



COMPANY PROFILE



BUSINESS VISION

The Loadpoint Bearings business vision is to be the prime point of contact for customers, throughout the world, requiring Air Bearing Spindles for their individual applications, whether they are standard 'off the shelf' or bespoke models.

We consider we can continue to achieve this vision through the company culture of listening to our customers, innovative design capabilities and ongoing investment in technology and people skills.





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Picture shows a 200KG
spindle sub 20nM
running accuracy.



FOREWORD

Tony Snow

Managing Director 2006-2016

Tony's natural aptitude for engineering was spotted during his apprenticeship at Loadpoint machine tool company in Swindon UK.

After progressing through the shop floor his interest extended to building high tech semi-conductor machines. A few years later in 1990, the company purchased a factory in Dorset and Tony was asked to run the new business, Loadpoint Bearings, as Works Manager. Tony took up the challenge and new company expanded at the current Ferndown premises.

In 2009, Tony successfully led a management buyout with Design Director, David Gilham and Sales Director, Jon Parkes. Since then the company has gone from strength to strength with a skilled and loyal workforce overcoming the global recession with increased sales and an expanding order book.

Tony said: *"One of our key successes has been long-term investment in apprentices. For example, our current Senior Management Team have progressed from the shop floor gaining engineering qualifications alongside on-the-job training. More recently, they have benefitted from individually tailored management training to ensure a smooth transition to the responsibility of staff management. The expertise of the entire team has been crucial to our success resulting in our reputation for delivering high quality precision products recognised across our global markets."*

The company continues to flourish in an increasingly challenging financial environment but the ethos which has led to its success will be maintained and further developed to meet the demands of its worldwide customer base.

Tony Snow retired in November 2016 and remains as a consultant, the directors and staff of Loadpoint Bearings are indebted to Tony, for his diligent management, training and attention to detail.

COMPANY HISTORY

1971

Introduced air bearings to the semiconductor dicing industry, making the world's first dicing machine using air bearings at Semitron Ltd UK, resulting in the foundation of Precision Rotors Dorset UK Ltd.

1980 to 1985

Precision Rotors Dorset Ltd, developing world's first successful PCB drilling spindles, several thousand spindles shipped worldwide.

1986 to 1990

Pope Precision Rotors Ltd, acquired by the Bramer UK Group, for the PCB market capitalization and development of industrial spindles. Spindle sales reached thousands across the globe as air bearings penetrated the US and Japanese high tech industries. Specific markets were semiconductor dicing and grinding, automotive car painting, contact lens/optical, machine tools.

1991

Acquired by Loadpoint Ltd UK, forming Loadpoint Bearings Ltd, a maker of precision machine tools, using air bearings, for accurate grinding and singulation of semiconductor components. Success during this period included growth and domination of ultra precision machining spindles, contact lens turning spindles and semiconductor dicing spindle markets.

2006

Loadpoint Bearings successful management buy in of 40%, from Loadpoint Ltd parent company. Strong alliance maintained with the parent company, for market/product development within the semiconductor industry. Average shipments per year 900 spindles, across automotive, semiconductor, optical industries. Annual revenue across 4 million US\$, with 25+ full time staff.

