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In recent years, the demand for high-strength steels, there has been a concrete trend. The market is waiting to see the production of customers. After the first sizing block of 4.5 mm and 5.0 mm, by the end of 2018, in this article

KEYWORDS: MEERDRIVE@PLUS; SIZING BLOCK, ORRR (SIZING OVAL ROUND ROUND ROUND); SIZING WITH SINGLE FAMILY PASS DESIGN; 4.5 MM WIRE ROD

INTRODUCTION

From a technical point of view, "a set of products that comply with the certification requirements of the certificate of approval of the product".

Under these conditions, since 1896, Feralpi Group has been a leader in the production of quality wire rod. Feralpi Group is a steel producer for the construction of buildings. As Caleotto, the company has been producing high-quality products, ensuring the

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The way to enter new, previously unexplored market niches and to further improve the quality of wire rod products had already been mapped out since the four-stand MEERdrive®PLUS sizing/finishing block, capable of meeting 100 percent of Caleotto's market requirements, went into operation.

By adopting the single drive technology for each stand, the MEERdrive®PLUS sizing block is the best technology on the market for the production of high-quality wire rod, and contributes to significantly reduce operating

costs in terms of roll rings inventory, changing times and maintenance. MEERdrive®PLUS offers a sound opportunity to produce an excellent wire rod in terms of dimensional tolerances and surface quality - but it is not only this single machine that does the "right job". It is a combination of technologies, allowing a constant control of dimensions and temperatures before and after the sizing block, which provides Caleotto with new opportunities, including consolidating its position on the market.



EQUIPMENT AND PROCESSES – THE PLANT LAYOUT

The Caleotto rolling mill has been heavily upgraded by SMS group with the introduction of the latest technologies, namely the MEERdrive®PLUS finishing/sizing block that

ensures the best dimensional tolerances and the cooling and equalizing line (with multi-loop technology) for thermo-mechanical rolling.

The undeniable advantages of the MEERdrive®PLUS technology are summarized below:

- Perfect adaptability to different dimensional ranges of the entry side passes from the upstream pre-finishing mill (single family pass design);
- Possibility of rolling at low temperature (750°C) on all steel grades for which this type of process is applicable, in the Ø 4.5 to 28 mm dimensional range;
- Possibility of optimal use and adjustment of reductions for each single product;
- Maximum flexibility in managing inter-stand tensions and roll ring speeds;
- Possibility of using roll rings with different diameters

on the single stands (multi-drive technology);

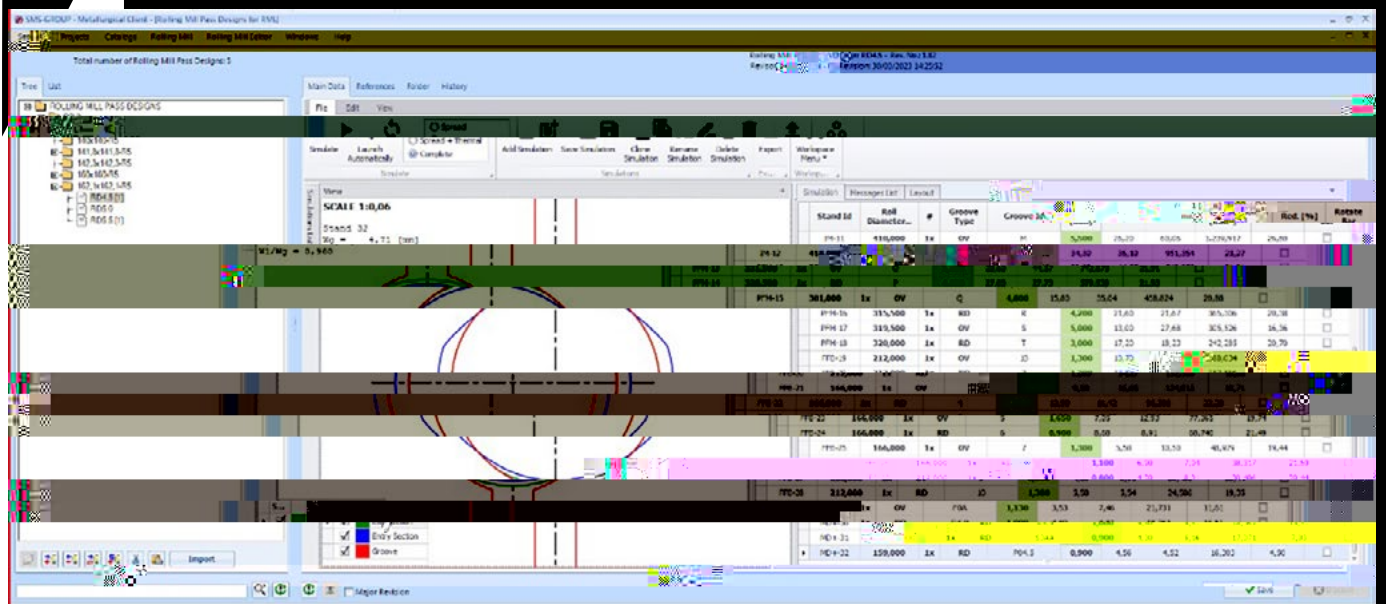
As a result of the above advantages it has been easy to achieve the tight dimensional tolerances required by Caleotto (± 0.05 mm – 60 % ovality), exploiting the existing single family pass design of the pre-finishing block with 10 stands positioned upstream, also thanks to the accurate sizing study performed with the new SMS-LPPS simulation and calculation program



