MULPIC®
PLATE COOLING TECHNOLOGY CHINA STEEL CORPORATION KAOHSIUNG, TAIWAN

Project start: April 2014
FAC completion: May 2016

In April 2014, Primetals Technologies received an order to supply a new Direct Quench (DQ) Plate Cooling System based on MULPIC technology as part of a modernisation project for the China Steel Corporation (CSC) 4.1m Plate Mill, with the aim to increase their product mix as well as improve the quality of their final products.

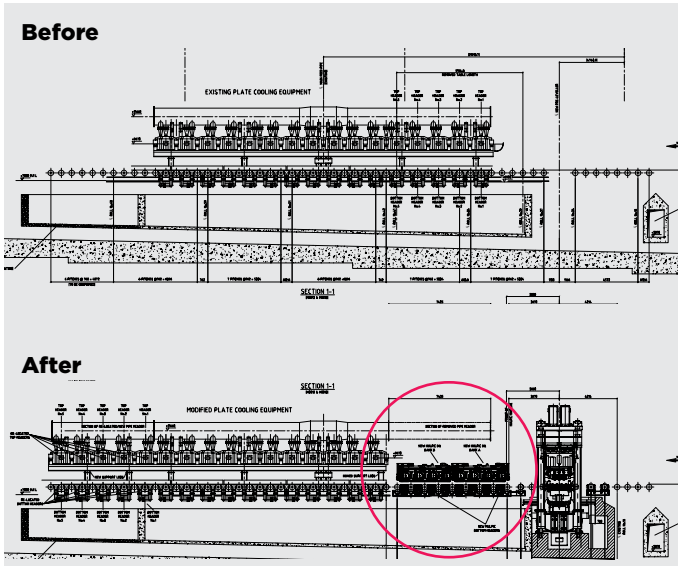
The scope of modernization of existing cooling machine by installing two four metre MULPIC® DQ cooling banks in front of an existing laminar cooling section. The scope of supply also included a new roller table, drives and automation systems for the new MULPIC® cooling sections as well as control of the customer supplied DQ Pumps.

MULPIC® TECHNOLOGY SOLUTION

MULPIC® technology is an 'in-line' cooling system with the capacity to achieve the cooling rates and temperature drops required for Accelerated Cooling (ACC) and Direct Quench (DQ) cooling for a wide range of plate thicknesses.

MAIN BENEFITS

- Hybrid cooling solution combining the powerful MULPIC DQ cooling banks with the existing Laminar Cooling sections is a fully automated and integrated mechatronic package.
- The installation of MULPIC® Technology allowed new steel grades including SUS304L Stainless Steel, high strength structural and wear resistance plates to be introduced.
- Improved product quality resulting from uniform and accurate MULPIC® cooling control
- Robust design and ease of maintenance also means reduced down time and reduced requirement for frequent maintenance.



Mechanical configuration

MULPIC Headers + Laminar Hybrid Cooling in action

SPECIFICATION

CSC MULPIC® - Plate Cooling System

Machine Length	**8 m** divided into **2** Cooling Banks.
No. of Headers per Cooling Bank	**4 Top + 4 Bottom**
Cooling Headers Width	**4,100 mm**
Cooled Plates Thickness Range	**10 ~ 220 mm**
Top Headers Height Adjustment	**500 ~ 1,200 mm**
Edge Masking Width Range	**1,000 mm ~ 4,300 mm**
Water Supply Pressure at TOP DQ (Pump Supply)	**5.0 bar**
Max. Flow DQ (Pump fed)	**4,100 m³/hr** per Bank

OPERATION PRINCIPLES

The MULPIC Level 2 Model controls the cooling for the new Sections as well as the existing Laminar Cooling Sections providing a hybrid cooling solution.

The intermediate Temperature and cooling rates of individual Sections are controlled.

Two (2) cooling operation modes are available:

- **DQ Only** – DQ flow applied in Banks A and B.
- **DQACC Hybrid** – DQ flow applied on Banks A and B, and ACC flow applied in the Laminar Cooling sections.

TECHNICAL FEATURES

- Highly Dynamic, Fast & Accurate Flow Control
- Header Design, individual flow control – Flexibility
- Length Temperature Uniformity - better quality
- Width Temperature Uniformity – better quality
- Adaptive, Model-based Cooling Control

PERFORMANCE

- FCT Accuracy (N=100) SD: **13°C** (G.V.: **16°C**).
- Cooling Rate Accuracy: **+/-10%** of target.
- Length Temperature Uniformity SD: **15.0°C**
- Width Temperature Uniformity SD: **10.0°C**

Primetals Technologies Limited
A joint venture of Mitsubishi Heavy Industries and partners

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