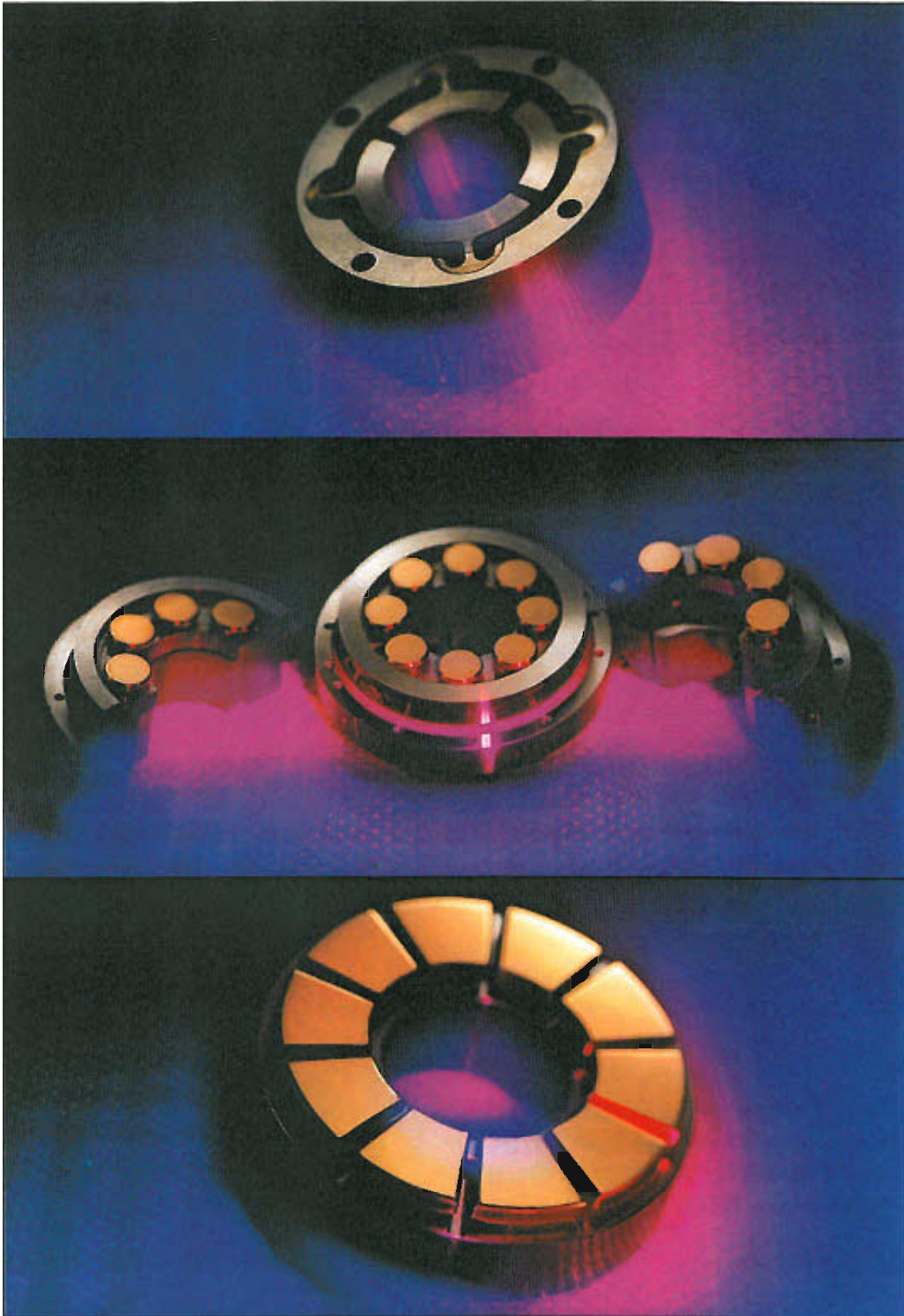


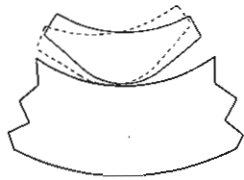
Superior Bearing Technology For Turbomachinery



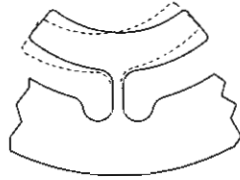
DP® Tilt Pad Bearings



KMC® products are protected by U.S. and foreign patents.