2009

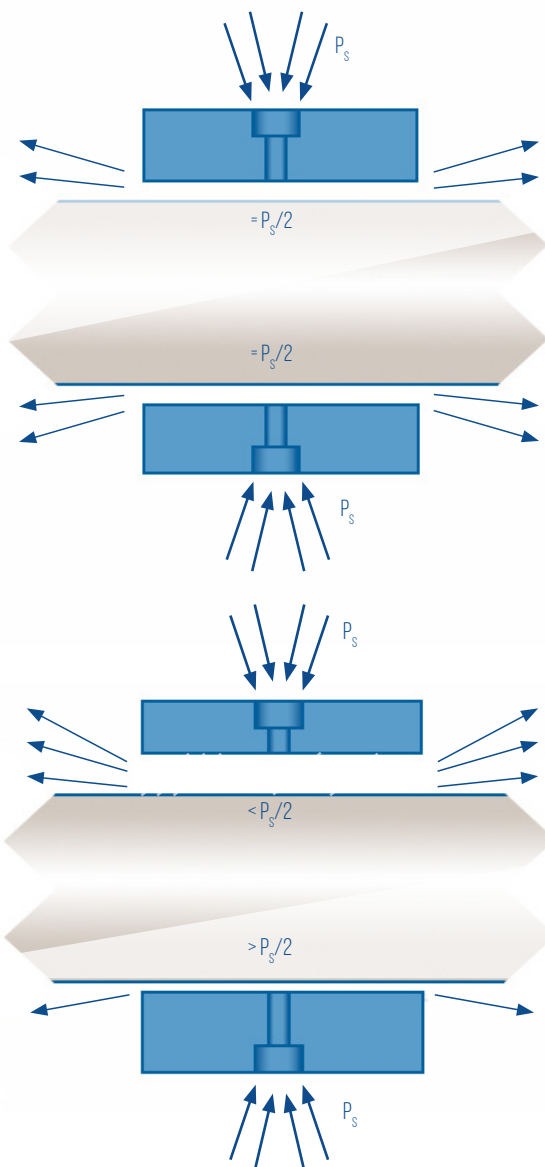
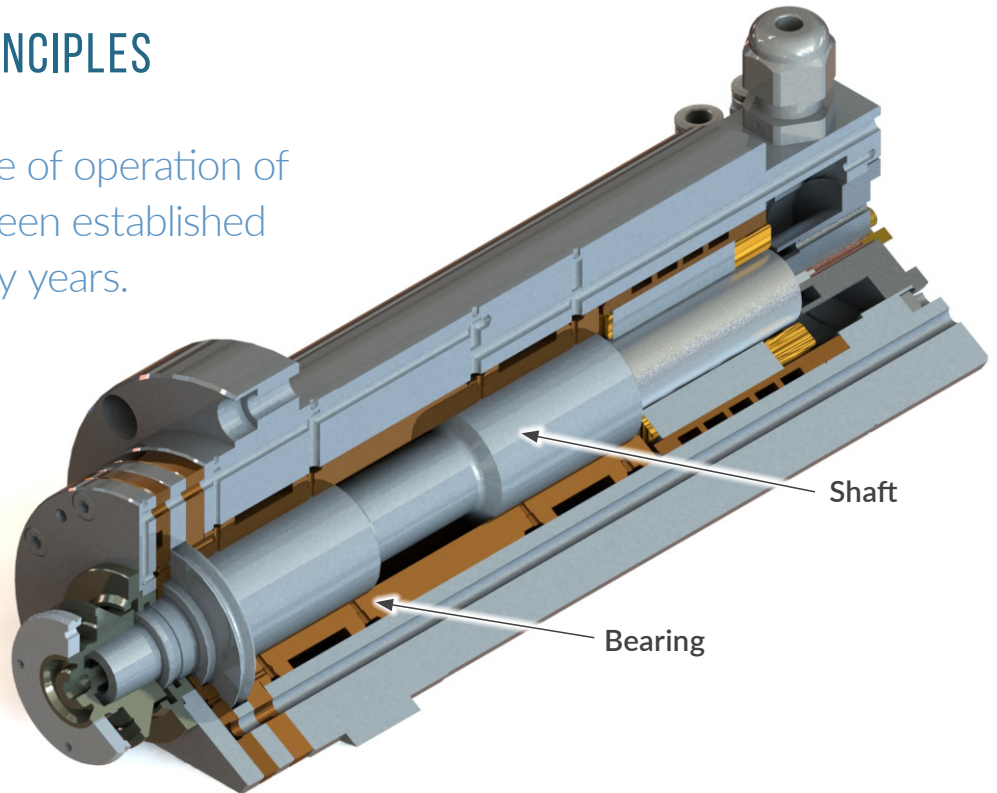
Full MBO of Loadpoint Bearings Ltd. Directors Mr Tony Snow, Mr David Gilham, Mr Jon Parkes.

The Future

Continuous investment in new manufacturing machinery and the latest test equipment ensures all Loadpoint spindles are manufactured to the highest quality standard irrespective of whether the spindle chosen from standard ranges or a completely new design. The manufacturing facility comprises of 10 000 Square feet of floor space, equipped with state of the art machinery to produce parts to sub micron tolerances. Non contact measuring equipment to analyse component geometries and surface finishes, ensure the highest quality standards.

AIR BEARING PRINCIPLES

The basic principle of operation of air bearings has been established for more than fifty years.



No Load applied

An air bearing may comprise of a sleeve separated from a plain shaft by a small gap, typically 5-50 μm .

High pressure air is fed through small orifices in the sleeve through to the bearing gap where it flows along the gap and out of the ends of the bearing. Orifice size is matched to the bearing size so that under no load the pressure in the gap, just downstream of the orifice, is approximately half the supply pressure.

Radial Load applied

When a radial load is applied, the gap on one side of the shaft closes down increasing its resistance to airflow and causing pressure to rise.

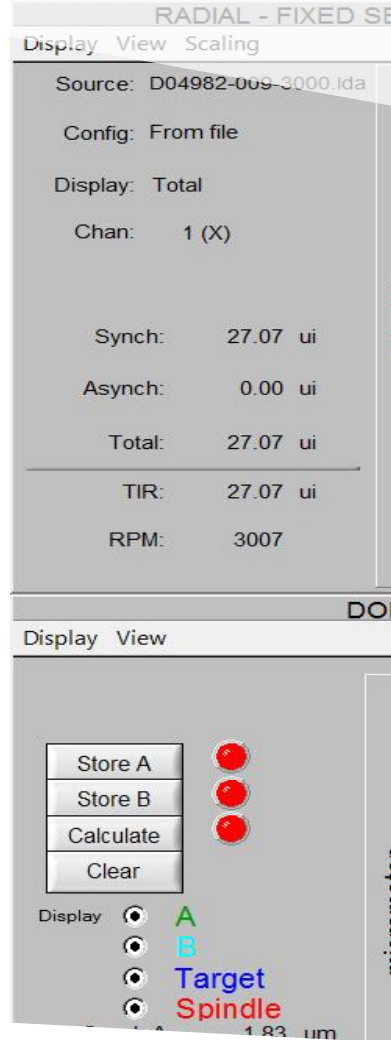
On the opposite side of the shaft, the larger gap has a reduced resistance to airflow and allows pressure to fall.

