

INTEGRATED AND INNOVATIVE SOLUTIONS ON COLD MILL COMPLEXES¹

MMK – ATAKAS The latest advanced Cold Mill Complex in Mediterranean Area

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Abstract

MMK-Atakas, a joint venture between Russian Magnitogorsk Iron & Steelworks and Turkish Atakas awarded Danieli as sole supplier an order for the technological equipment of a new complex, containing: Meltshop, Hot & Cold Rolling Mills, Coating Facilities for flat products. The installation site selected for this complex is in the city of Iskenderun in Turkey; A brand new facility for production of coated flat products will be installed in a other site near Istanbul. The Iskenderun site will consist of electric arc furnace, ladle furnace, vacuum degasser, thin slab caster, hot rolling mill with a nominal annual capacity of 2.4Mt of hot rolled coils in thicknesses ranging from 1 to 20mm and widths ranging from 800mm to 1570mm, continuous pickling line with capacity of 1.2Mtpy, cold rolling mill with capacity of 0.75Mtpy, hot dip galvanizing line with capacity of 0.45Mtpy and, finally, a color coating line with capacity of 0.2Mtpy. The plant is located by the sea and will have its own harbour, with great advantages in terms of logistical flow of material from the ship to the plant. This new plant will start production in 2009 with a gradual ramp-up during 2010. The initial “starting core” of the complex will be the coating facilities following by processing lines, meltshop and the hot rolling. This paper describes the cold complex facilities, the newest in the Mediterranean area, designed to enhance production flexibility and provide the customer with the ability to follow and successfully meet market demand.

Key words: Cold mill complex; Meltshop; Hot and cold rolling mills; Coating Line.

SOLUÇÕES INOVATIVAS E INTEGRADAS EM COMPLEXOS DE LAMINAÇÃO A FRIO

Resumo

MMK-Atakas, uma joint venture entre a russa Magnitogorsk e a turca Atakas contemplaram a Danieli como um único fornecedor para fornecimento dos equipamentos tecnológicos de um novo complexo de laminação a frio com Aciaria, Laminadores a Quente e a Frio e uma Linha de Pintura.

O local selecionado para tal empreendimento foi a cidade de Iskenderun na Turquia. A nova planta para produção das bobinas pintadas será instalada em outra planta perto de Istanbul. A planta de Iskenderun possui forno elétrico a arco, forno panela, desgaseificador a vácuo, lingotamento de placas finas, laminação de tiras a quente com produção de 2,4 milhões de toneladas por ano, espessuras de 1 a 20 mm e larguras de 800 a 1570 mm, uma linha de decapagem de 1,2 milhão de toneladas por ano, uma laminação a frio de 750 mil toneladas por ano e uma linha de galvanização de 450 mil toneladas por ano e finalmente a linha de pintura tem uma capacidade de 200 mil toneladas por ano. A planta é localizada a beira mar e terá seu próprio porto com grandes vantagens em termos de logística e fluxo de material. Esta planta tem início de produção em 2009 com uma rampa de aprendizado gradativa durante 2010. O “starting core” inicial deste complexo será a unidade de pintura seguidos por aciaria e laminação a quente, etc..Este trabalho descreve este complexo, o mais novo na área do Mediterrâneo, projetado para proporcionar flexibilidade de produção e dar ao cliente a habilidade para atacar com sucesso a demanda exigida pelo mercado.

Palavras-chave: Complexo de laminação a frio; Aciaria; Laminação a quente; Laminação a frio; Linha de pintura.

¹ *Technical contribution to the 46th Rolling Seminar – Processes, Rolled and Coated Products, October, 27th-30th, 2009, Santos, SP, Brazil.*

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INTRODUCTION

MMK Atakas is the 6th cold mill complex awarded to Danieli in the last few years, as other latest references we have VSC, UNICOIL, GIC, MARCEGAGLIA AND ARVEDI. As indicated in the plan view below, the cold mill complex includes:

- Continuous pickling line
- Two-stand cold reversing mill
- Hot dip galvanizing line
- Painting line