ROCKING PIVOT TILT PAD



FLEXURE PIVOT™ TILT PAD

Standard tilt pad bearings achieve low cross-coupling through rocking or sliding motion (Figure 2). FLEXURE PIVOT™ tilt pad radial bearings achieve the same low cross-coupling and high stability through flexure and rotation of the center post while eliminating any pivot wear and high contact stresses.

RADIAL FLEXURE PIVOT™ TILT PAD BEARINGS

Features

- **Minimizes the manufacturing tolerance stack-up.**

The integral pad-pivot-retainer design eliminates most of the manufacturing tolerance stack-up as shown in Figure 1. This feature is a critical design parameter which has a direct impact on the rotor's stability, critical speed, and synchronous response characteristics.

- **Eliminates pivot wear and contact stresses.** The FLEXURE PIVOT™ tilt pad design eliminates the pivot wear and brinelling associated with standard type tilt pad bearings. This prevents the degradation in performance with time, maintains the desired bearing preload, and provides a narrower spread in the stiffness and damping coefficients as shown in Figure 2.

- **Custom design and optimization.** The FLEXURE PIVOT™ tilt pad bearings can be custom designed to provide optimum rotordynamic performance as shown in figure 3. The bearing design parameters are varied to match the stability and unbalance response characteristics of the rotor.

- **Eliminates pad flutter and spragging.** The rotational stiffness increases the pad natural frequency and eliminates pad flutter and spragging often encountered on the unloaded pads in standard type tilt pad bearings.

- **Retro-fit small and miniature size bearings.** The advanced techniques utilized in the manufacture of FLEXURE PIVOT™ tilt pad bearings makes them a good choice for retro-fitting small and miniature size fluid film and rolling element bearings.

- **Centering and minimum radial play capability.**

The FLEXURE PIVOT™ design provides a means to hold the shaft centered in the bearing at low speeds, thus minimizing the radial play which is critical in some high-speed high-performance turbomachinery.

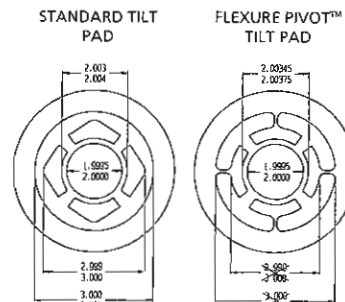


Figure 1

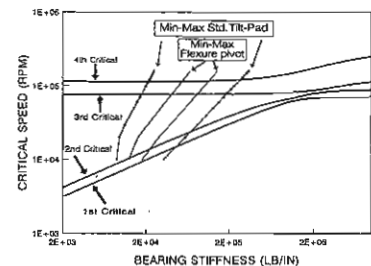


Figure 2
Undamped Crit Speed Map

STABILITY VS PAD ROTATIONAL STIFFNESS
High speed overhang Geared Compressor

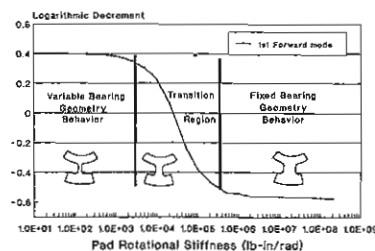
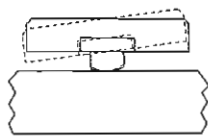
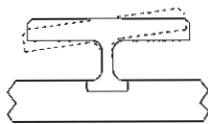


Figure 3



ROCKING PIVOT TILT PAD



FLEXURE PIVOT™ TILT PAD

Standard type thrust bearings form a converging wedge through rocking motion of the pad pivot support. FLEXURE PIVOT™ tilt pad thrust bearings form a wedge through flexure of the post support while eliminating the pivot wear and high contact stresses.

