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Project #76: Self-Centering Motor Housing Design Proposal

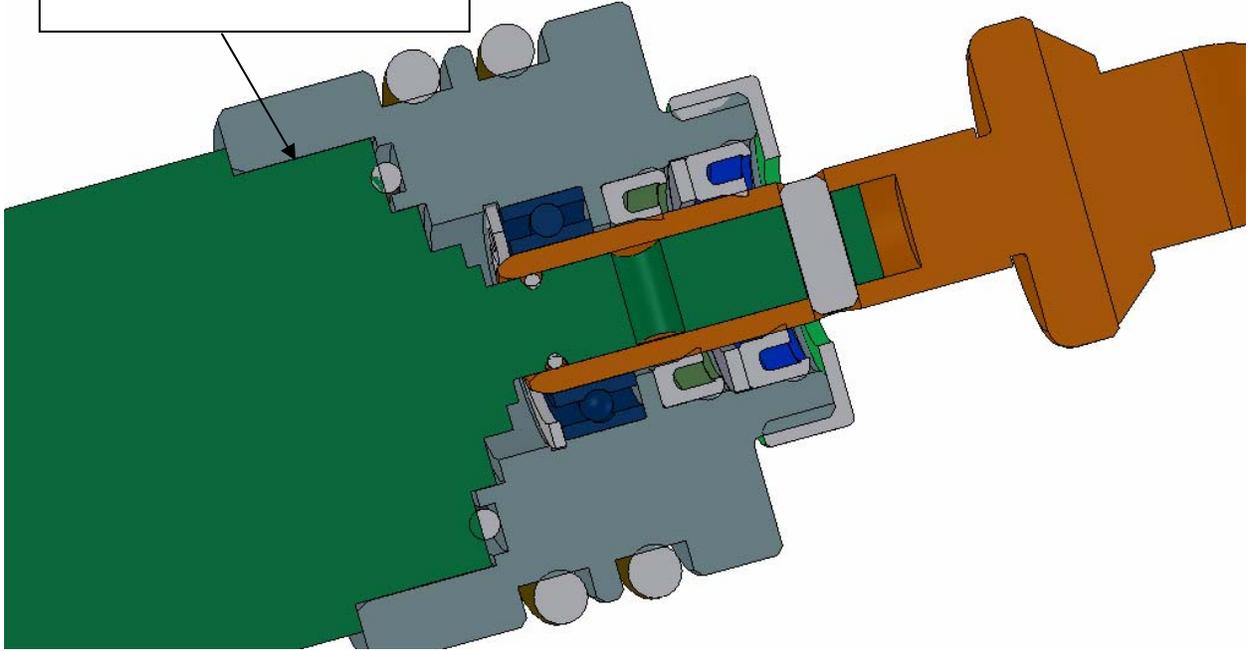
Current Design's Limitations

The current design of the Doberman Motor/Insert Housing introduces potential off centering issues. There is an inherent gap between the components to allow for the fitment of Motor's outer cylinder into the counter-bore of the Insert Housing. In addition, the tolerances of these features need to allow for their manufacturability.

