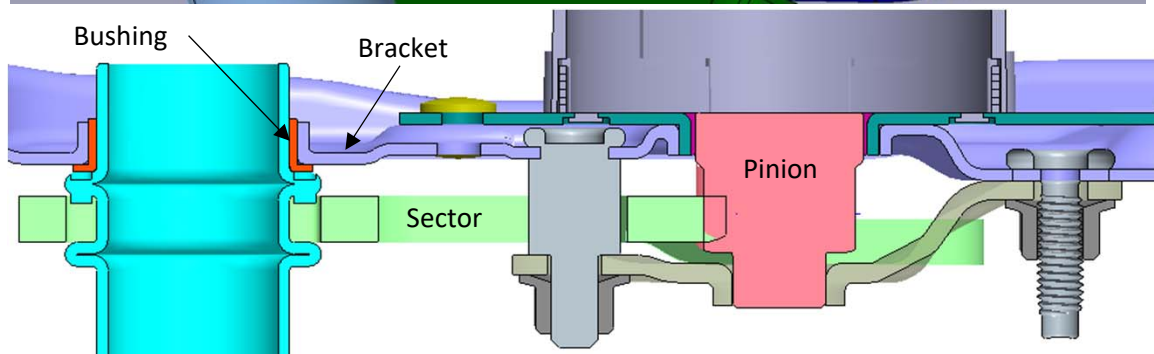
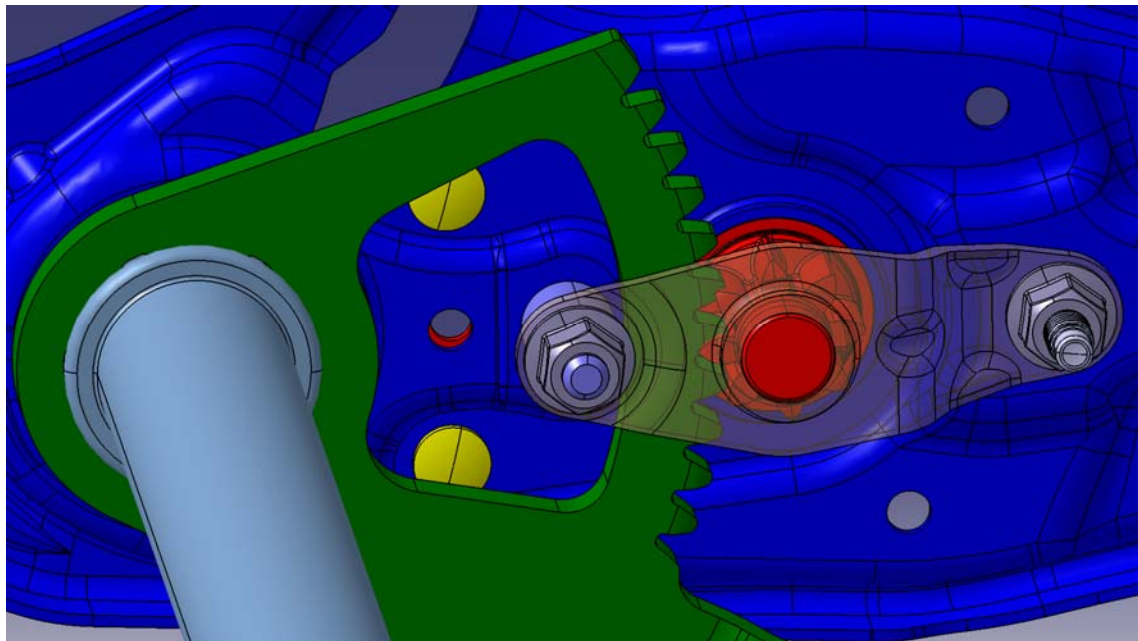


## Sector Gear Specification

- **Problem:**
  - A Power seat lift mechanism exhibited a “lumpy” feel during adjustment
  - The Sector had no gear specifications
  - CAD data without involute profiles was used to fabricate the parts
- **Objective:**
  - Investigate gear mesh characteristics to determine if problem may be resolved with revisions to the sector gear and component geometry and tolerances
  - Recommend gear specifications for drawing
- **Constraints:**
  - Maintain current gear module and ratio
  - Pinion is a current production part and may not be revised

