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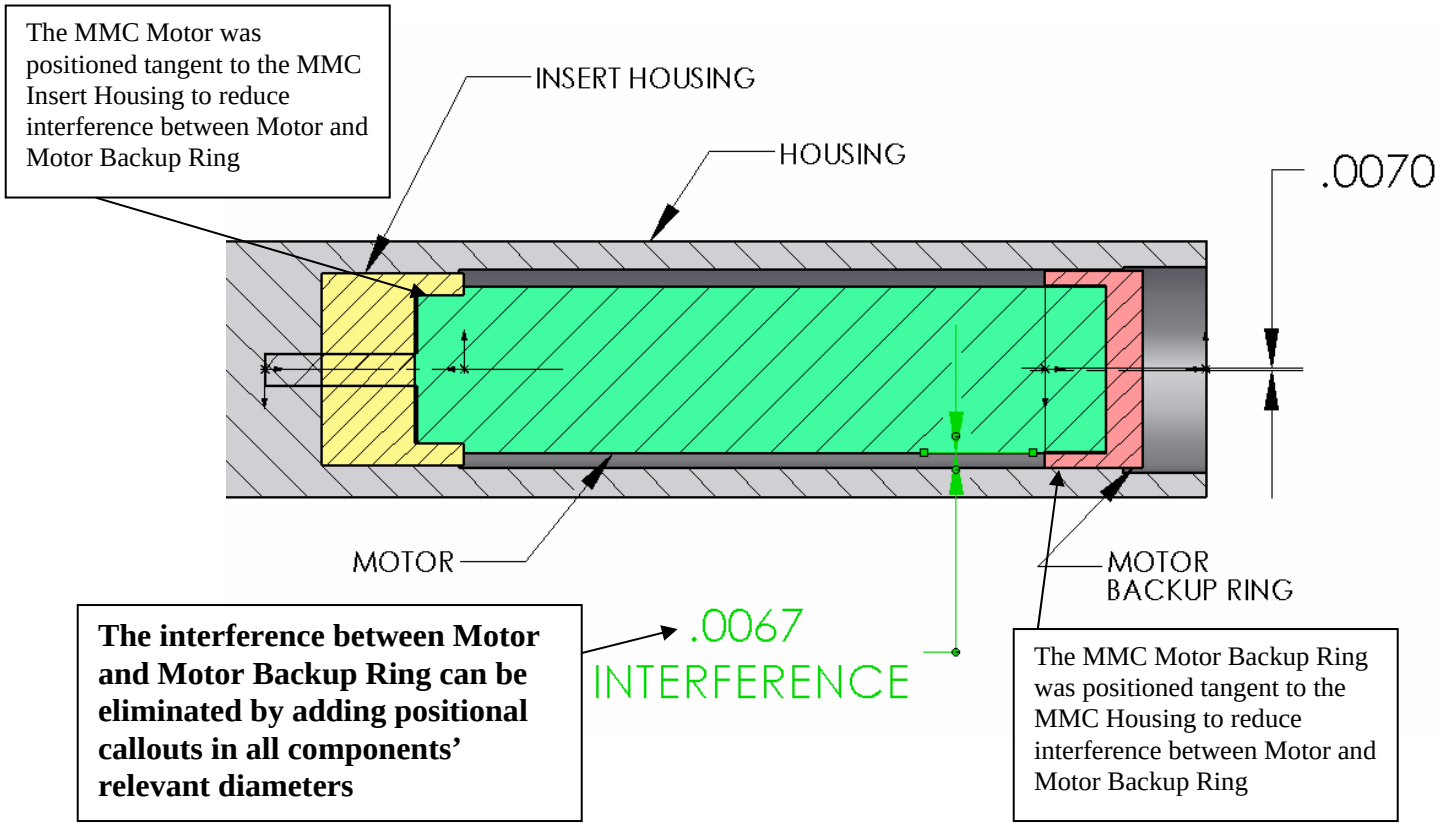
Project #126: Motor Tolerance Analyses

Tolerance analyses were conducted for the Motor and related components to evaluate the safe engagement of the cable to the pins. Analyses of the engineering drawings have shown that the radial positioning of several key diameters are not controlled potentially affecting the alignment between the pins and the cable. Mock-up models were generated at worst-case conditions taking into account the current block tolerances of total runout within .003 and the findings are as follows,

1. The analysis showed a **.0067** interference between the Motor and the Motor Backup Ring

2. The actual positioning of the pins to the cables could not be analyzed because the Motor Connector drawing was not provided.