The pressure difference across the bearing gives it the capacity to support the applied load without incurring any metal - metal contact even if there is no shaft rotation.

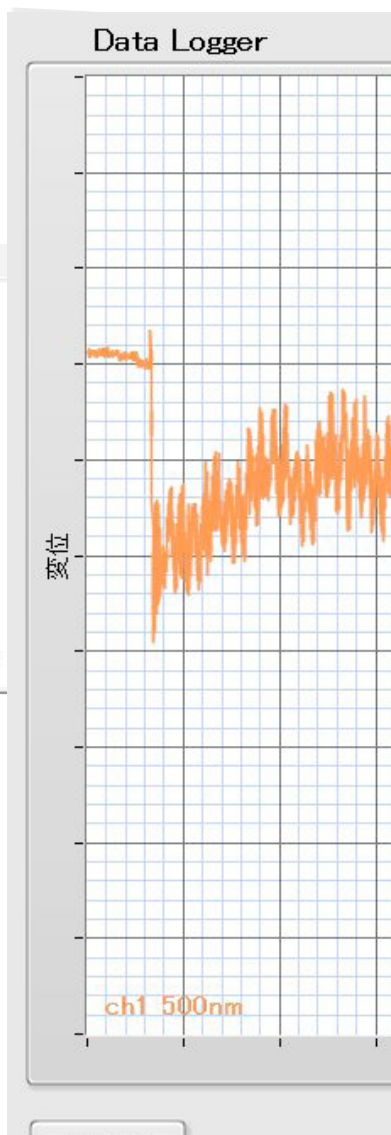
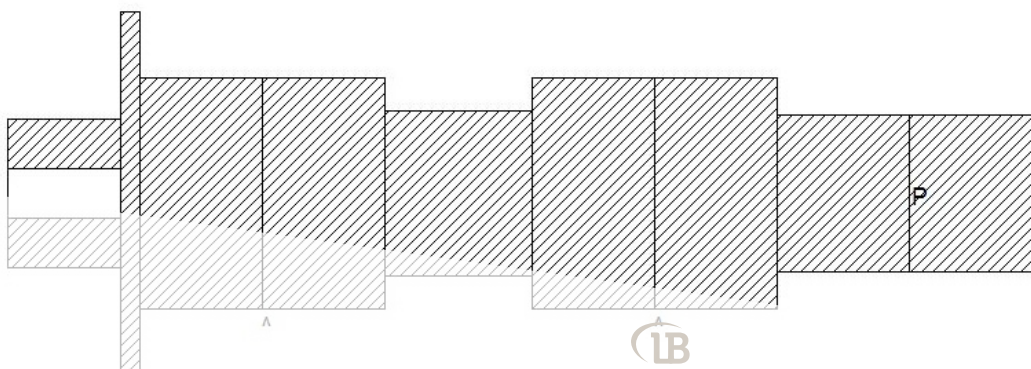
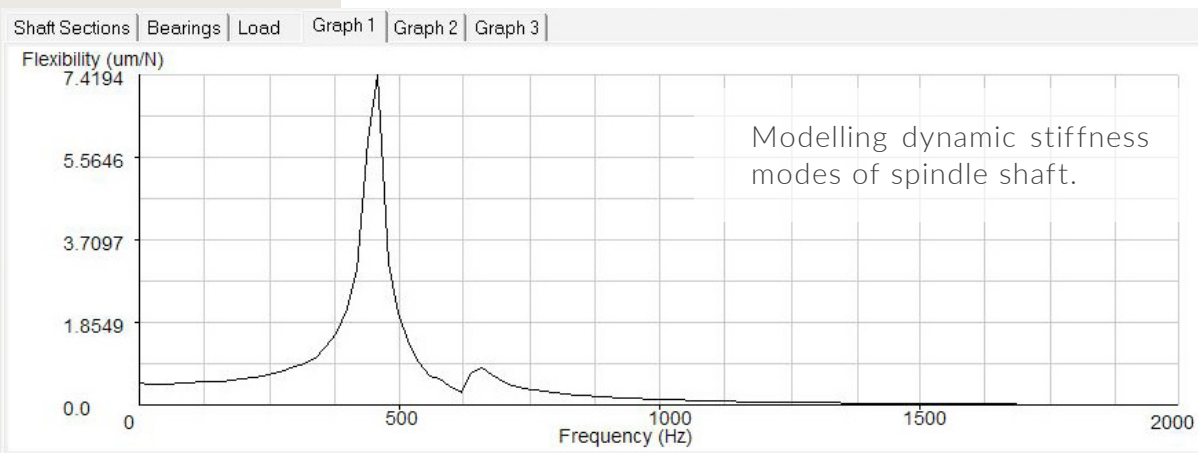
AIR BEARING MANUFACTURING PRECISION

