

## About R&D Dynamics Corporation

R&D Dynamics is a world class center in research, development and production manufacturing of affordable high-speed small turbomachinery for various aerospace and commercial applications. We provide complete service including thermodynamic analysis, design of machine, prototype manufacturing, development, qualification, and production manufacturing. R&D Dynamics is also a world leader in oil-free foil air bearing technology.

### High Speed Oil-Free Turbomachinery are needed for:

- Fuel Cells
- Commercial Air Conditioning
- Industrial Air Compressors
- Oxygen and Nitrogen Generation for Aircraft Safety
- Gas Exploration
- Turbogenerators to Produce Electricity from Exhaust Gas
- Small Gas Turbines

R&D DYNAMICS CORPORATION IS ISO9001:2000 / AS9100 CERTIFIED AND REGISTERED



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CRYO 04-12



Design, Development & Manufacturing of

## Cryogenic Helium Turboexpanders and Circulation Fans

Supported on **Foil Gas Bearings**



Your Success Is Our Success.®



# Turboexpander

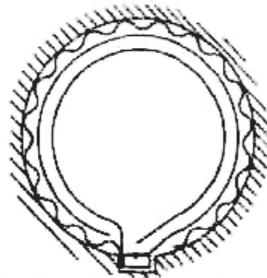
## For Cryogenic Helium Refrigeration Systems

- NO SCHEDULED MAINTENANCE
- FLOATS ON FRICTIONLESS FOIL GAS BEARINGS
- HERMETICALLY SEALED OPERATION
- INTEGRATED COMPRESSOR BRAKE WASTE HEAT EXCHANGER
- INTEGRATED SPEED CONTROL SYSTEM

## How Foil Bearings Work

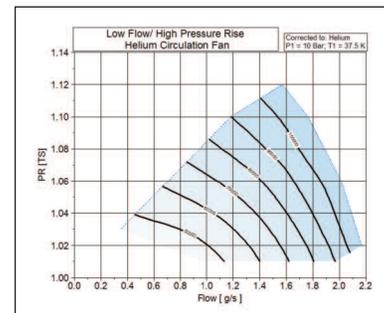
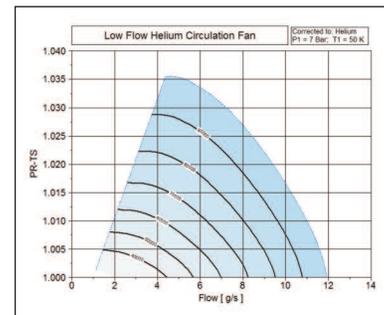
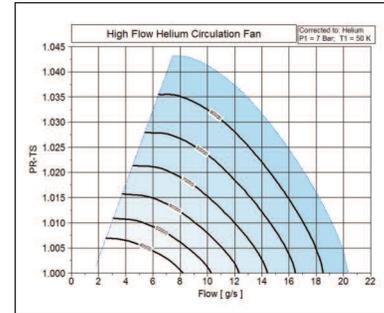
The motor/rotor shaft is supported radially by two journal bearings and axially by two thrust bearings. As the shaft rotates, a wedge is formed due to the radial displacement of the shaft. Hydrodynamic action draws the working gas into the wedge where it is locally compressed. The pressurized section provides support for the shaft while the layers of foil provide the compliant features of the bearing. As the shaft speed increases, a hydrodynamic film of gas is produced that forces the shaft to lift off and become airborne eliminating any contact between the shaft and the bearing.

**TYPICAL FOIL BEARING**



# Helium Circulation Fan

## TYPICAL FAN PERFORMANCE MAPS



## For Cryogenic Helium Systems

- NO SCHEDULED MAINTENANCE
- FLOATS ON FRICTIONLESS FOIL GAS BEARINGS
- HERMETICALLY SEALED OPERATION
- STAND-ALONE CONTROL, OR PLC COMPATIBLE
- HIGH FLOW, LOW FLOW & LOW FLOW - HIGH PRESSURE RISE CONFIGURATIONS
- HIGH EFFICIENCY
- LOW STATIC HEAT LEAK
- 20K TO 80K INLET TEMP