3. The distance between center lines of the Motor and the cavity that houses the cables (Motor Connector) is **.007** at worst-case conditions.

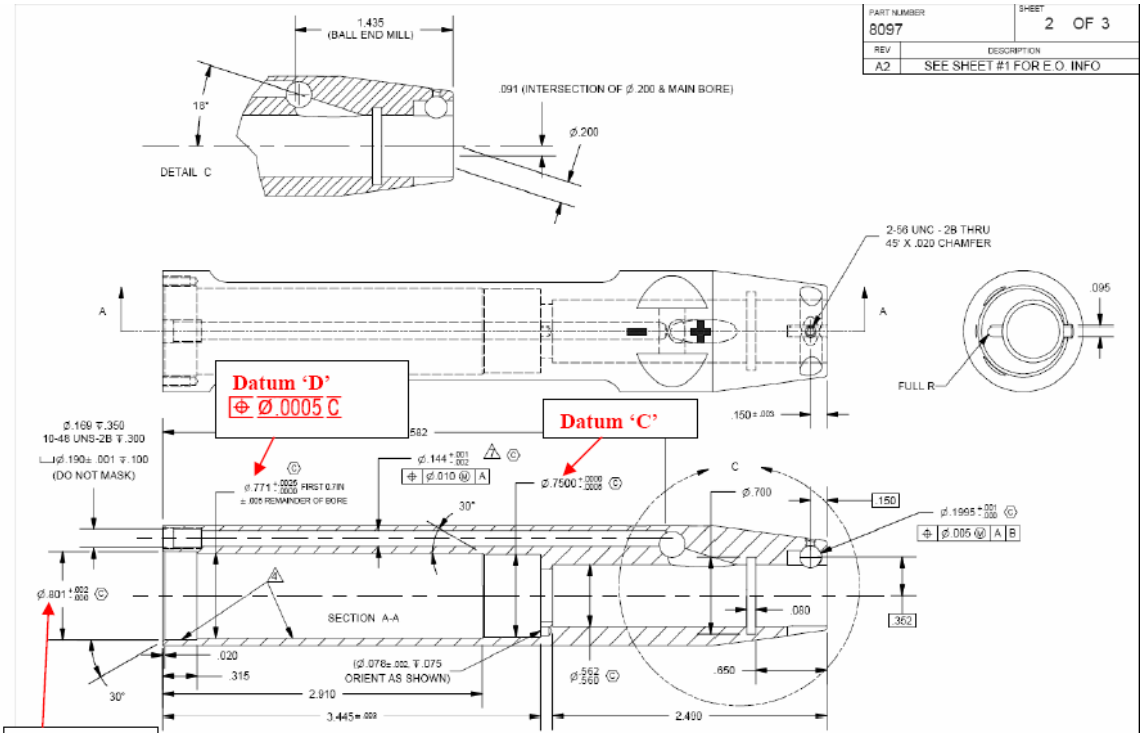


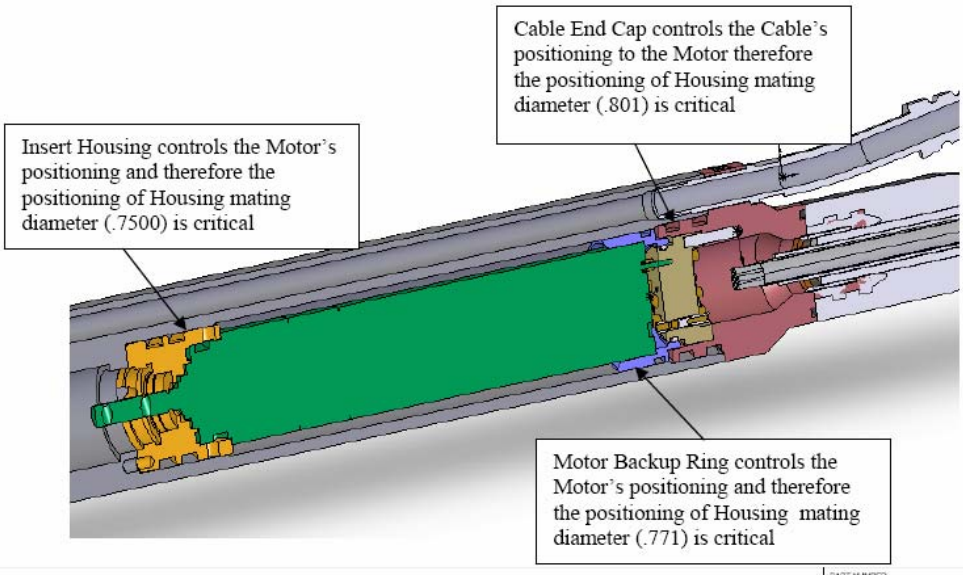
4. Outlined below are the recommended changes for the key diameters of the different related components within the Arthrex assembly.
    a. **Housing (P/N 8097):** The holes that meet with the Insert Housing and the Motor Backup Ring need to be controlled to ensure proper alignment of the Motor to the Cable. The proposed changes are as follows,