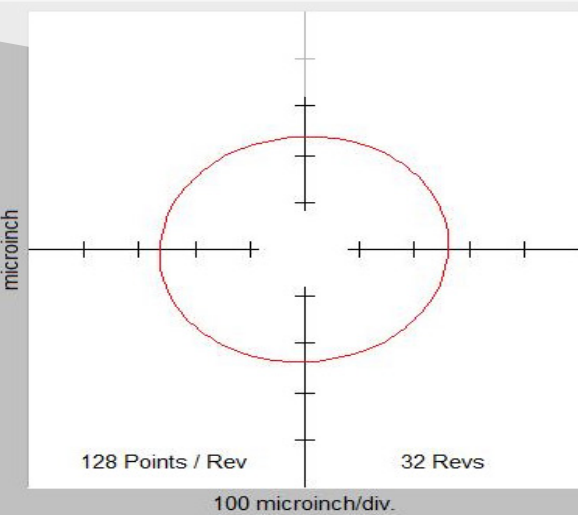
Loadpoint bearings are a Lloyds ISO 9001 accredited company.

Air bearings have to go through sequential processing over a period of 6-8 weeks prior assembling into completed spindles, this usually includes hardening, stress relieving, chrome plating then machining to sub-micron accuracies. Loadpoint Bearings routinely achieve and certify parts to within 80 nM mechanical accuracy, cylindrical, round and flat parts. This is achieved by maintaining the best manufacturing equipment and metrology equipment in the world. Along with a highly skilled and trained workforce.

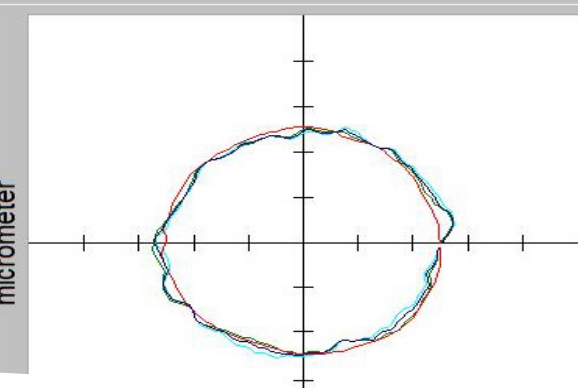


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NALDSON REVERSAL



Display View Scaling

Source: D04982-009-3000

Config: From file

Display: Fund Incl.

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Fund: 0.00 ui

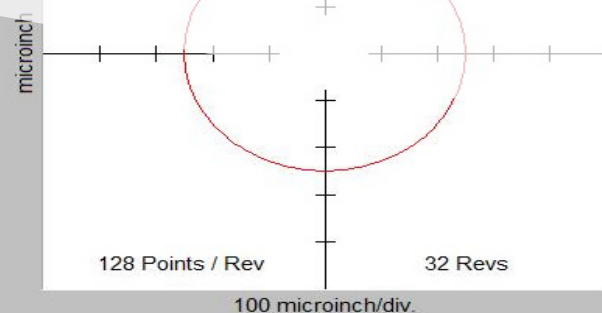
Residual: 1.46 ui

Asynch: 0.00 ui

Total: 1.46 ui

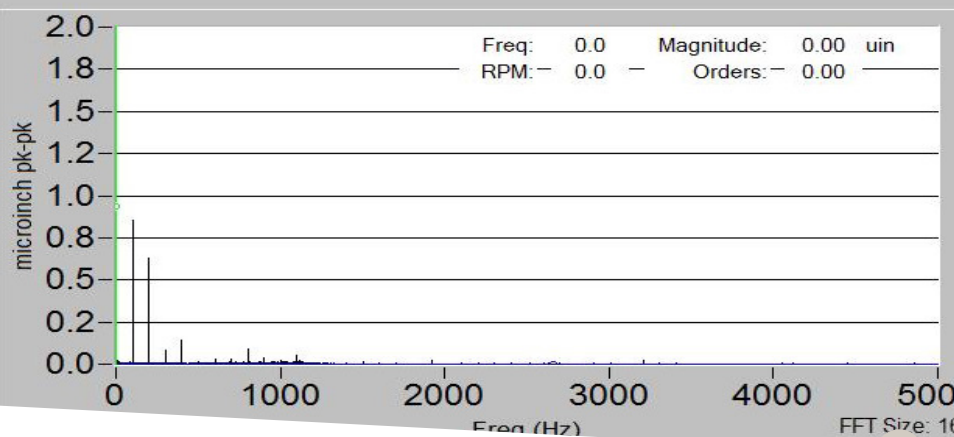
RPM: 3007

During spindle testing, runouts are certified using non contact measuring techniques. This example is less than 10nM axial and radial motion error at 2 500 rpm, (dynamic runout)