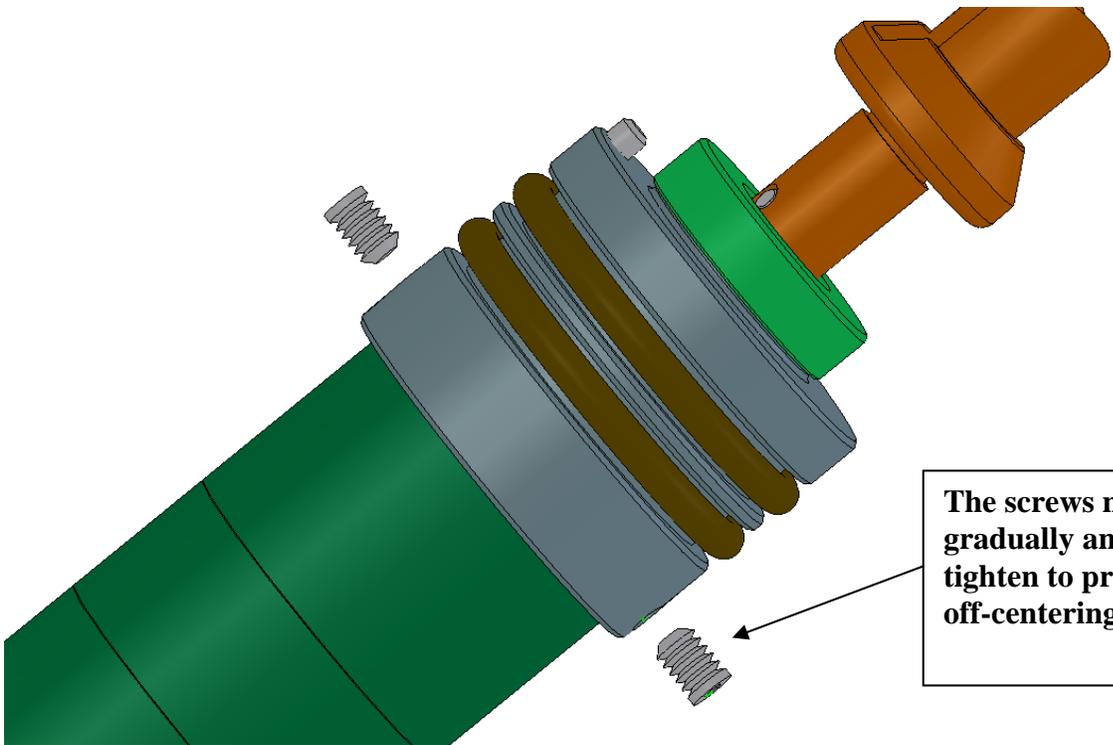
Furthermore, the method of securing the Insert Housing onto the Motor by tightening of two screws can also contribute to the misalignment. The assembling procedure is technique sensitive and time consuming.

The layouts below show further details of the current design's limitations.

