



## Technology Commercialization Opportunity

A Novel **Artificial Hip Joint** Using an Elastic Squeeze Film Mechanism

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### Inventors

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### Background and Technology Description

A continuing problem with current artificial hip joint replacements is wear of the articulating surfaces. In metal-on-plastic designs, wear particles from the relatively softer UHMWPE material can generate an autoimmune reaction in the body known as osteolysis which results in resorption of living bone tissue surrounding the artificial socket and subsequent loosening or detachment of the socket from the acetabulum. In metal-on-metal designs, high concentrations of metallic ions associated with nanoscale wear particles have been found deposited in the surrounding tissue, and these high ion concentrations may pose long-term health concerns.

Aggravated wear is linked to the lack of full-film lubrication prevalent with current artificial hip joint designs. The load transmitted from ball to cup varies in magnitude and direction but does not reverse direction during the gait cycle. Thus, the only mechanism then capable of supplying synovial fluid to the joint is 'wedge-film' action generated by relative tangential surface motions associated with the gait cycle kinematics. Even though ball and cup contacting surfaces are conformal, the ball and cup elastic properties, load magnitude, and the surfaces' radii of curvature result in a load-carrying lubricated contact region which covers only a small percentage of the total possible surface contact area.

A novel artificial hip joint design is introduced that predicts significant improvements in bearing performance over conventional designs. Elastic elements and a non-spherical cup surface are incorporated into the design to promote and enhance 'squeeze-film' action, which alleviates the sole reliance on wedge-film action and encourages a wider spatial distribution of lubricant film pressure.

**Keywords:** Total Hip Replacement, Artificial Hip Joint, Total Hip Arthroplasty

### Technology Readiness

The novel artificial hip joint is presently at this level of readiness:

Idea	<b>Concept</b>	Prototype	Alpha Version	Beta Version	Released
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RIT and Cornell developers will work with licensees to move the design to a commercial product.

### Intellectual Property

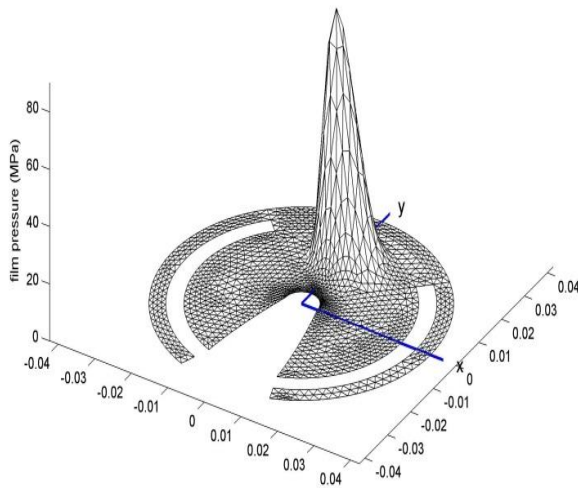
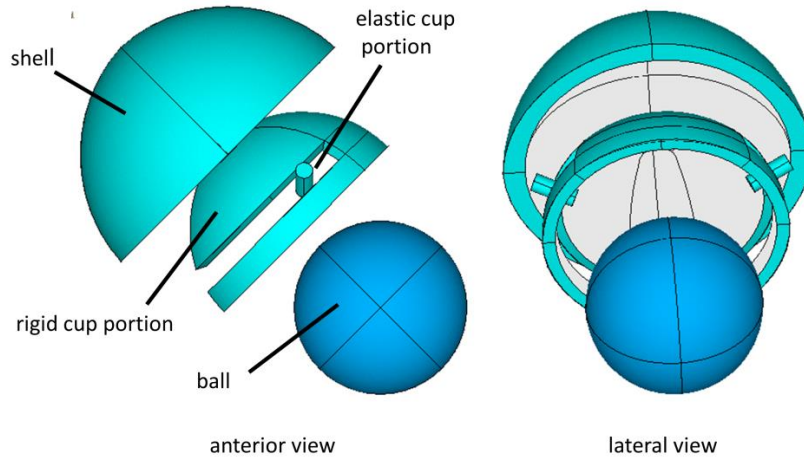
This technology is the subject of a pending U. S. patent application.

## Target Customers

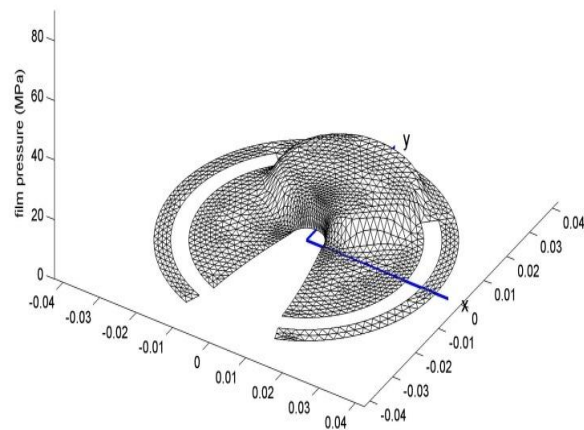
- Prosthetic Hip Joint Manufacturers
- Material Suppliers
- Materials Testing Laboratories

## Opportunity

RIT's Intellectual Property Management Office (IPMO) and Cornell's CTEC are interested in working with those parties who are qualified and interested in the commercialization of this novel artificial hip joint. Arrangement types include licensing the application to existing organizations or to new organizations that have expertise in the field or related fields.



Predicted film pressure in conventional design  
(16mm cup, peak value 90 MPa)



Predicted film pressure in new design  
(16 mm cup, peak value 10 MPa)

## Contact

Those interested in learning more about this opportunity should contact:

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