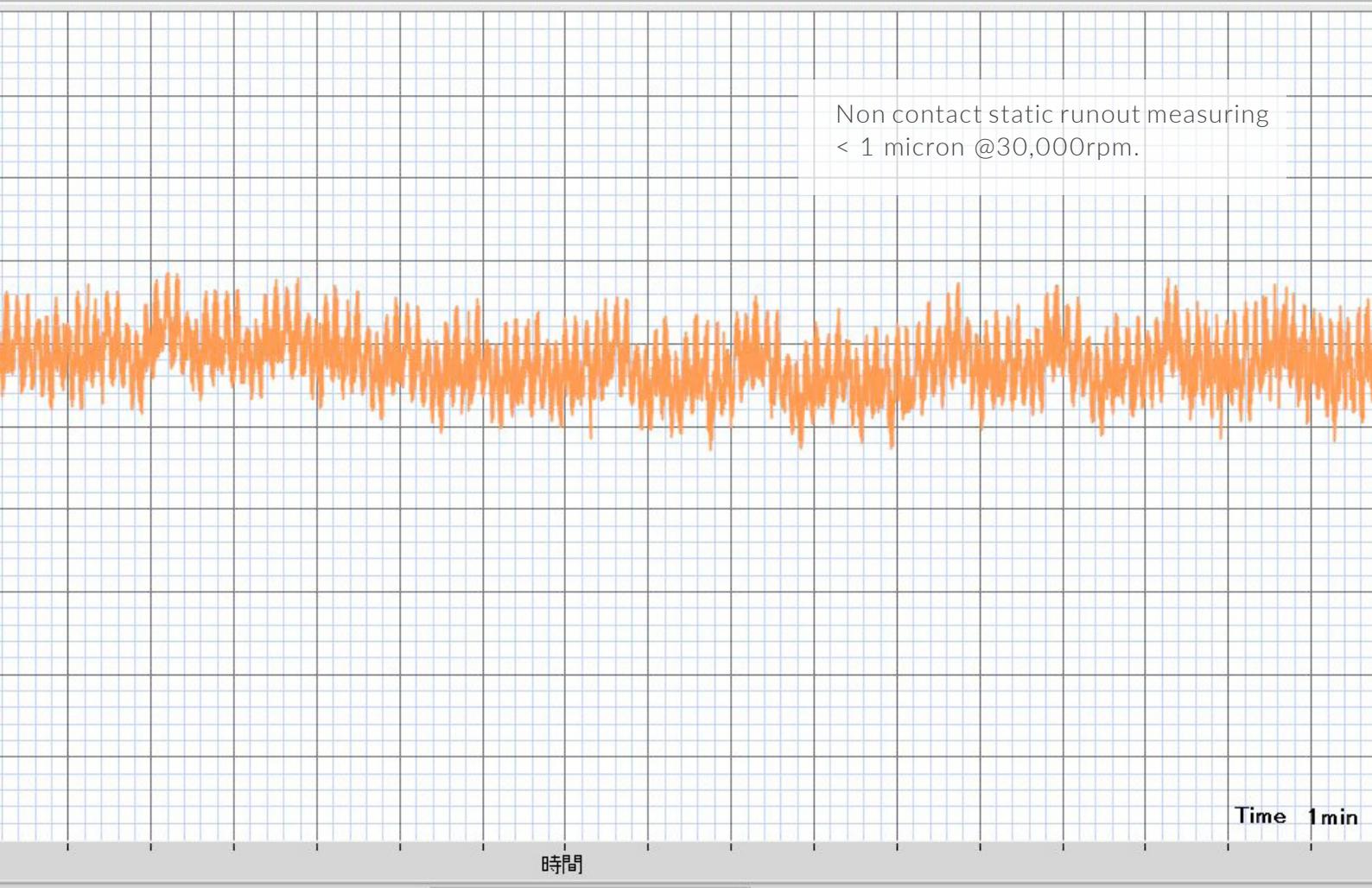


FFT

Display View Scaling



Non contact static runout measuring
< 1 micron @30,000rpm.



時間

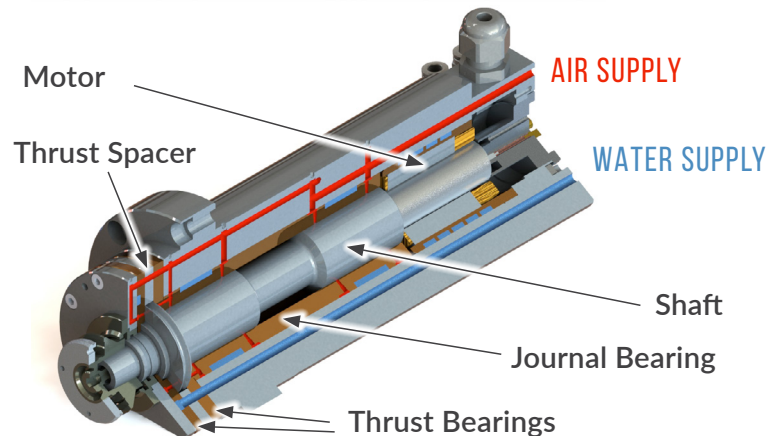
Y軸

Logger Mode

AIR BEARING DESIGN

Loadpoint air bearing spindles employ two or more cylindrical journal bearings to support radial loads and an opposed pair of flat, annular thrust bearings to support axial loads. A practical design of air spindle also has an integral drive motor and means of work holding.