**Gap between parts
introduces misalignment**



**The screws need to be
gradually and carefully
tighten to prevent /reduce
off-centering issues**

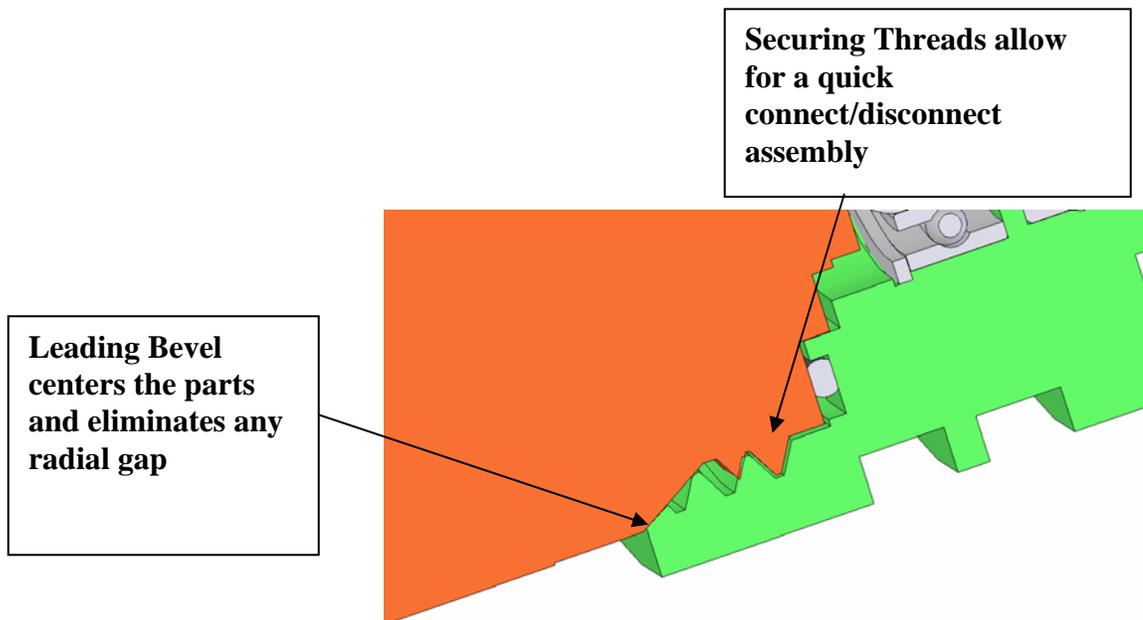
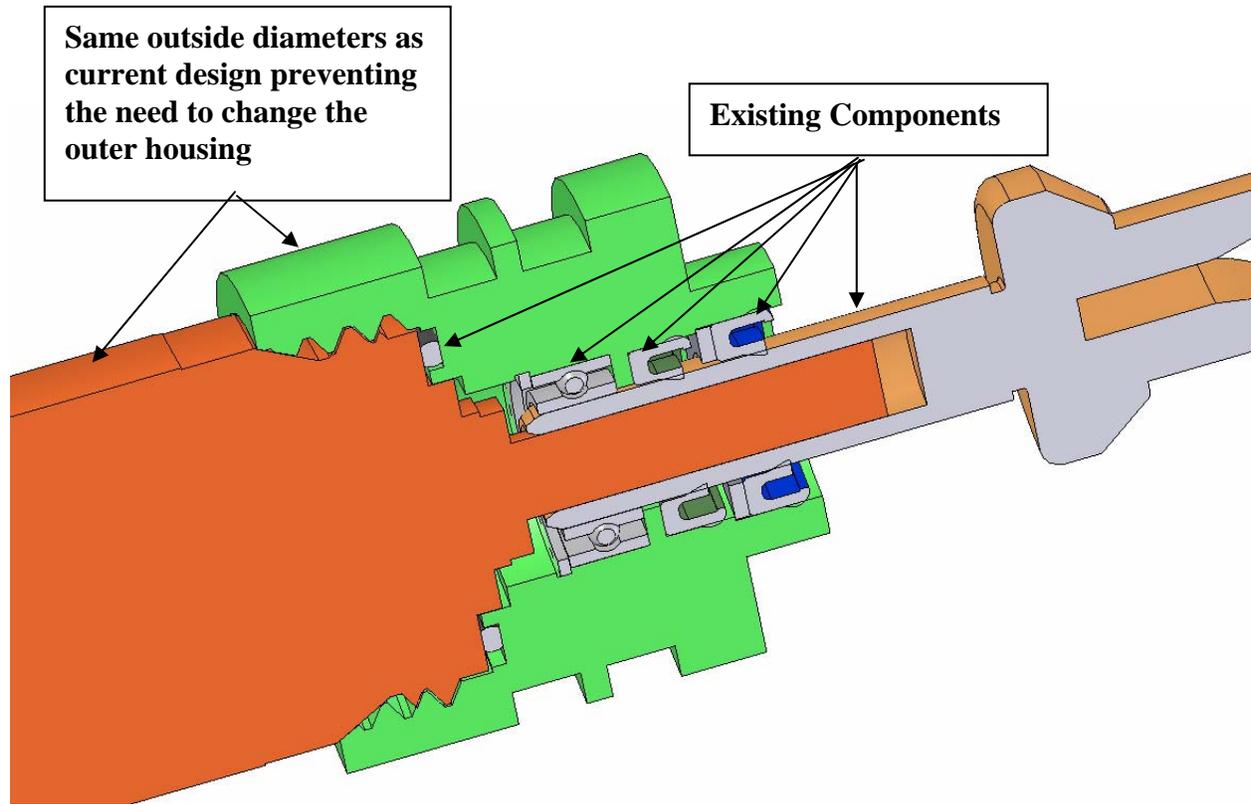