THRUST FLEXURE PIVOT™ TILT PAD BEARINGS

Features

- **Custom design of the FLEXURE PIVOT™ post support.**

The FLEXURE PIVOT™ post support is designed to provide an optimum wedge ratio at design load conditions. (As shown in Figure 4). This results in an increase in the load capacity and a significant reduction in the horsepower loss.

- **Retro-fit in small envelopes.** The FLEXURE PIVOT™ thrust pad design permits retro-fitting in a small envelope space where only taper land or flat thrust plates would fit. This is an advantageous design flexibility which allows space saving and load capacity upgrades for existing thrust bearings.

- **Simple construction and manufacturing.** The construction of FLEXURE PIVOT™ tilt pad thrust bearings is simple, and contains fewer parts than standard type tilt pad bearings. Manufacturing, assembly, maintenance, and inspection is much simpler than with other bearing types. The absence of moving parts eliminates wear and fretting in service.

- **Elimination of pad flutter.** The rotational stiffness provided in the FLEXURE PIVOT™ tilt pad bearing eliminates the pad flutter problem typically experienced on the inactive side of standard tilt pad thrust bearings.

- **Higher load capacity in reverse rotation.**

Offset FLEXURE PIVOT™ tilt pad thrust bearings can carry higher load capacities in reverse rotation than standard type tilt pad bearings giving them an additional benefit in certain high load applications.

- **Static and Dynamic misalignment capability.**

Although the self-leveling links in standard type tilt pad bearings provide some misalignment capability, the stack-up of tolerances on the pads and on the lower and upper leveling links consumes most of this capacity. FLEXURE PIVOT™ tilt pad bearings are ground and lapped flush after assembly ensuring adequate misalignment capability through their ability to flex and follow the runner. They are also more capable of handling the dynamic misalignment of the runner which causes excessive wear and fretting in standard type tilt pad bearings.

- **Lower lubricant flow requirements.** Special surface preparation and material selection allows FLEXURE PIVOT™ tilt pad thrust bearings to carry higher loads at lower oil flows, which makes them the bearing of choice for applications where lubricant availability is low.

- **Soft-pad Hard-pad design feature.** The FLEXURE PIVOT™ tilt pad design allows construction of a soft-pad hard-pad thrust assembly. This allows optimizing the design for several load conditions, and improves the start-stop characteristics of the bearing.

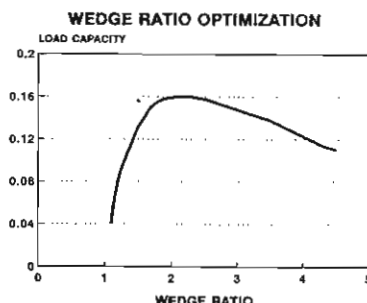


Figure 4

KMC, Inc. was founded in 1983 and became a subsidiary of Cookson PLC, an international technology company based in the UK, in 1988. Since being associated with Cookson, KMC has developed business associations and agreements in the UK and Japan, and is currently exploring similar arrangements in the EEC.

The company moved to its new 30,000 square ft. facility which incorporates both engineering and manufacturing functions under one roof in May of 1992. DEFLECTION PAD™ tilt pad bearings are designed at KMC using state-of-the-art rotordynamic, structural, and hydrodynamic finite element codes and are tested in-house in spacious and modern testing laboratories. The machine shop is outfitted with the latest CNC and wire EDM production machinery.



Customized radial and thrust bearings optimized for the customer's particular needs are our specialty. A standard line of thrust bearings is also available.

TYPICAL APPLICATIONS FOR TURBOMACHINERY

Any Fluid Lubricated Bearing Application With Special Emphasis On:

- Compressors
- Turbines / Expanders
- Turbochargers
- Gear Boxes
- Electric Motors
- Superchargers
- Air Conditioners
- Pumps
- Refrigeration Equipment

KMC® DP® bearings including FLEXURE PIVOT™ tilt pad bearings are protected by both issued and pending patents in the United States and abroad.

For more information please call:



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