In a typical spindle compressed air enters through a port on the rear face and is fed through drillings to reservoirs surrounding each journal bearing and reservoirs positioned each side of the thrust bearings. From the reservoirs, air is fed through rows of orifices into the bearing gaps. Exhaust air from the ends of the journal bearings, inner and outer edges of the thrust bearings is vented to atmosphere.



Cooling water enters the air bearing spindle through a port on the rear face. From here it is typically ducted along the spindle where it flows through a reservoir surrounding the front bearing. The cooling water is then fed back along the spindle where it passes through a port on the spindle's rear face.

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Advantages

Compared to other types of spindle, air spindles have a number of performance advantages:

| | |
|-----------------------------------|--|
| High rotational accuracy | Bearing air films average any surface features to a low level, enabling error motions of less than 0.05 μm TIR to be achieved |
| Low vibration | All air spindles are balanced to better than 0.001 gm cm |
| High dimensional stability | Low bearing friction and water cooling allow bearings to operate at extremely high surface speeds |
| High speeds | again low bearing friction and the use of water cooling allow bearings to operate at extremely high surface speeds |
| High stiffness | The small clearances inherent to air bearings enables them to be designed with high static stiffness. Air bearings also enable large shaft diameters to be used which enhances the stiffness of spindle assemblies |
| Increased bearing life | The absence of metal-metal contact ensures an unlimited bearing life provided the air supply is maintained clean and free from oil and water |
| Improved surface finish | Due to the inherently high accuracy of rotation of air bearings and low vibration, air spindles use in machining applications can produce surfaces with mirror finishes |
| Cleanliness | Not requiring any liquid lubricants air spindles are suitable for use in clean rooms |
| Ease of maintenance | Air spindles do not require servicing. Air supplies must however be maintained |

PRODUCT SUMMARY

Dicing Spindles

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Diamond Turning Spindles

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Grinding / Micromachining Spindles

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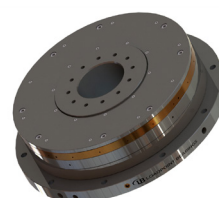
Automotive Coating/Spraying

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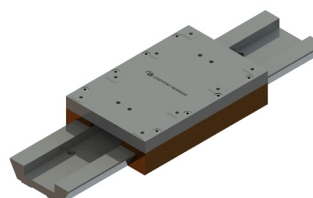
Rotary Tables

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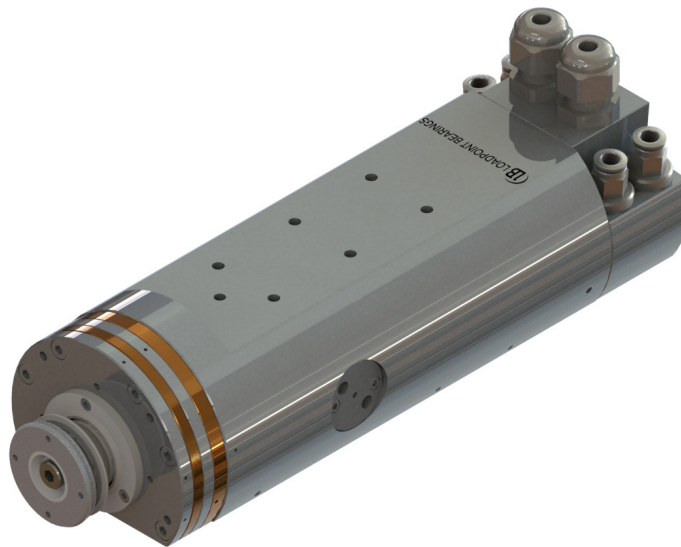
Linear Slides

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DICING SPINDLES

Loadpoint Bearings is the leading manufacturer of dicing spindles supplying all original equipment manufacturers in the world with products that have become accepted as industry standards.



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A range of spindles to suit all types of dicing machine is available. These include flange mounted, gantry mounted and round bodied cantilevered spindle styles. Spindles may also be customised to meet individual requirements.