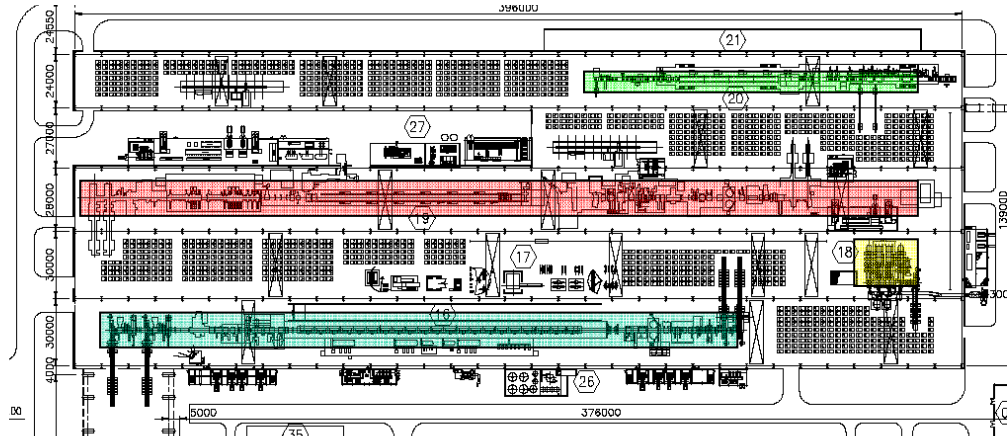


Figure 1 – Plan View of a Typical Cold Mill Complex.

METHODS AND MATERIALS

1 - Turboflow® Continuous Pickling line

The continuous pickling line is designed to produce more than 1.2Mtpy. The entry section consists of two robust uncoilers, opener, flattening and anti-coil breaking units; all designed for a high level of reliability. Moreover, the project concept is based on the “any coil feed” philosophy, this in order to avoid production losses due to stops in the feeding process. The main goal of this concept is to reduce time losses as regards diminished “operating time”, which is divided into coil preparation and coil joining time.

Coil preparation time is reduced thanks to a double toggle type shear able to perform 10 cuts per minute, while coil joining will be done using a state-of-the-art laser welding machine, which is the final solution in terms of joint over-thickness and strength.

The core of the facility, three tanks and a five-stage rinse tank in the pickling section, is based on the Danieli patented Turboflow® technology. This is a new concept based on a turbulent channel made to reach the highest possible energy savings and great flexibility in pickling conditions, in order to obtain the same pickling result regardless of strip grade and speed. A five-stage rinsing tank guarantees the removal of chemical agents from the strip surface and reduces the amount of water required as well as waste effluents. The fume exhaust system with scrub unit sucks the pickling vapor generated in the process tank and purifies it in order to comply with European environmental regulations.



Figure 2 – Overview of entry side of pickling section.

2 – 2-Stand Cold Reversing Mill

The 2-Stand Cold Reversing Mill will produce 0.75Mtpy, with a mix consisting of: *low carbon, CQ, DQ, DDQ, IF* and *HSLA* steels.

This new mill will be able to roll coil having the following characteristics:

Entry thickness between	1.5 – 4.5 mm
Width between	800 – 1530 mm
Yield strength between	220 – 600 MPa
Maximum coil weight	35t
Entry internal diameter	610 mm
Outside diam. between	900 – 2200 mm
Output thickness:	0.25 – 2.0 mm;
Maximum speed	1485 meters per minute (mpm)

The mill equipment has been engineered in such a way as to ensure ample production flexibility. First of all, the uncoiling unit will be provided with a flattener unit for shadow handling of material during the rolling passes of other coils. Two tension reels and a complete set of coil handling equipment have been installed to allow maximum flexibility in production planning in terms of quantity of rolling passes per coil. A fully automatic work roll changing device has been chosen to minimize time losses due to work roll changing.

The two mill stands provided by Danieli will be four-high type, with positive and negative work roll bending actuated by E-blocks in closed loop with state-of-the-art automation and controls.

The latest technology has been applied to thickness control with three thickness measuring devices to better control strip thickness along the entire coil length and during all the phases of the rolling cycle: acceleration, steady state and deceleration. Coupled with each thickness measuring device, Danieli will provide a laser speed-meter in order to control strip speed and provide “mass flow control” of the gap, this to reduce the over-thickness in the starting phase of rolling.

Danieli is supplying two shape-meter rolls in closed loop with the roll coolant selective header sets, controlled by Level-1 automation supplied by Danieli Automation; this to maximize flatness control and mill efficiency, with a fast response in flatness control. This places the mill in a superior class in terms of rolled material quality for the purpose of gaining coil quality supremacy in the strategic eastern Mediterranean market.

Mathematical models for parameter setup and ongoing gap adjustment will also be provided by Danieli Automation in the so-called fully automatic Level-2 package.

