPERATING TEMPERATURE

Maximum for RFM: 800°C (1472°F)

### PREVIOUS SITUATION

- High failure rate—change out 1 “gun barrel” thermocouple assembly every six hours (12 per day on three furnaces)
- 10 feet of thermocouple wire wasted every time assembly is replaced
- Maintenance personnel spend a great deal of time building the “gun barrel” thermocouple assemblies
- Safety issues—due to high usage, operators began leaving used assemblies all over the casthouse floor

### PYROTEK SOLUTION

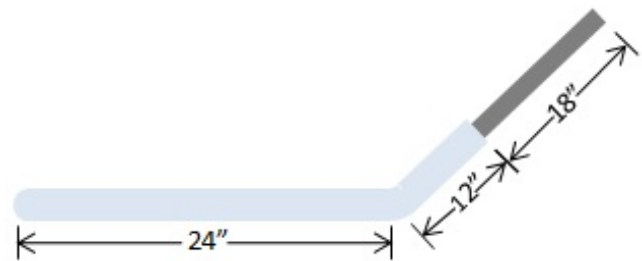
Pyrotek’s reinforced fibreglass material (RFM®) was chosen as the thermocouple protection tube (TCPT) for the assembly because it is lightweight, thermal shock resistant and able to withstand molten metal. Two RFM TCPT designs were trialed:

#### Design #1: 18-inch RFM hot leg mounted to two cold leg pipe extensions with a 45-degree pipe joint elbow

Although effective while the furnace was in rest position, when tilted, the metal level raised above where the RFM tube and 3/4-inch pipe extension met and failed.

#### Design #2: RFM tube with a 45-degree bend

This design allows the RFM tube to extend 12 inches above the bend, increasing protection against molten metal when the furnace is tilted.



To allow for easy insertion of the thermocouple, the opening of the O’-Sialon tip was machined to form an angle to guide the TC into it.

This design also replaced the 10 feet wire with a 1/8-inch MGO with a type K male plug. This extension can be used for several change outs.

### PROCESS IMPROVEMENTS

- Increased life from six hours to eight to 10 days
- Casting operators have a more reliable means to measure holding furnace temperatures
- Casting operators spend less time changing out the RFM holding furnace thermocouple assemblies
- Maintenance personnel no longer spend time building TC assemblies in-house
- Less waste is generated in the casthouse

### ESTIMATED SAVINGS

Although the RFM assemblies are more expensive than the “gun barrel” assemblies there are still substantial savings due to longer lifespan as well as lower labour and maintenance costs.

	OLD DESIGN	NEW DESIGN
Annual Cost (USD)	\$170,100	\$34,650
<b>Total Savings (USD)</b>	<b>\$135,450</b>	