July 2014

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Attached hereto is a list of questions raised by Mr. Monaco - Ilva - Bagnoli. These questions relate to the problems of operation on #2 Morgan rod mill at Sparrows Point.

The answers to a great number of Mr. Monaco's questions were obtained through the courtesy of Lou Moses of Bethlehem.

W.W. Knight

MMK/ah
Questions & Answers for
Mr. Gaetano Monaco, First Asst. Rolling
Mills Supt. of Ilva

18 Aug. 1955

1. Q. - General view of your wire rod mill (number of stands, disposition and regrouping of motors and stands etc.)

A. - We do not give out mill arrangement drawings.

2. Q. - What is the rolling scheduled diagram of your mill (charged billets, rolled rods, scheme of calibration)? What is the speed of the mill (ft/min) per each size?

A. - 65507 attached (M.C.Co.)

3. Q. - Which is the typical monthly or weekly program followed in your wire rod mill for rolling? How many sizes do you roll in a week? What is the minimum tonnage per size?

A. - Bar sizes 3/8" to 1-1/4" - 55%
Rods up to 3/8" - 12%
Infrequent .218" rod - 10%

4. Q. - Have you a scheduled periodic program for rolling?

A. - Schedules are necessarily arranged to conform to orders on hand.

5. Q. - What is the average monthly output of your rod mill?

A. - Average production is 31,400 tons per mo. all products.

6. Q. - What is the theoretic productivity (metric tons at 100%, at maximum speed) for each size?

A. - Can be calculated from drawing 65507 (M.C.Co.)

7. Q. - What is the actual average output per hour and per shift, for each size? What is the average efficiency of your mill for each size (actual output/theoretic output)?

A. - Bars 3/8" to 1-1/4" rounds - 51 NT per hour
Rods up to 3/8" - 39 NT per hour
Combined products - 47 NT per hour
Yield - 95%

8. Q. - In percentage, how many are the work hours, the stoppage hours (for cobbles, for mechanical and electrical stoppages, for roll changes and misc.)?

A. - Delays for all causes 14% of scheduled operating time.

9. Q. - Do you consider your mill quite qualified for rolling 5 m/m wire rod (i.e. for drawing)?

A. - The mill is very well qualified to produce 5 m/m (.197) but we have no demand for this size in U.S.A. Greatest demand is for .218" plus rod for our own wire plant and for resale.
10. Q. - During the rolling of 5 m/m wire rod what do you think the maximum efficiency (real tons/theoric tons) can be of a 4-strand mill? What can the maximum efficiency be of a 2-strand mill?

A. - Approximately 85% for 4-strand. 87% for 2-strand.

11. Q. - In order to make 5 m/m wire rod, do you think a 4-strand mill is more convenient than a higher speed 2-strand mill? Do you think it is difficult to carry on a 4-strand mill?

A. - A 2-strand mill cannot be speeded to produce the same tonnage of rods that can be produced on a 4-strand mill. Conversion cost per strand is less on a four-strand mill. It is not difficult to operate a 4-strand mill with a split (2-2strand finishing train.

12. Q. - How long do you believe is necessary for a 4-strand rod mill to reach the maximum efficiency with new and inexperienced men (foreman and crew)?

A. - This will depend largely upon type of mill previously worked by crew. Generally an intelligent crew with no previous experience can bring a Morgan type mill up to full production faster than a crew with fixed ideas implanted by experience on mills of other types. Also full mill efficiency depends on product mix and ability to take advantage of scheduling good tonnage orders for various sizes scheduled without need for frequent roll changes.

13. Q. - How long to reach in your mill the actual efficiency?

A. - Using rollers and other key men, who were experienced on other types of rod mills, some 9 to 12 months were required to attain a reasonable rate of production. More years were required to cumulatively reach present production rates.

14. Q. - What percentage of 5 m/m wire rod in tolerance for drawing are you able to roll? What are your tolerances?

A. - Very little .218" rod is rolled on No. 2 Mill, production being centered on No. 1 Mill. Tolerances plus or minus .0156". Out of round .025".

15. Q. - Do you think it is better to roll 5 m/m rod from 50x50 or 60x60 m/m billet?

A. - This depends on quality desired. Better cold bending stock can be obtained from lighter reduction required when using 2" (50m/m) billets.

16. Q. - What kind of steel do you use in order to make 5 m/m wire rod? Do you consider the Thomas or Bessemer low carbon rimmed steel easy at rolling?
16. A. - Depends on customer demand. No Thomas steel used.

17. Q. - When you roll 5 m/m wire rod, what average of cobbles occur in a shift? How many at the roughing, at the preparing, at the looping and at the finishing stands?

A. - Three to four cobbles per 8-hour turn.

18. Q. - Do you prefer twist roller guides for the preparing or looping stands? Do you use them? How do you repair the rollers?

A. - We prefer twist plugs to roller guides for holding up the oval to be repeated in the looping stands. Roller guides are sensitive and demand constant attention.

19. Q. - Does the wear in the working grooves of the same roll often occur in different way? Have you any trouble in the cooling water system?

A. - During the cycle of a roll's installation an occasional leaning guide will cause off-side groove wear, not common, roll grooves generally wear uniformly. There is no difficulty with cooling water.