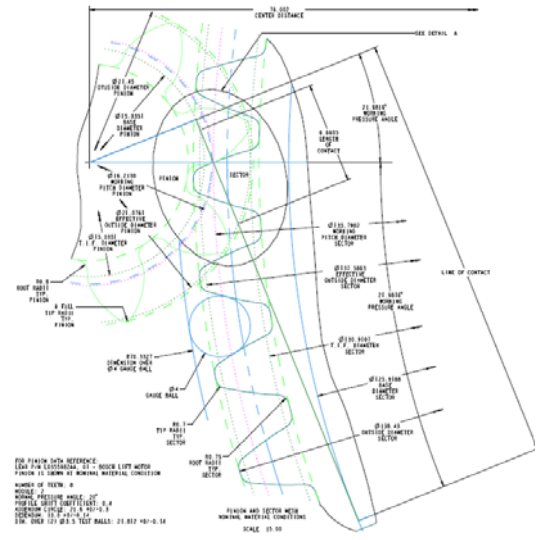
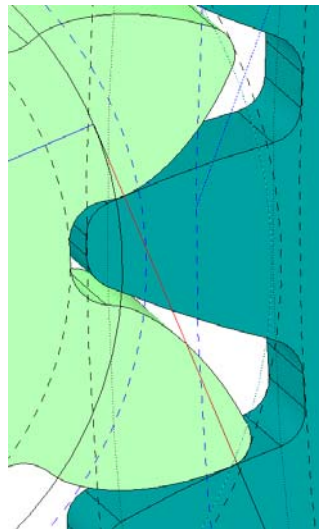
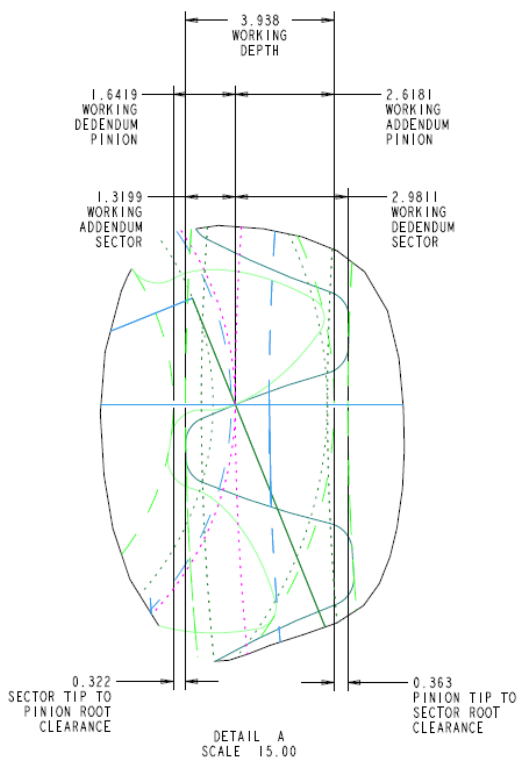


# Virtual Engineering, Inc.

Engineering Your Competitive Edge...

## Sector Gear Specification

- Process:**
  - Calculated maximum and minimum contact ratios based on available drawing tolerances (goal is minimum contact ratio greater than 1)
  - Verified tip-to-root clearance (goal is to always have positive clearance)
  - Documented backlash (goal is to minimize)
  - Calculated characteristics for several iterations of component tolerance and sector gear profile shift variations
  - Demonstrated contact ratio application using CAD models in Creo Parametric
- Results:**
  - Root cause of problem was that the contact ratio was less than 1
  - Laid out several options for customer to consider
  - Final selected options were a balance of minor tolerance tightening and revision to the sector gear profile shift
  - Provided customer with nominal gear CAD models



	VE630-03	VE630-04	VE630-02	VE630-05	VE630-01
<b>Gear</b>					
Profile Tolerance [mm]	0.15	0.1	0.1	0.15	0.15
<b>Bracket</b>					
Positional Tolerance [mm] bet. torsion tube pivot hole and actuator pilot hole	0.3	0.2	0.1	0.1	0.03
Profile Shift	-0.035	-0.005	0.02	0.049	0.068
<b>CD</b>					
Min	75.764	75.814	75.864	75.864	75.899
Nom	76.002	76.002	76.002	76.002	76.002
Max	76.304	76.254	76.204	76.204	76.169
<b>Contact Ratio [ ]</b>					
Low	0.887	0.959	1.002	0.972	1.011
Nominal	1.061	1.014	1.120	1.100	1.119
High	1.209	1.214	1.226	1.213	1.212
<b>Backlash [degrees]</b>					
LMC Pinion and Gear, Max CD	0.706	0.551	0.485	0.540	0.492
NOM Pinion and Gear, Nom CD	0.321	0.220	0.220	0.223	0.205