        i. Make the .7500 diameter datum 'C'

        ii. Add a true-position callout on the .771 diameter to datum 'C'

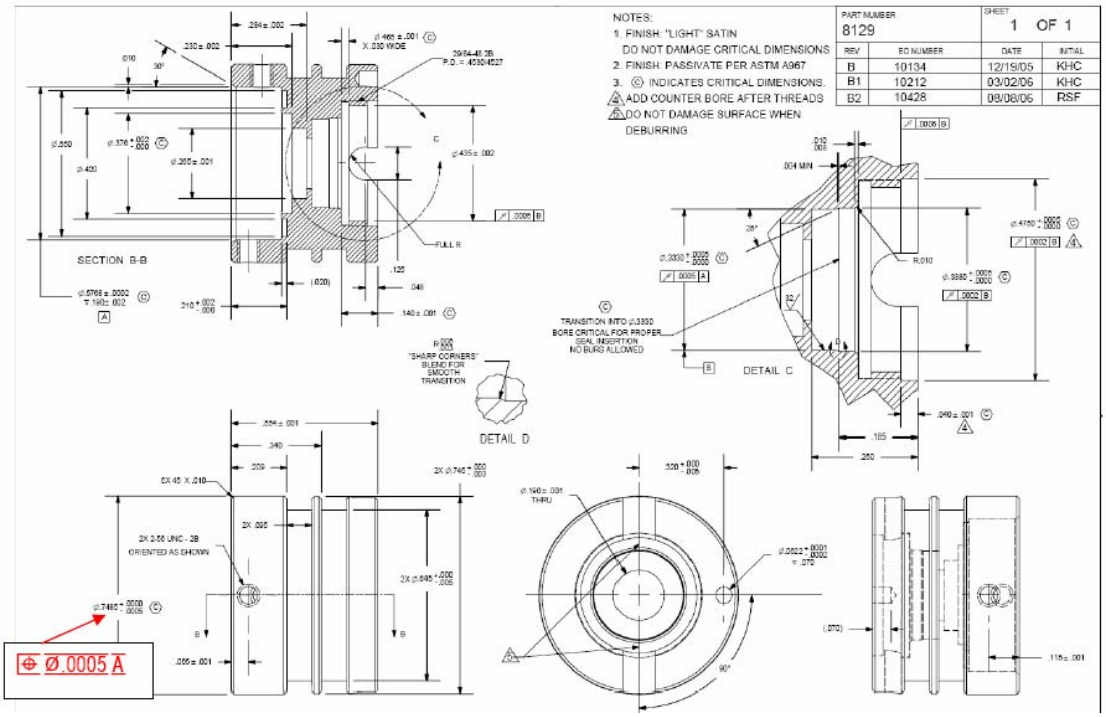
        iii. Add a true-position callout between the Motor Backup Ring mating diameter and the Cable End Cap mating diameter


PART NUMBER
8097
SHEET
2 OF 3
REV
DESCRIPTION
A2
SEE SHEET #1 FOR E.O. INFO
1.435
(BALL END MILL)
18°
.091 (INTERSECTION OF Ø.200 & MAIN BORE)
Ø.200
DETAIL C
2-56 UNC - 2B THRU
45° X .020 CHAMFER
.095
FULL R
Datum 'D'
⌖ Ø.0005 C
Datum 'C'
582
.150±.005
Ø.169 ₸.350
10-48 UNS-2B ₸.300
⌴Ø.190± .001 ₸.100
(DO NOT MASK)
Ø.144 +.001 -.002
⌖ Ø.010 Ⓜ A
Ø.7500 +.0000 -.0005
30°
C
Ø.700
150
Ø.1995 +.001 -.000
⌖ Ø.005 Ⓜ A B
Ø.801 +.002 -.000
SECTION A-A
.080
362
.020
.315
(Ø.078±.002 ₸.075
ORIENT AS SHOWN)
Ø.562 +.000 -.005
.650
30°
2.910
3.445±.003
2.400