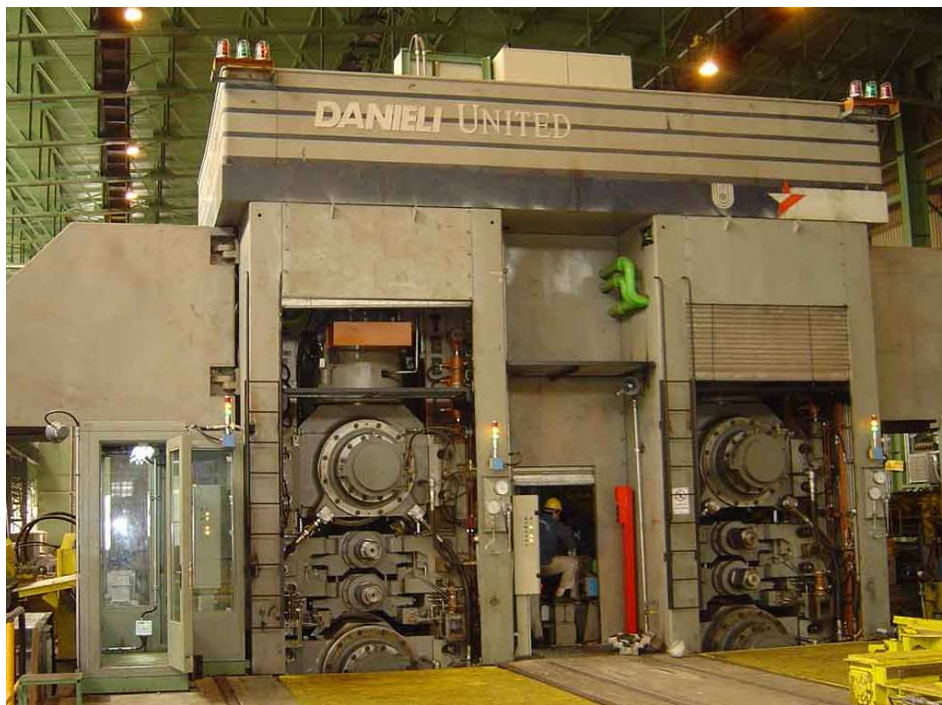


Figure 3 – Operator Side of 2-Stand Cold Reversing Mill.

3 - Hot Dip Galvanizing Line

Danieli's continuous galvanizing line is designed for a yearly production of 0.45Mt of finished coils, intended for "high quality" paint applications.

It will be equipped with: a double entry and mashed seam welder, a degreasing section followed by a strip entry accumulator.

The horizontal annealing furnace is provided by Danieli Centro Combustion.

The annealing furnace includes: a recuperative room, a direct fire section, gas-fired radiant tubes and a jet cooler section.

The wiping equipment shapes and directs a sharp and uniform air jet which measures the metal coating to produce the desired uniform coating weight. This streamlined design provides the most efficient performance in both low speed/heavy coat weight and high speed/light coat weight operations. Nozzle gap openings are easily adjusted to optimize performance. The quality of zinc coating is assured by the new generation Danieli Kohler air wiping system.

After cooling, the strip will be skinpassed to achieve the desired roughness value, then it will be tension leveled and passivated.

A Danieli carousel type side trimmer at line exit will cut the strip to the desired width before the strip is oiled and rewind.



Figure 4 – Recoiler Section.



Figure 5 – Heating Section.



Figure 6 – Zinc Pot Area.



Figure 7 – Exit Section.

4 - Colour Coating Line

This is a 0.2Mtpy capacity line for a large spectrum of applications such as: white goods, construction and general application. The line is equipped with: a double entry end with hydraulic stitcher. High efficiency degreasing sections are located before and after the entry accumulator to prepare the strip in the best condition prior to the painting process.

The painting section is composed of a pre-treatment section, primer and finish coaters followed by horizontal centenary gas ovens and water quench equipment. At finish oven exit the strip is directed to the exit accumulator prior to being inspected and than rewind.



Figure 8. Process Section Overview



Figure 9. Danieli Köhler Air Knife.



Figure 10 – Skin Pass Mill.

5 - Electricals and Automation

Danieli Automation will design and supply all the electrical equipment and the control systems for the entire plant from the meltshop down to the hot strip mill and coating lines, providing the Customer with an integrated and optimized system configuration. The single source automation system and the experience of DANIELI AUTOMATION, a Company entirely dedicated to innovation in the steel industry, will improve plant efficiency thanks not only to common interfaces and design concepts but also to smoother project execution, quicker and more efficient start-up, easier know-how transfer.

CONCLUSION

With this new complex, MMK and Atakaş are going to be the most innovative complete coil complex in the entire Mediterranean area. With its high quality and cutting edge technology, DANIELI is fulfilling MMK-Atakas need to enlarge their steel market.

Considerable attention has been placed on the environment, with technology that reduces waste effluents and energy consumption to a minimum. Danieli's offices worldwide provide customer assistance during each phase of the project, with Danieli Service in charge of the plant commissioning and post-commissioning phases.