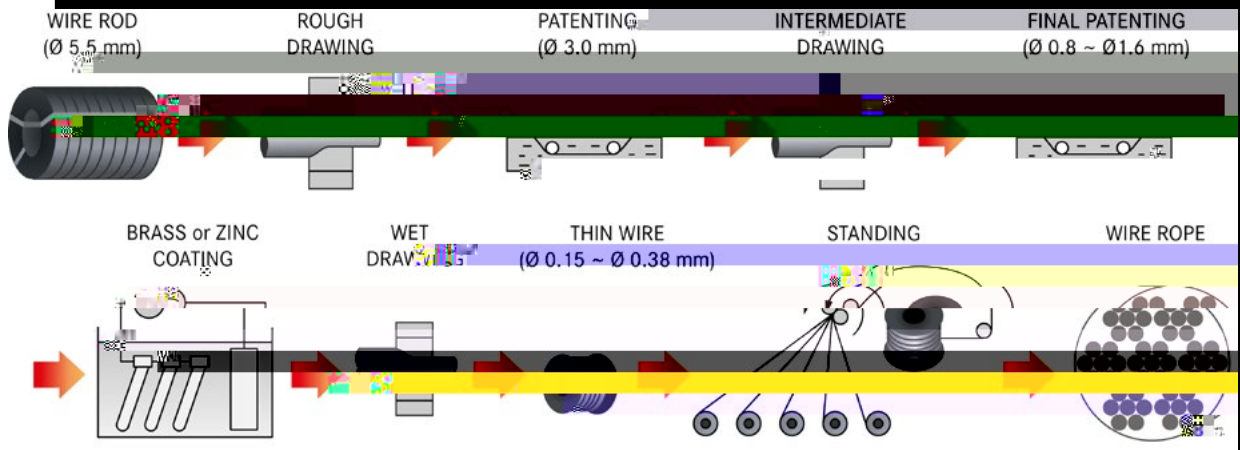
↑ - MEERdrive®PLUS at CALEOTTO S.p.A.

The classical MEERdrive®PLUS oval-round-oval-round sequence has been used, where the first two stands work at higher reductions, preparing an entry feeder pass for the next two stands to obtain a precise finished product with low reductions. The stability of the process and the achievement of the best dimensional tolerances are

ensured by the extremely small distance between the last two stands and the optimal management of inter-stand tensions.



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The use of a smaller initial diameter produces significant advantages, such as the elimination of one of the patenting process steps, or of one or more drawing steps. Another resulting advantage is the final microstructure, which is finer and more homogenous, due to the improved cooling effect of the coils on the cooling conveyor, leading to a reduction in pearlitic lamellar spacing. The subsequent drawing becomes more reliable and smooth;