Cable End Cap controls the Cable's positioning to the Motor therefore the positioning of Housing mating diameter (.801) is critical
Insert Housing controls the Motor's positioning and therefore the positioning of Housing mating diameter (.7500) is critical
Motor Backup Ring controls the Motor's positioning and therefore the positioning of Housing mating diameter (.771) is critical

b. **Insert Housing (P/N 8129):** The outer diameter of the Insert Housing needs to be controlled to the mating diameter of the Motor to ensure proper alignment of the Motor to the Cable. The proposed change is as follows,

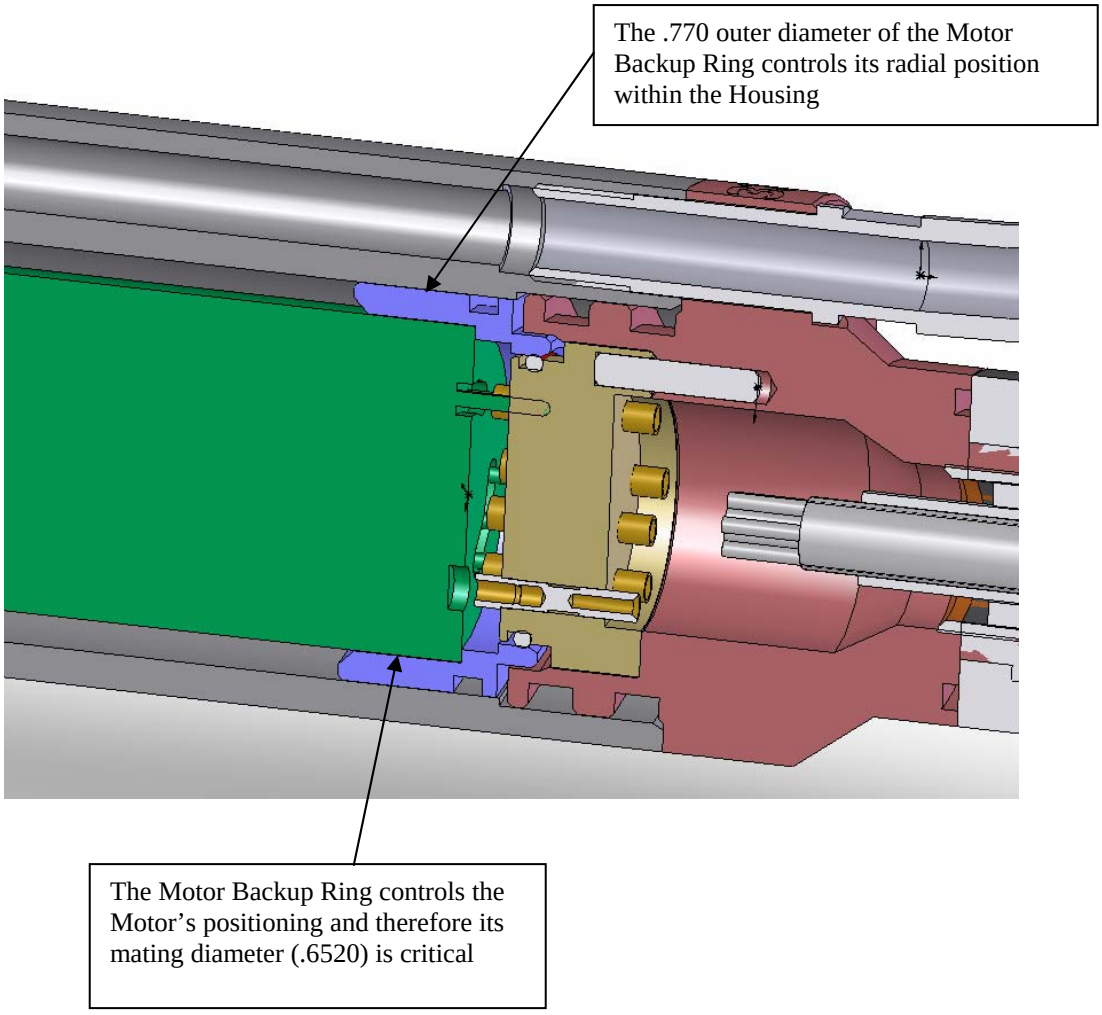
iv. Add a true-position callout on the .7485 diameter to datum 'A'



