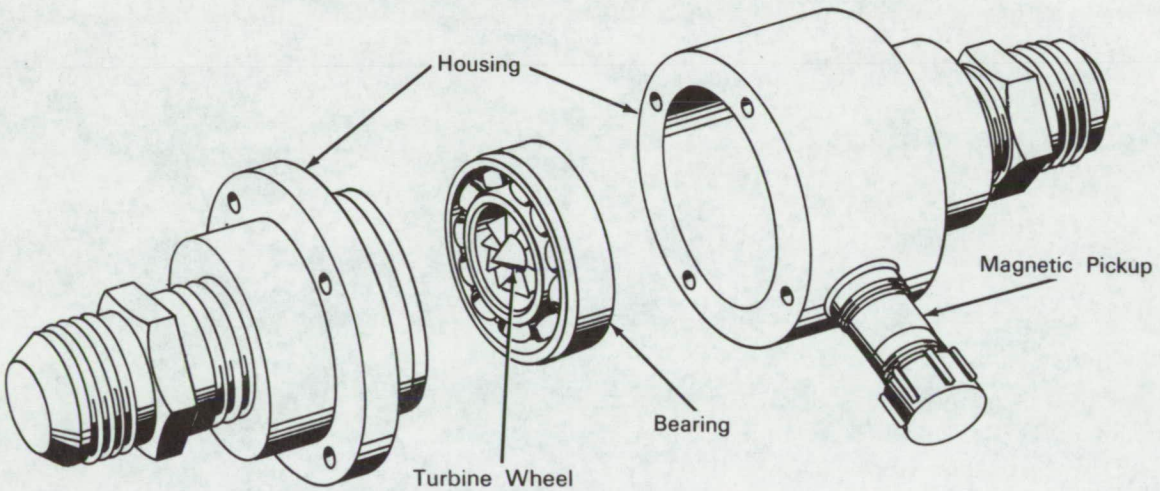
NASA TECH BRIEF

Ball Bearing Used in Design of Rugged Flowmeter



The problem: Obtaining useful measurement of liquid flow rates in the presence of wide ranges and violent surges. Conventional turbine-type flowmeters employ a shaft-mounted turbine wheel supported by small bearings on the shaft. Because of the small size of the bearings, high flow rates and sudden large changes in flow rates cause bearing wear and result in the relatively short mechanical life of these instruments.

The solution: A volumetric flowmeter using a magnetic pickup to time the revolutions of a turbine wheel pressed into the bore of a small bearing.

How it's done: A turbine wheel is press-fitted into the inner race of a ball bearing. A small permanent magnet is imbedded in either the outer perimeter of the turbine wheel or in the bearing inner race. The bearing and turbine-wheel assembly is then enclosed in a housing in a manner to cause practically all fluid flow through the housing to be directed through the turbine wheel. The housing incorporates a wire-coil pickup aligned with the enclosed bearing so that an electric pulse is produced each time the magnet passes that point in the housing. Thus, the pulse frequency gives a direct indication of turbine-wheel speed.

Notes:

1. This device has been used successfully to meter flow rates of jet fuels and water, and could be used for other flow measurements where rates and surges require rugged instrumentation.
2. Slight clearances between the housing and bearings provide sufficient transfer fluid in the bearing to act as a lubricant.
3. Calibration of the flowmeter is simply accomplished by flowing a known quantity of a given fluid through the instrument in a specific time increment. Comparison of the meter output with the known quantity-to-time calculation gives the meter-drag factor.

(continued overleaf)

4. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
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Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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(Lewis-159)