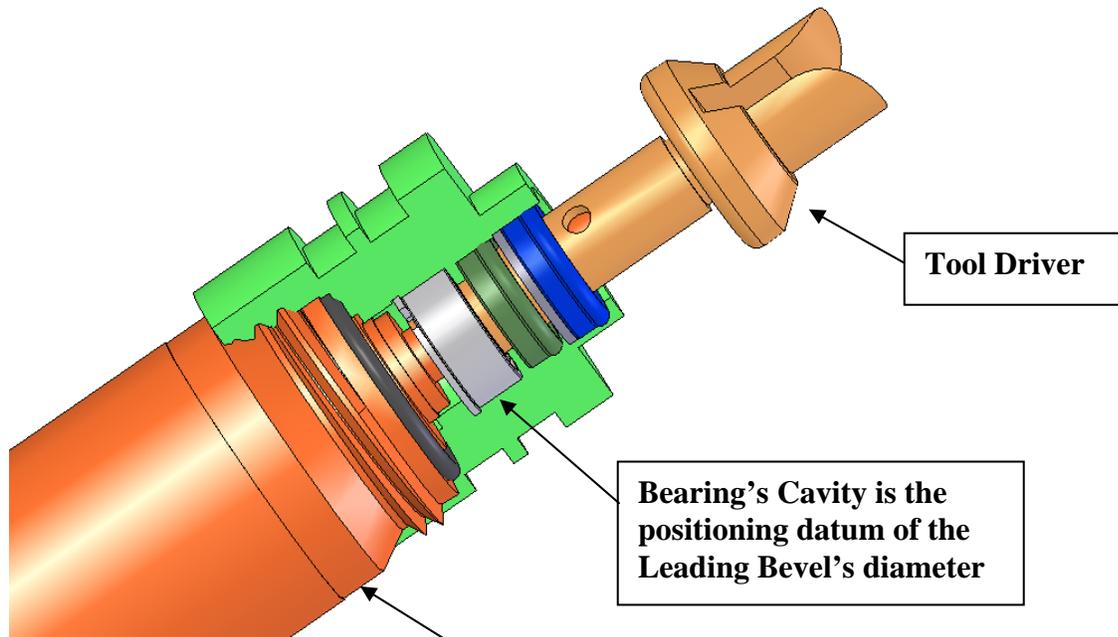
Proposed Design:

Several design concepts were considered and evaluated to incorporate a feature or mechanism that would ensure centering of the motor housing assembly. An aligning feature that consists of a centering leading bevel with threading engagement was chosen due to the following reasons,

1. Eliminates the gap between components because the Insert Housing's inside bevel diameter is the stop (seal) against the outer bevel of the Motor preventing any radial movement
2. Provides a good sealing stop – leading bevel
3. Eliminates total number of parts within the assembly – two sets screws are eliminated from the current design
4. Facilitates the assembly process because the housing is secured by simply threading it onto the motor without having to handle the alignment between components – the bevel self centers the parts
5. Allows for the use of existing components, such as outer housing, bearings and sealing rings, reducing the time and cost of the changeover improvement.

