

QUALITY ROAD MAP FOR COPPER ROD PLANTS

Those who are familiar with complex equipment are well aware that every plant passes through three main phases:

- a** Start-up and ramp-up
- b** Steady operations
- c** Operational excellence

With regard to copper rod plants, we can say that the phase of operational excellence is achieved when the crew is very familiar with the plant, when the SOPs (Standard Operating Procedures) are regularly applied and implemented and when all the production parameters are well stabilized and controlled. Under these specific conditions the plant reaches the best possible OEE (Overall Equipment Efficiency) and the quality standard of the rod is predictable and repeatable. Just as the combination of several positive factors determines the perfect equilibrium described above, the lack or failure of just one of these factors can detrimentally affect the condition of operational excellence.

Furthermore, complex plants may suffer so-called technical obsolescence which is the unlucky condition that may occur when a new technology supersedes the existing one, and it becomes preferable to use the new technology in place of the existing one, even if the old equipment or technology is still functional. For example, some of our readers may remember that the development of the multiwire drawing machine in the 1980s imposed complex and tight quality requirements upon copper rod, potentially making several rolling mills obsolete. We have seen that the phase of “operational excellence” is a delicate balance between several factors that are menaced by the risk of obsolescence. On the other hand, if the copper rod mill user is able to keep the trained personnel in his factory, to

control and implement the SOPs on a consistent basis and to modernize the equipment whenever required, the condition of “operational excellence” can be maintained and eventually improved. Keeping the wire rod mill updated with the latest technological advancements is of paramount importance and, for this reason, we have defined the combined efforts made by Continuus-Properzi and our customers to maintain or regain the status of “operational excellence” as the “quality road map”. To embark upon this journey through the “quality road map” we dispatch a skilled senior process engineer, with specific experience in the production of copper rod and in the maintenance of copper wire rod mills, to the project site where the plant is in operation. The first step is a general assessment of the SOPs and their relevant implementation as well as an assessment of the working conditions of the plant including the laboratory and rod testing and analysis procedures.

At the completion of such a technical audit, a detailed report is prepared by Continuus-Properzi and shared with the plant user. This report indicates the eventual integration necessary to improve the SOPs and highlights any necessary equipment modifications to keep the plant updated and avoid technical obsolescence. Sometimes the difference between a plant performing at an operational excellence level and a plant nearing technical obsolescence is caused by only a few details and with little investment the plant can be kept in perfect operational condition. This is a vivid example showing that collaborative dialog and continuous cooperation between the user and the supplier of the plant is the key factor to compete in this global marketplace characterized by more and more stringent quality requirements coupled with increasing pressure for cost reduction. *by Carmelo Maria Brocato*

Standard Classification: Cu-ETP1-ROD Ø 8,00mm - Continuous Casting & Rolling Plant

Class	Oxygen max. ppm	Surface Defect Small	Surface Defect Medium	Surface Defect Large	Magnetic Inclusion Small	Magnetic Inclusion Medium	Magnetic Inclusion Large	Twist Test 25 tors.	Twist Test 30 tors.	Diameter Tolerance mm (*)	Note
1	250	10	0	0	0	0	0	≥24	≥15	±0,20	(■)
1 Top	250	5	0	0	0	0	0	≥24	≥18	±0,20	(§)
2	350	20	2	0	5	2	0	≥18	/	±0,20	(□)
3	450	30	8	0	10	5	1	≥18	/	±0,30	(▲)
4	1000	100	50	5	40	20	10	≥18	/	±0,40	(►)

Copper rod grading

(■) Class 1: Free of flaws & copper dust after T.T. – free of any surface roughness, stains or other surface defects – T.T. ≥18 on the previous rod coil – T.S.O. (**): ≤300Å – Chemical Analysis: (***)

(▲) Class 3: Flaws on the rod sample after T.T. at 25 torsion – seams & copper dust on the rod sample after T.T. – surface roughness – free of stains very few surface defects – T.S.O.: ≥400Å.

(§) Class 1 Top: maximum of 5 (small) Surface Defects = [this copper rod will be suitable for Enameled Wires and for Fine Wire Drawing, up-to: Ø 0,05 mm.](#)

(►) Class 4: Tundish pin and pour spout cleaning – some problems on wheel's copper level.

(□) Class 2: Some flaws on the classed A rod samples – light surface roughness – free of stains – very few surface defects T.S.O. : ≤400Å – Chemical Analysis see (***)

(*) Diameter Tolerance

(**) T.S.O. = Total Surface Oxides

(***) Se + Te + Bi < 2; Sb < 3; As < 5; Pb < 4; S < 15