

TalyMaster

Bearings industry roller bearing

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Customer requirements

Inspection of these roller bearings are currently completed using different instruments to quantify radius, roundness, surface finish and roller dimensions.

Taking advantage of the latest TalyMaster and the newly developed User Interface several roller bearings can be mounted on the XY stage at one time and greatly reduce operator input, one of the reasons for using this method is the fact that the manufacturer needs to carry out 100% inspection of the bearings for roundness, surface finish and contour as these specific bearings are flight critical.

The manufacturer are producing 4000 bearings a month and need to measure 200 bearings a day over a 10 hour shift, this means they need to measure one roller bearing every 2–3 minutes.

Roller bearing – overview

Roller bearings like these used in aerospace applications are precisely manufactured to stringent criteria. Normally made from high carbon chrome steel or for improved corrosion resistance; hardened stainless steel alloy. The

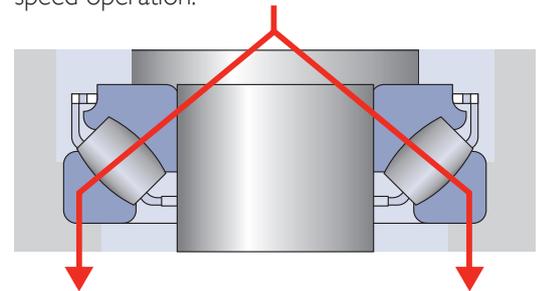


bearings are heat treated, hardened and precisely ground to specific shapes and drops over its curved surface which have to be measured and quantified accurately.

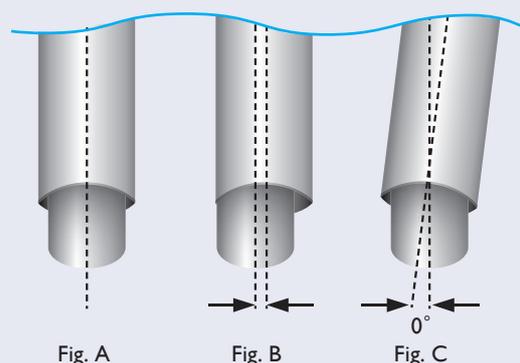
In spherical roller thrust bearings the load is transmitted from one raceway to the other at an angle to the bearing axis. The bearings are therefore suitable to accommodate radial loads in addition to simultaneously acting axial loads.

Another important characteristic of spherical roller thrust bearings is their self-aligning capability. This makes the bearings insensitive to shaft deflection and misalignment of the shaft relative to the housing.

Spherical roller bearings incorporate a large number of asymmetrical rollers and have specially designed raceways which can therefore support very heavy axial loads and permit relatively high speed operation.



Roller bearings – manufacturing issues



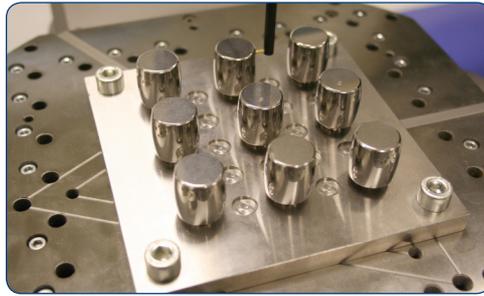
Typically when manufacturing a roller bearing, the alignment of the grinding tool to the component is critical.

Fig. A shows a correct tool alignment to the roller bearing which produces an in-tolerance component.

Fig. B shows an offset tool alignment whose axis is not in line with the bearing axis and moves the centre point of the bearing left or right of the bearing axis.

Fig. C shows an angled tool alignment which then produces a component which includes a parallelism error.

“A brand new inspection concept combining roughness, roundness and contour on a fully automated inspection system.”



The solution – TalyMaster

TalyMaster is a brand new inspection concept combining roughness, roundness and contour on a fully automated inspection system. The instrument incorporates complete part manipulation ensuring high throughput and significantly reduced inspection costs compared to the traditional inspection methods.

The roller bearings were mounted on a magnetic plate (dedicated fixtures would be required in a production environment) and under program control roundness and straightness were measured. Roundness, surface finish and the contour shape were then evaluated. Although shown is a 3x3 matrix a maximum 16 parts pallet would be possible.

Talyrond advantages for contour

Normal inspection of roller bearing for roller radius, crown position and localised drops would be historically performed using a profilometer ie. a Form Talysurf. With this method a large error can be introduced in to the measurement by the alignment of the part. The roller bearing is very difficult to hold and maintain the correct alignment to stop any cross tracking of the component during measurement. This cross tracking could introduce a roller radius error and the contour drops would also change dramatically. Using this method you would not be able to ascertain any parallelism errors and could cause the operator to change the tool alignment from results that are compromised.

The Talyrond method centres and levels the bearing first so that the bearing axis is aligned vertically to within 0.8µm, the subsequent straightness measurement is then exported in to Talymap Contour automatically with reference to the axis so the contour drops, radius and surface finish can be analysed accurately.

Fixtures are also simpler and multiple parts can mounted and measured.

Speed and accuracy

These components are flight critical and require 100% inspection so cycle time is essential.

Using the Talyrond's new centre and level feature, helps decrease the speed of these measurements – during the auto centre and level routine the algorithm now saves the last two roundness planes taken to calculate the axis alignment, once at target the roundness planes measured for checking the alignment are available and can be used by the programmer to set the axis datum, there is no longer the requirement to re-measure these planes therefore reducing the cycle time by approximately a minute.

Efficiency and throughput

Inspection normally consists of utilising two instruments for quantifying both roundness, surface finish and form typical inspection times would be approximately ten minutes for roundness ten minutes for surface finish and form, total twenty minutes for the complete analysis of the roller bearing.

A reduction in the number of instruments and the simplified measurement technique means that a less skilled operator can now run the instrument.

Using the spreadsheet, the total savings can be calculated and used as an effective method of communicating the value of the TalyMaster product.

This application is showing an increased inspection throughput of 85%



To aid in the understanding of this instrument and application a full demonstration video showing the TalyMaster measuring and analysing the roller bearings in conjunction with the new Pallet User Interface is now available – please contact Business Development TH UK.



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