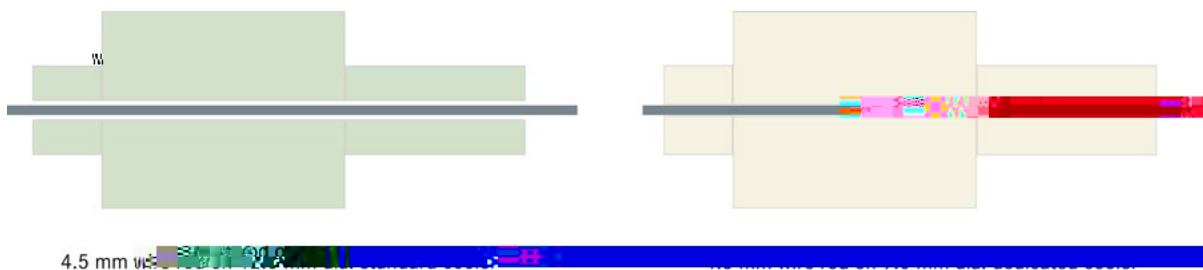
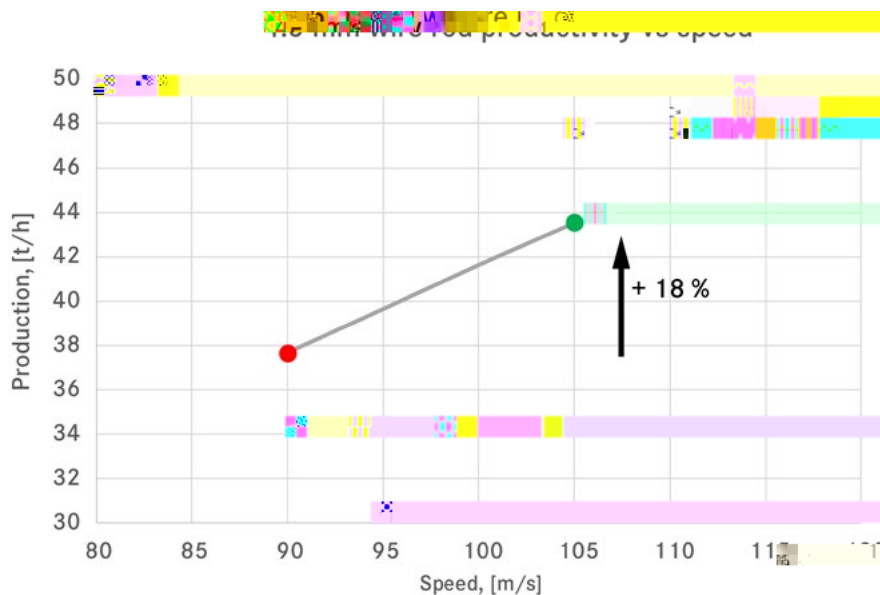


Fig. 1 - Potential of the new dedicated cooling elements.

CALEOTTO 2023 OPERATIVE RESULTS

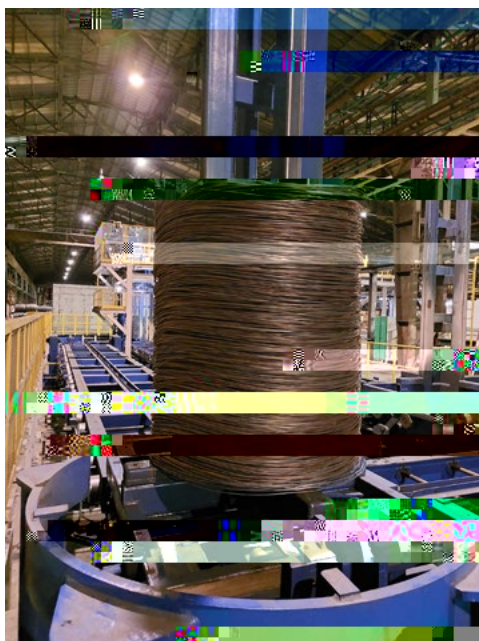
The wire rod coils produced during the trials were sent to some of Caleotto's customers to assess the overall quality of the product and the possible benefits resulting from the reduction of diameter. The following table lists the steel grades and the main mechanical and microstructural characteristics obtained during the various trials.

Decarburization values, surface defects and the mechanical properties are in line with the current plant production and in accordance with the main quality standards. The microstructural characteristics were found to be compliant with customer requirements

Tab. 1 - Results on steel grades and designations of the rolled products for the wire rod trials.

Steel Grade	Designation	Decarburization (%)	Surface Defects (%)	Yield Strength (MPa)	Reduction of Area (%)	Microstructure
C4C	EN 10263-2	*	0.045 (1.0)	357	81	Ferrite + carbides
C7D	EN 16120-2	*	**	377	81	Ferrite + carbides
C56D2	EN 16120-4	0.055 (1-2)	0.035 (0.8)	969	54	Pearlite
C72D2		0.035 (0-08)	0.03 (0.7)	1194	54	Pearlite
C82D2		0.045 (1-0)	0.03 (0.7)	1252	48	Pearlite
C84D2		0.04 (0-9)	0.025 (0.6)	1274	46	Pearlite

Notes:
 (*) The decarburization value is not significant for low-C steel
 (**) Free cast billets; surface defects were not measured



↑ ↓ ↶ ↷ - Wire rod coils used during the trials.

These new products, rolled in a wide range of steel grades, are currently supplied by Caleotto to the many Italian customers traditionally dedicated to wire drawing and cold heading, and potentially to customers throughout Europe. The new diameters allow Caleotto to be ranked among the most innovative producers of high-quality drawing steel. The super thin high-carbon wire rod can eliminate the need for intermediate wire annealing and reduce the number of drawing pass sequences, thereby reducing production costs during final processing. The wire rod for

cold heading components is generally more plastic, less brittle due to fewer drawing steps, and features greater cold formability. Thanks to the technologies provided by SMS group S.p.A., Caleotto is pleased to be able to expand its dimensional range and to offer its customers the thinnest wire rod produced in Europe. In the future, the long-standing collaboration will be consolidated thanks to the commissioning of the new large-diameter bar-in-coil line, scheduled for the third quarter of 2024.