AUTOMATIC ROLLER PRODUCTION – NOW QUICKER AND CHEAPER!

OPENING REMARKS

In conventional terms – heavy duty welded steel conveyor rollers are usually constructed around three core elements or components – roller tube, roller shaft and roller bearing housing assembly.

In the majority of current roller designs - the bearing housing assembly consists of several different components incorporated into the body of the steel bearing housing, previously welded onto the roller tube – in order to complete the manufacturing cycle of the roller.

It is worth mentioning at this point – the traditional roller manufacturing processe usually involves the preliminary welding of two such empty steel bearing housings onto opposing ends of the roller tube. This is followed by a series of sub-assembly operations upon the production line to incorporate all of the necessary internal elements of the roller bearing housing assembly. The traditional roller production process therefore may be briefly summarised as follows:

- 2 x bearing housings welded onto the roller tube.

- Pre-prepared shaft introduced into the roller body.

- 2 x ball bearings pressed onto the opposing ends of the roller shaft and pressed into the bottom of the pre-welded bearing housings –

  (sometimes preceded by back face seals behind the bearing, in the bottom of the housing bore).

- Circlips assembled into a pre-machined groove upon the shaft, in front of the bearing.

- Thereafter a subsequent series of several different operations to assemble into the two bearing housings at opposing ends of the roller tube - the rest of all the necessary components for the chosen design of bearing housing assembly.

  This would include any necessary sealing components etc, assembled in front of the bearing - to complete the production of the roller.

The majority of roller manufacturers, including some well known major international manufacturers, still use this traditional concept of assembly during the manufacturing process. We do know of some roller designs where each bearing housing assembly may incorporate up to 9 or 10 individual components – including the pressed steel bearing housing.

If one searches for roller designs – and in particular for roller bearing housing assembly designs - on the internet for example, it is easy to find illustrative examples of such designs and manufacturing techniques.

THE NEW CARTRIDGE BASED ROLLER

By contrast - the Edwin Lowe Ltd style of cartridge (bearing housing assembly) is "prefabricated" i.e. produced as one single component incorporating all necessary elements such as bearings, seals etc – even the grease! It is in essence treated as one single component during the roller manufacturing process. This now means therefore that the roller simply consists of 3 components – 4 individual pieces viz:

- 1 x roller tube
- 1 x roller shaft
- 2 x prefabricated bearing housing assemblies (cartridges)

This greatly simplifies the whole of the roller assembly and manufacturing process. There are fewer components to handle – so the assembly process is swifter and much more controllable. Also manufacturing throughput can therefore be increased, compared with traditional techniques.

Since fewer components are involved in the assembly process, there is reduced risk of assembly errors – and the removal of the necessity of controlling many individual component dimensional tolerances, within a traditional bearing housing assembly - has also made life much easier.

Summed up therefore – should the roller manufacturer wish to fully automate his roller manufacturing process, then the simplification/prefabrication of the roller bearing housing assembly (cartridge) renders this much easier. There is also a further major advantage to the roller manufacturer – a significant reduction in the amount of capital expenditure required to achieve such automation.

THE AUTOMATIC ROLLER PRODUCTION LINE

Traditional designs

Where roller manufacturers use, let us say, 9 pieces for his chosen design of bearing housing assembly, this means it will be necessary for the roller manufacturer to install upon his automatic production line, individual stations for each of the bearing housing assembly components concerned. This means in essence:

- 9 x reservoirs)
- 9 x feed tracks) or the equivalent
- 9 x pick & place units)

In total therefore, the manufacturer would need to install and commission 27 individual pieces of equipment, to feed all necessary components onto the production line.

The Edwin Lowe cartridge design

By contrast if the Edwin Lowe design of prefabricated bearing housing assembly (cartridge) is adopted for the roller manufacturing process - there would be a much reduced requirement for equipment as follows:

- 2 x reservoirs
- 2 x feed tracks
- 2 x pick & place units

Using this modern development, the manufacturer would simply need to install and commission only 6 individual pieces of equipment, again to feed all necessary components onto the production line.

The potential cost savings to be generated when considering capital investment therefore, are self evident. Not only has the requirement for multiple pieces of equipment been removed, but the layout of the production line has been greatly simplified, which will lead to quicker installation and commissioning and easier maintenance in future.

COMPARATIVE OUTPUTS – TRADITIONAL AUTOMATION AND NEW CARTRIDGE BASED AUTOMATION

In broad terms – where idler manufacturers have fully automated production of traditional roller designs such as those mentioned here – upon a current conventional automatic production line, production outputs of around one roller per minute may be achieved – up to 60 pieces per hour – depending upon roller specification.

By contrast if the new cartridge concept is adopted for automatic roller production, a much simplified production line would achieve higher output– again depending upon roller specification.

Working recently with a UK specialist manufacturer of automated assembly equipment – we forwarded to an overseas manufacturer, a provisional schedule of budget cycle times, based upon an automatic roller production line proposal – based upon using Edwin Lowe Ltd cartridges - which underlines this point.

EDWIN LOWE LTD – AUTOMATIC PRODUCTION
- CARTRIDGE BASED STEEL ROLLERS

BUDGET OUTPUT/CYCLE TIMES AT 100% EFFICIENCY

Roller Diameter	**Cycle time per roller**	**Output per hour**
63.5 mm	34 seconds	105 pieces
70.0 mm	35.2 seconds	102 pieces
89.0 mm	38.8 seconds	92 pieces
102.0 mm	41.3 seconds	87 pieces
108.0 mm	42.4 seconds	85 pieces
133.0 mm	47 seconds	76 pieces
159.0 mm	52 seconds	69 pieces

Obviously, in real life, no automatic production line actually operates at 100% theoretical efficiency. In practice we would look towards 85/90% efficiency once such a system is fully "bedded in" – but the above schedule gives a good idea of benefits which may accrue to the manufacturer, by switching to cartridge based roller manufacturing technology.

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