c. **Motor Backup Ring (P/N 8060):** The outer diameter of the Motor Backup Ring needs to be controlled to the mating diameter of the Motor to ensure proper alignment of the Motor to the Cable. The proposed changes are as follows,

v. Add datum 'A' to the mating diameter of the Motor (.6520)

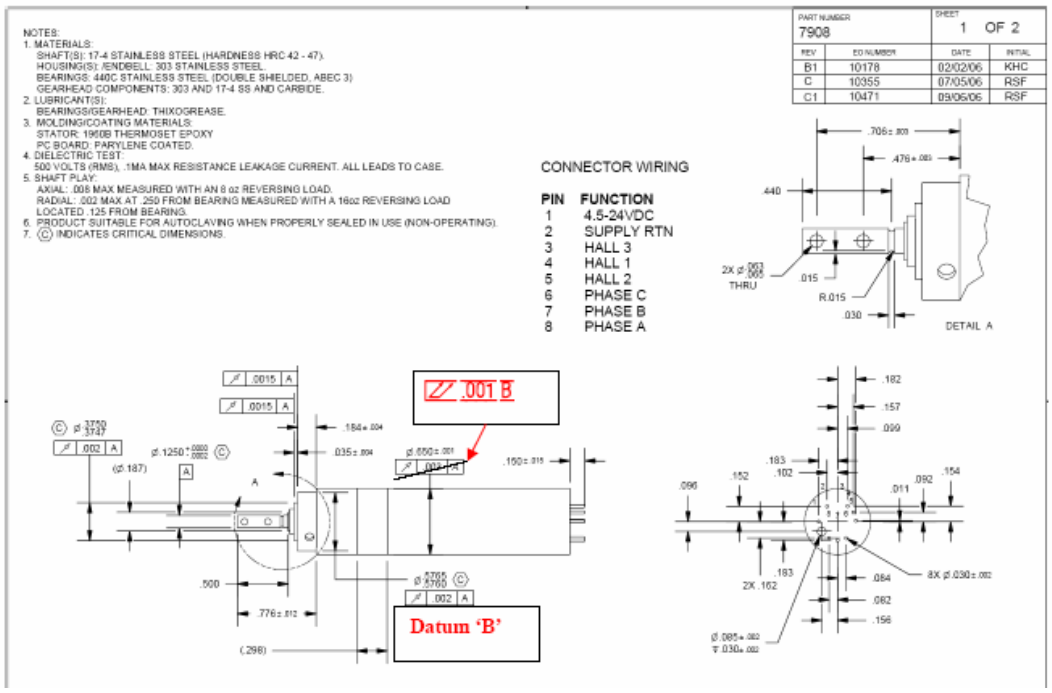
vi. Add a true-position callout on the .770 diameter to datum 'A'



d. **Motor (P/N 7908):** The outer diameter of the Motor needs to be controlled to the diameter that meets with the Insert Housing to ensure that the Motor is properly positioned to the Cable. The proposed changes are as follows,