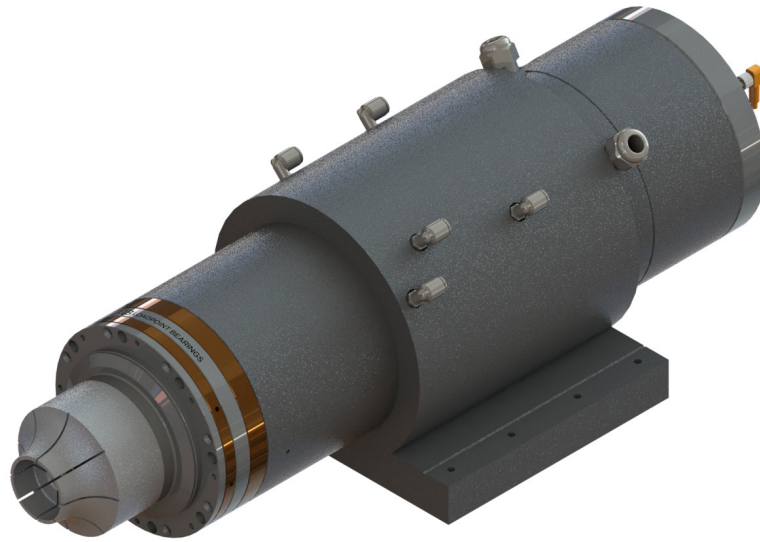
The spindles cover a full range of blade diameters from 50mm (2in) up to and including 101 mm (4in). For 50 mm diameter blades, spindles have a maximum speed of 60 000 rpm and develop 2.5 kW of power. Larger spindles for 101 mm blade diameters have a maximum speed of 40 000 rpm and develop 2.5 kW of power.

DC brushless motors are fitted as standard to achieve maximum operating torque over a wide range of speeds. This makes the spindles suitable for cutting a variety of materials ranging from silicon through to quartz. AC motors can also be fitted to spindles to meet customer drive specifications. Spindles are fully water cooled to minimise thermal growth. They are also designed and constructed for maximum durability. All spindle designs have been proven in heavy duty dicing applications.

Loadpoint Bearings can also fit electrical brushes for touch sensing circuits and supply balanced wheel mounts and spacers. AC and DC drives specially matched to dicing spindle applications are available from Loadpoint Ltd.

DIAMOND TURNING SPINDLES

Loadpoint Bearings are the leading supplier to original equipment manufacturers within the ultra precision machining industry. Running accuracies lower than 10 nanometers certified.



A range of spindles are available for applications including contact lens turning, flycutting of optical components, mould grinding and ultra precision face grinding. Spindle designs are continually reviewed and updated to include the latest innovations in high precision technology.

They are manufactured to the highest standards of precision of all spindle types. They are also fitted with low noise motors and are dynamically balanced to within 0.001 gm cm to achieve motion errors as low as 0.05 μ m peak-peak. Bearing designs are also optimised to give maximum overall spindle stiffness in both radial and axial directions.

Spindles are available with foot mounted or plain cylindrical housings. Work or tool holding arrangements are manufactured to suit individual requirements and include air operated chucks, vacuum chucks and collets.

Smaller spindles within the range can reach speeds of 15 000 rpm with air cooling or 25 000 rpm with water cooling. These higher speed spindles are fitted with AC induction motors whilst spindles designed for lower speed machining applications are fitted with DC brushless motors. Encoders are used where accurate speed control or angular positioning is required.

Ultra precision spindles may also be integrated with air slides for applications requiring extreme positional accuracy.

GRINDING SPINDLES

Loadpoint Bearings offer air bearing solutions to a variety of general industrial applications.



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These include high speed bore grinding, mould grinding, tool grinding, graphite milling, glass edge grinding, workheads, pcb drilling and fibre rolling.

Standard spindles are available in a wide range of configurations. Drives are air turbines, AC or DC brushless motors with power levels from 300 watts to 15 kW. Associated spindle speeds range from 100 rpm to a maximum of 120 000 rpm. Work or tool holding includes collets, air or vacuum chucks manually or automatically operated.

High powered bore grinding spindles are a recent addition to the range. Optimised for dynamic stability using extensive computer modelling these spindles achieve 1.2 kW of useable power at speeds of up to 120,000 rpm.

Loadpoint Bearings design and development experience places the company in a strong position to develop novel air bearing products for specific applications or simply to advise on the potential use of air bearings in new applications.

AUTOMOTIVE COATING/SPRAYING

Loadpoint Bearings have a range of paint spraying spindles to suit all major original equipment manufacturers applications.



First introduced in 1983 Loadpoint Bearings paint spraying spindles are subject to continuous development to meet the new and ever increasing demands of the automotive industry.

All spindles are driven by axial flow air turbines which allows the use of higher paint flow rates and provides rapid speed recovery in response to paint overflow. Axial flow turbines also give rapid acceleration and braking to minimise downtime at changeovers.

Spindle designs are robust. They feature a unique bearing suspension system designed to be tolerant of out of balance as below.

Spindles are manufactured from durable materials to increase their crash resistance and minimise bearing surface damage in the event of air pressure failure.

