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PRESSED STEEL ROLLER BEARING HOUSINGS - IMPOSSIBLE TO PRESS A PERFECT CIRCLE!

OPENING REMARKS

We are all familiar with the precision pressed steel bearing housing, which most manufacturers use to start the manufacturing process of the heavy duty welded steel roller. What we are less familiar with, is the fact that - although they are regarded as precision components in their own right – they still do present the roller manufacturer with a potential problem, concerning axial alignment / roller rotational eccentricity.

Why is this, we ask? The answers are summarised here.

THE PRESSED HOUSING

The usual design of pressed steel bearing housing, used in the traditional way by most roller manufacturers, is in essence, a precision deep drawn steel shell.

This is produced via a series of deep drawn presswork operations, in order to provide a tightly toleranced circular bore, within the main body of the housing - within which to assemble the bearings, via tight interference fit – until recently the usual and recommended way, to assemble the roller bearings.

Historically speaking, this has been the main reason why very fine diameter tolerances, of a few microns only, have been specified within the housing bore, by the major bearing manufacturers, for this particular application.

THE RAW MATERIAL

However – the steel raw material, from which all pressed steel housings are made, incorporates a directional grain, when viewed under a microscope – similar in some ways to the grain in wood.

This means that the pressed bore / inside diameter of the finished steel housing **will always incorporate a degree of directional ovality** – irrespective of what we may do to try and eliminate this. It is a natural feature of the raw material and of the deep drawn steel presswork process.

This degree of ovality may only measure a few microns, but nevertheless it will always be present within the bore of the finished housing - and therefore is a factor that the roller manufacturer should always take into account in his assembly process.

DIMENSIONAL TOLERANCES AND SURFACE WORK HARDNESS

In addition – presswork manufacturers will always produce the steel housing within a range of dimensional tolerances agreed in advance with the roller manufacturer – for example - a maximum tolerance / minimum tolerance dimensional variation- for all critical housing dimensions - **including the housing bore / inside diameter.**

Also – a combination of different surface hardness factors - within the steel coil raw material (which differs at each and every point of the material surface within the entire steel coil) and of the accrued work surface hardness in the finished pressing (variations due to tool temperatures, cycle times, for example) **means that each individual pressed housing will also always incorporate its own individual degree of finished surface work hardness.**

IMPOSSIBLE TO PRESS A PERFECT CIRCLE!

Put simply - a combination of all of these factors (and others such as ambient storage temperature of the raw material, production tooling dimensional tolerances, etc) means that it is virtually impossible to produce bearing housing bores, with consistent and perfectly circular profiles.

As a result, we can say that each individual bearing housing - even if produced from the same batch of raw material and from the same production run – **will always incorporate its own unique bore diameter – which will always incorporate a degree of directional ovality.**

MISALIGNMENT ON THE WELDING MACHINE.

In turn, this means that every single time a roller manufacturer welds two empty steel bearing housings onto the two opposing ends of the prepared roller tube (the traditional way of commencing the roller assembly / manufacturing process) – **there will always be a degree of axial misalignment between the two opposing central axes of the bearing housings.**

Obviously therefore, when ball bearing are subsequently assembled into the two bearing housings – **the two central axes of the bearings themselves will always be slightly misaligned.**

This may not prevent the roller manufacturer from producing a roller that can function, as it were, but certainly, now that there is a technique for minimising the risks associated with the potential problem described here – current traditional assembly methods can no longer be regarded as best practice,

Please refer to our other informal working paper on this subject entitled - '**THE AUTOMATIC AXIAL SELF ALIGNMENT OF ROLLER COMPONENTS'.**

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05.03.14