20. Q. - In detail what is the shape of the passes at first stands? What are the reductions? Have you any skidding of the billets at the stand No. 0? What do you think highest reductions can be in the first two stands? Do you groove the first passes?

A. - See M.C.co. dwg. 65504 attached. Reduction shown on M.C.co. dwg. 65507. No skidding in #0 stand nor are the rolls ragged (grooved). Depending on roll diameter and type of steel to be rolled maximum reductions in first 3 stands might be 26%, 32% and 27%.

21. Q. - Do there often occur roll breakages or wabbler breakages? In what stand particularly? What is the quality of your rolls?

A. - No wabbler breakage. In year of 1954 one body break, no neck failures. Rolls are of standard American chilled grain material.

22. Q. - How many tonnages per pass can you obtain, for each size and each stand? How often do you stone the grooves?

A. - 90 to 100 tons per pass.
2 to 8 stoneings per 8-hour turn.

23. Q. - What is your changing schedule, when you roll 5 m/m wire rod?

A. - Normal changing of finishing pass is every 8 hours.
24. Q. - How long does it take you to change passes in the whole mill? How long change rolls at roughing mill or to change the rolls at one preparing stand?

A. - Roll Pass layouts and spare housings are arranged to suit normal schedulings permitting roll changes on the idle 21st turn of the week.
Pass changes - Finishing Mill - 25 minutes
Roughing Mill - 45 minutes.

25. Q. - How long do the couplings and spindles last? Do you usually repair them when they are worn out? How?

A. - Life of couplings and spindles depends on how well pass elevation is maintained. Also proper lubrication is factor. Pod type (not gear type) are repaired by adding hard bearing face by means of welding rod.

26. Q. - What is the life of your MORGIL bearings, especially on the finishing stands? How often do you inspect them? How many roll bearings do you break?

A. - Life of MORGIL bearings varies. Some 30 bearings are re-conditioned per year. They are inspected after each roll change. There is no breakage.

27. Q. - Does water ooze into the oil system? What percentage? How do you take it out? Which is the oil pressure and flow at the finishing stands?

A. - The amount of water that finds its way into MORGIL lubricating system depends on how roll bearing sealing elements are maintained. Not more than 2% of water should be allowed. Water is removed by centrifuge. Recommendations of Morgan Construction Co. followed concerning pressure and flow. (Ilva consult Morgan oil specs. 19 May 1950, page 18).

28. Q. - How often do you change the guides when you roll 5 m/m? Have you a guide changing schedule, when the mill is running?

A. - Guides are run as long as they function properly and are changed when rolls are changed.

29. Q. - Do you repair the worn guides? How?

A. - Guides are redressed by grinding whenever possible. When badly worn they are usually discarded and new ones substituted.

30. Q. - How many men have you in the MORGIL bearing shop and guide shop?

A. - One "Bearing Setter" per turn.
31. Q. - When you run 5 m/m rod, how many rollers do you employ? How many men are working in your mill for each shift? What difference of pay is among the main men?

A. - One "roller", two "finishers", total of 23 men, mill and furnace. Prohibitive to state wage rates.

32. Q. - Which kind of bottom (hearth) do you use in your furnace (refractory on the heating zone and soaking zone)?

A. - Furnace hearth is of Plastic "Kn".

33. Q. - What is your furnace repairing schedule (time, frequency and kind of repairing)?

A. - Furnace repairs are generally dependent on the condition of the furnace - there is no fixed schedule. Approximately 18 to 24 months between general repairs.

34. Q. - Does the scale ever melt or become hard on the furnace hearth? In such case how do you clean the bottom from scale?

A. - Hearth is cleaned with a scraper on the pushout peel and also bars with chisel point.

35. Q. - What is the temperature of the billets? How do you read the temperature (ray-tube, thermocouples, how many? Where?)?

A. - Billet temperature 2000°/2100°F. No recording tube.

36. Q. - What do you burn in your furnace? How many Kcal/tons?

A. - Coke oven gas and/or oil. Coal equivalent about 94 lbs. of coal equal to 1,270,000 B.T.U. per ton of billets heated.

37. Q. - Flying Shear - Is it automatic? What sizes do you use it for? How do you rectify the knives?

A. - Flying shear is not automatic. Sizes where flying shear is used depends on total elongations to shear and analysis of steel. To re-use knives they are ground and backed up by proper amount of shims.

38. Q. - Do you consider useful to have a crop shear before finishing (for 5 m/m rod)?

A. - We do not have such a shear but one might be useful in reducing cobbles.

39. Q. - Have you a schedule for mechanical and electrical replacements and inspections? How many electrical and mechanical men work for the maintenance of your mill?

A. - Major and special repairs occur on the 21st turn of the week. Two electrical and four mechanical repairmen who are also assigned to neighboring departments.
40. Q. - What place (part) of the mill is cause of the highest number of stoppages? Have you trouble in your pusher?

A. - Principally in finishing end of mill. Do not understand "pusher" question.

41. Q. - How much does the conversion cost (from billet to 5 m/m rod) affect the total cost?

A. - Prohibitive to supply cost figures.