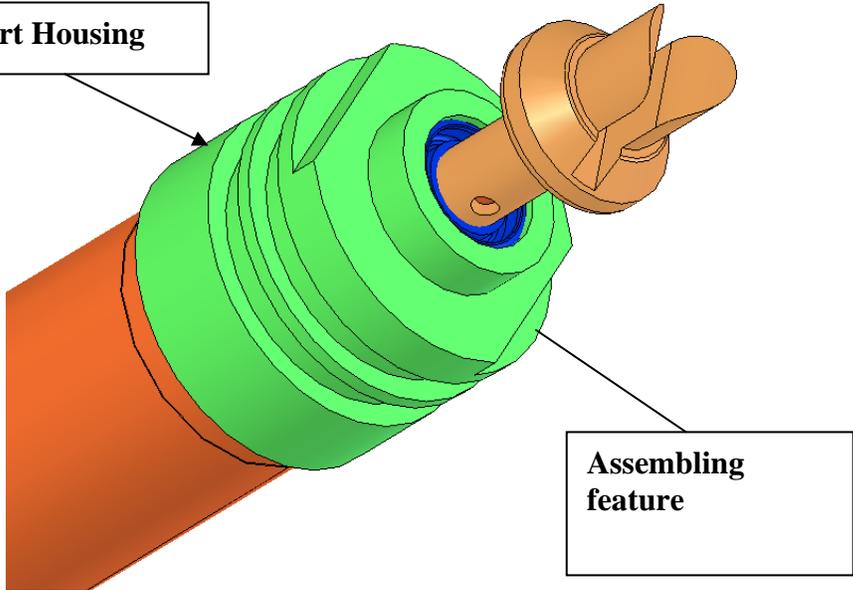
In order to ensure Tool Driver's concentricity, the Motor's leading bevel positioning is directly controlled to the shaft portion and the Insert Housing's leading bevel positioning is controlled to the bearings' cavity. A feature can be added to the top of the Insert Housing to facilitate its insertion during assembly process. The layouts below further describe the centering leading bevel with threading engagement features for the Insert Housing and Motor components.





Motor's precise OD is the datum that controls the positioning of its leading bevel and shaft

Insert Housing



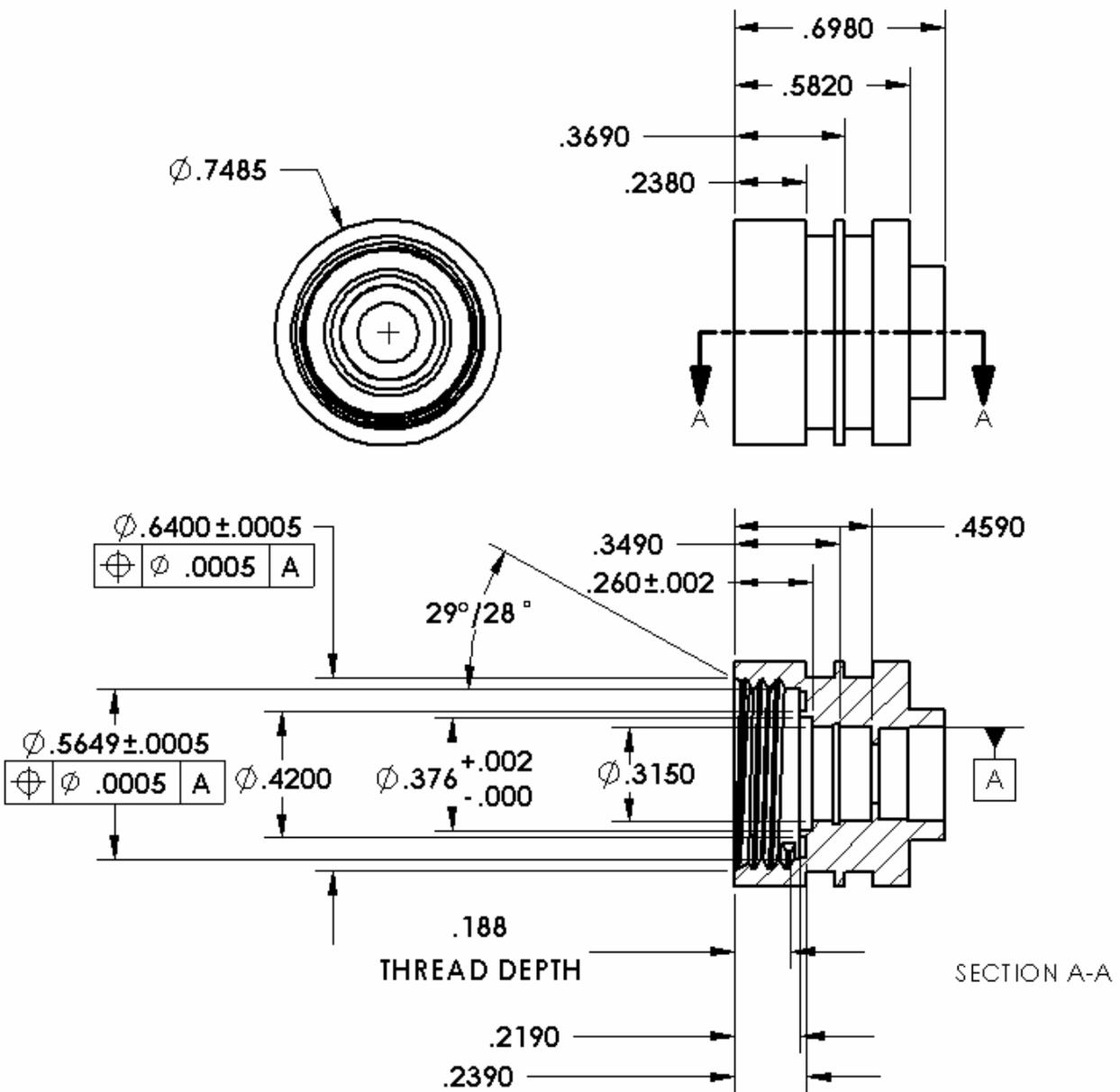
Proposed Design Specifications:

Models of the new proposed Insert Housing and the DC Motor were generated and their specifications were established. The assembly was created and tolerance stack-up analyses at worse case condition were completed.

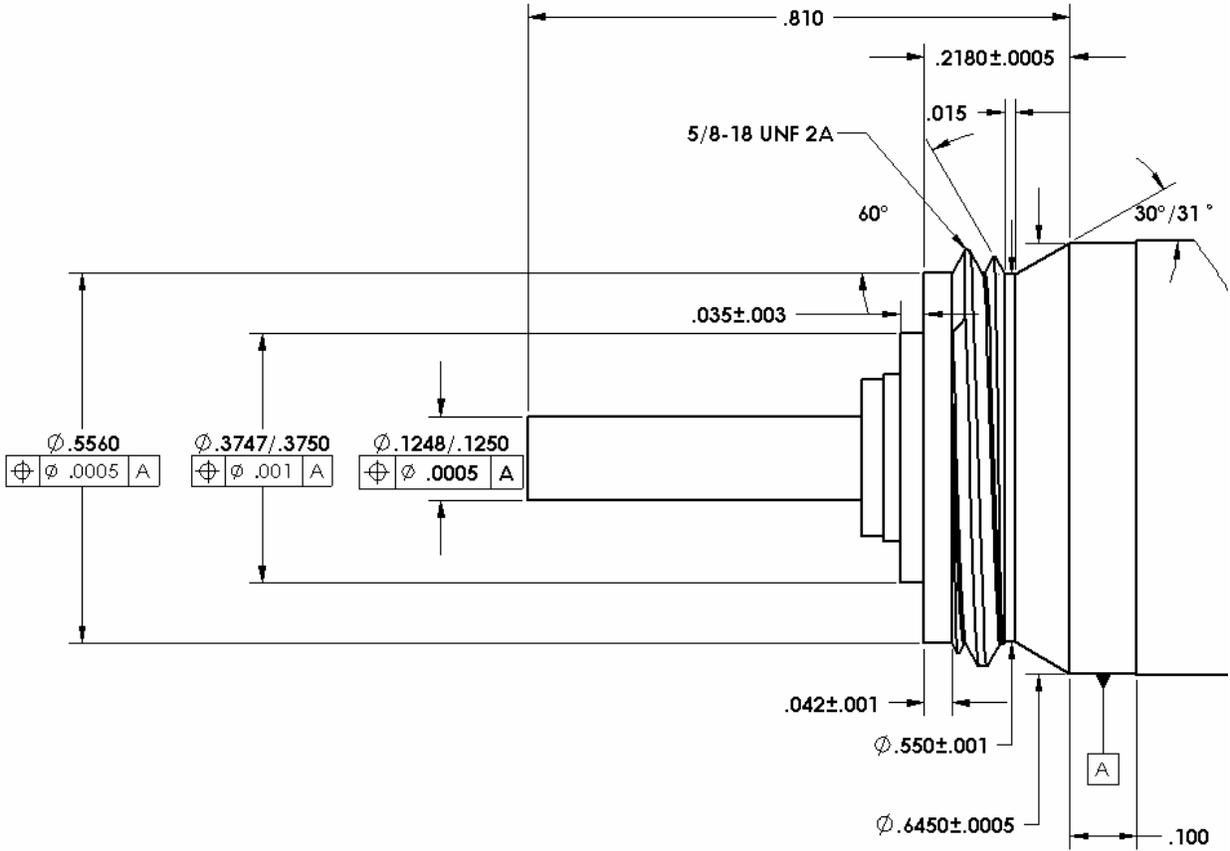
The proposed components' specifications and tolerance analysis are shown below.