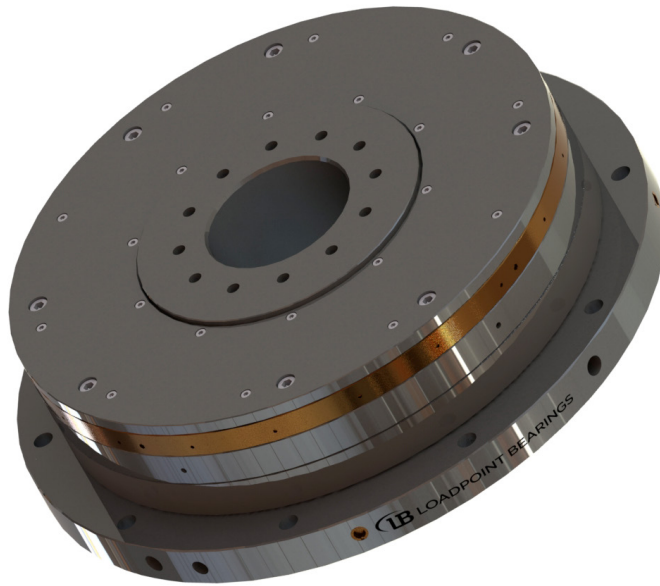
Spindles have been rigorously tested in robot applications and their robustness and durability proven in service.

A range of spindle designs are available to cover speeds to a maximum of 100,000 rpm and bell sizes to a maximum of 70 mm diameter.

Loadpoint Bearings also offer spindle repair, bell manufacturing and balancing services.

ROTARY TABLES

Loadpoint Bearings is a leading supplier of high precision rotary tables to the dicing and electronics/semiconductor industries.



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A wide range of rotary tables is available from 50 mm (2 in) diameter up to and including 400 mm (16 in) diameter.

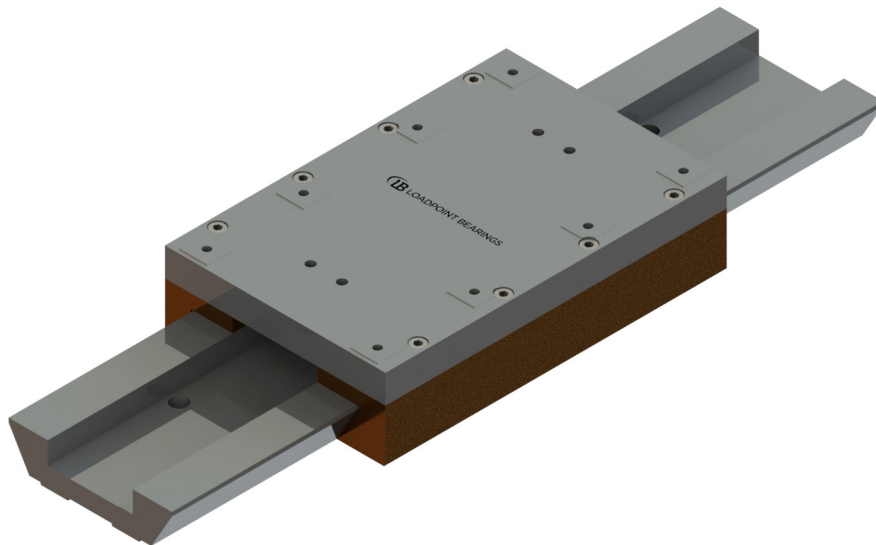
Tables are produced with standard or reduced heights. Standard height tables have the advantage of maximum axial, radial and tilt stiffness whereas reduced height tables have lower radial and tilt stiffness. All tables feature the low axial motion errors inherent of air bearings.

Tables may be externally driven via belts or worm and wheel or alternatively can be fitted with an integral drive motor. The use of DC brushless torque motors with high resolution encoders can achieve angular position resolutions better than 0.1 arcsecs. Full technical support is available for drive selection and setting up.

Optional features include large diameter central through holes for coolant feed or a central vacuum feed with rotary coupling.

LINEAR SLIDES

Loadpoint Bearings manufacture a range of products for linear motion applications.



These include high precision air bearing slideways, cylindrical sleeves and air pads.

Slideways are available in lengths of up to 500 mm (20 in). They are designed and manufactured to give high stiffness and low motion error. Running accuracies better than 1 μm (0.00004 in) over their travel length can be achieved. Slideways can be supplied with an integral direct drive motor and encoder or built to take an external drive.

They may also be integrated into complete spindle assemblies to enable accurate spindle positioning. Full technical support is available for drive selection and setting up.

Air pads are designed to support heavy objects and provide a constant ride height with zero friction in a horizontal plane. They are used typically in metrology and automotive industries. Air pads are available in diameters of up to 300 mm to support loads to a maximum of 15kN.

Cylindrical sleeves and matching shafts enable linear motion with rotation to be achieved. Alternatively two more units can be built into a single assembly to act as a slideway. Sleeves are available in diameters of up to 50 mm to support loads to a maximum of 100 kg.