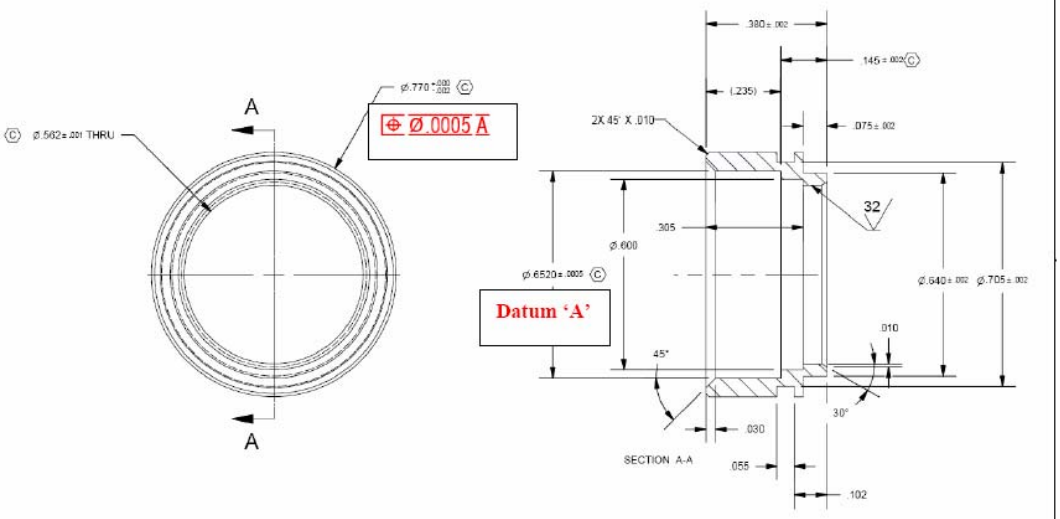
vii. Add datum 'B' to the mating diameter of the Insert Housing (.5765/.5760)

viii. Add a total runout specification on the .650 diameter to datum 'B'



NOTES:
1. FINISH: LIGHT SATIN DEBUR.
2. FINISH: PASSIVATE PER ASTM A967
2. Ⓒ INDICATES CRITICAL DIMENSIONS.

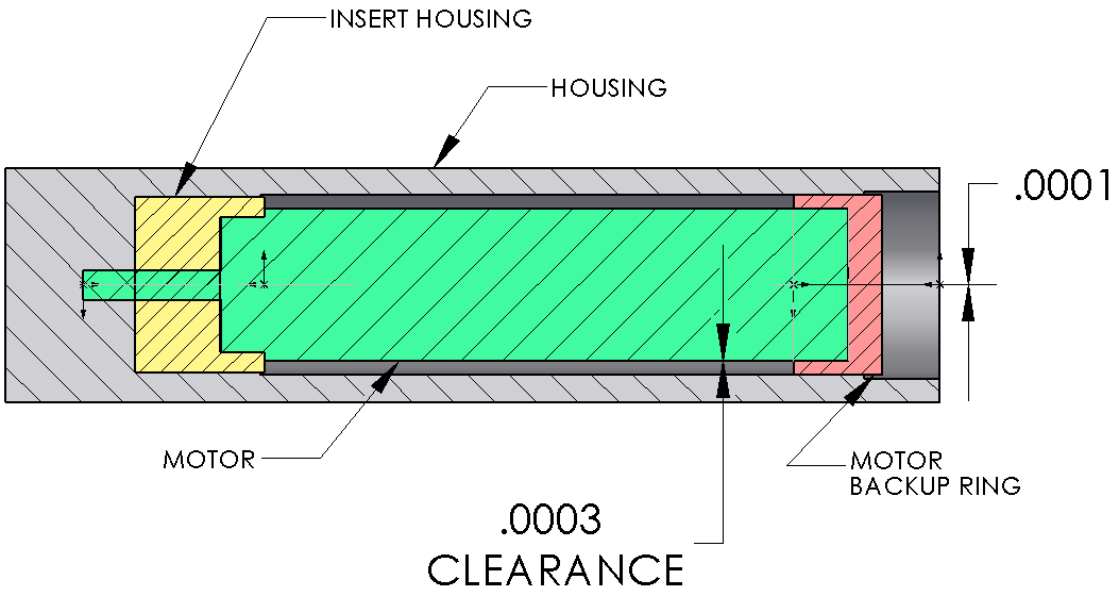
PART NUMBER 8060		SHEET 1 OF 1	
REV	EO NUMBER	DATE	INITIAL
A	10006	09/27/05	KHC
B	10053	11/01/05	KHC



5. **Analysis after implementing recommended positional callouts:**

    a. The .0067 interference between the Motor and the Motor Backup Ring was eliminated creating a .0003 clearance.

    b. The distance between center lines of the Motor and the cavity that houses the cables (Motor Connector) was greatly improved from .007 to **.0001**.



6. **Conclusion:** Even though the alignment of the Motor to the Motor Back Rings has been greatly improved by incorporating positional callouts to the applicable diameters, the analysis to ensure safe engagement of the cable to the pins could not be conducted because the following drawings need to be provided,

    a. **Dowel Pin (P/N 8055)**

    b. **Motor Connector (P/N A8059)**