- Specifications shown are only for the features that were revised from the existing design.
- Any changes to these specifications are permissible, but would required additional tolerance studies

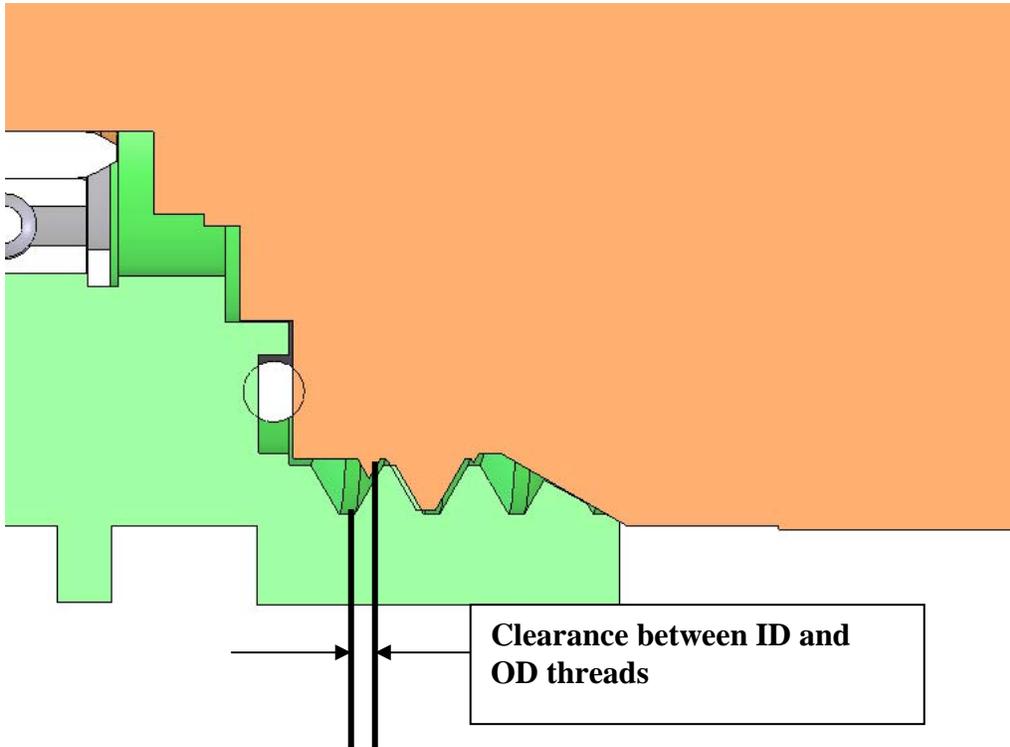
Insert Housing (P/N8158)



DC Motor (P/N B0610H4288)



Tolerance Analysis



Note: The O-Ring cavity depth was left the same as current design (.020), but further evaluations are required to ensure that appropriate amount of o-ring material is being compressed by the Motor's surface.

