

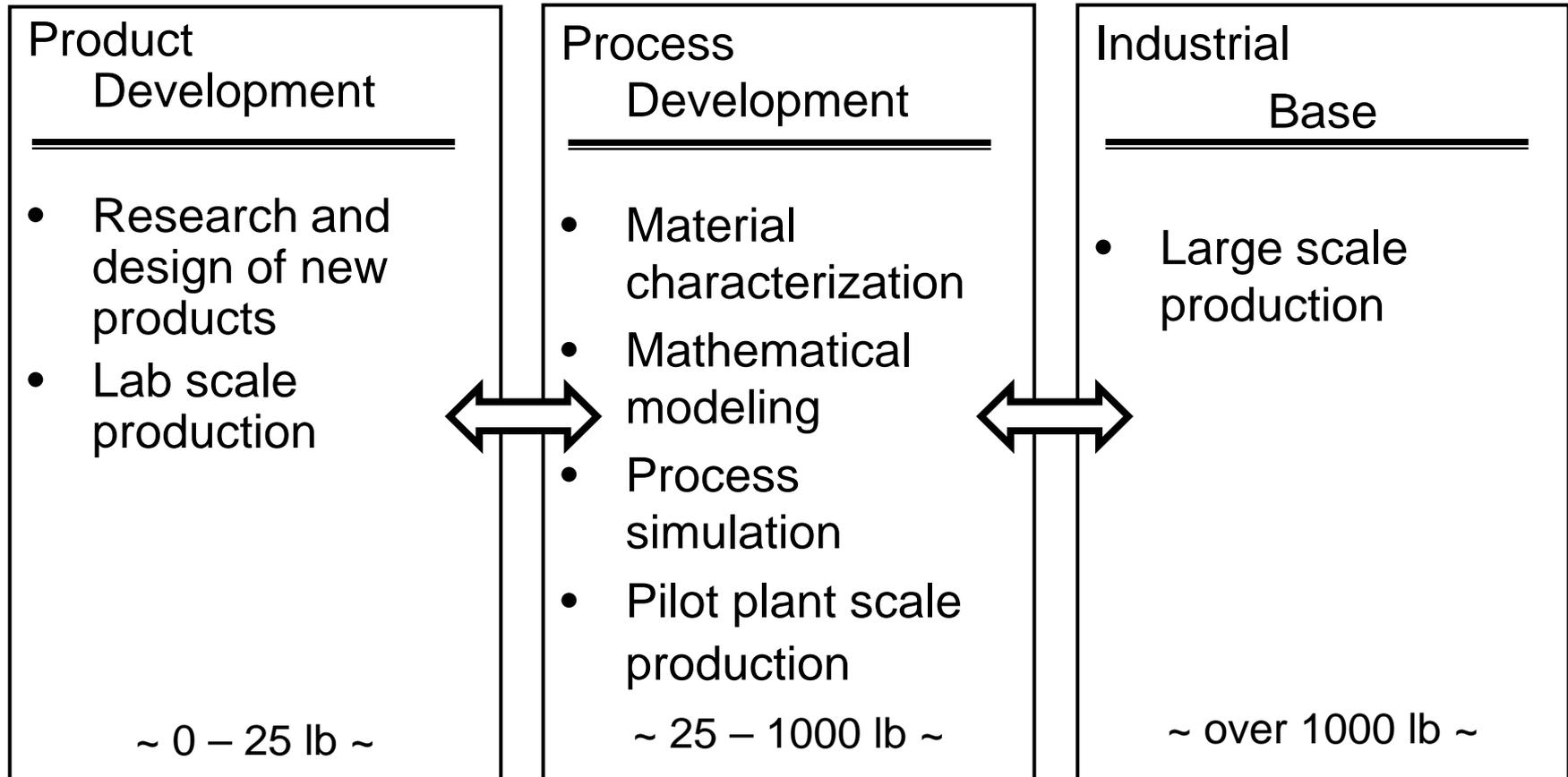


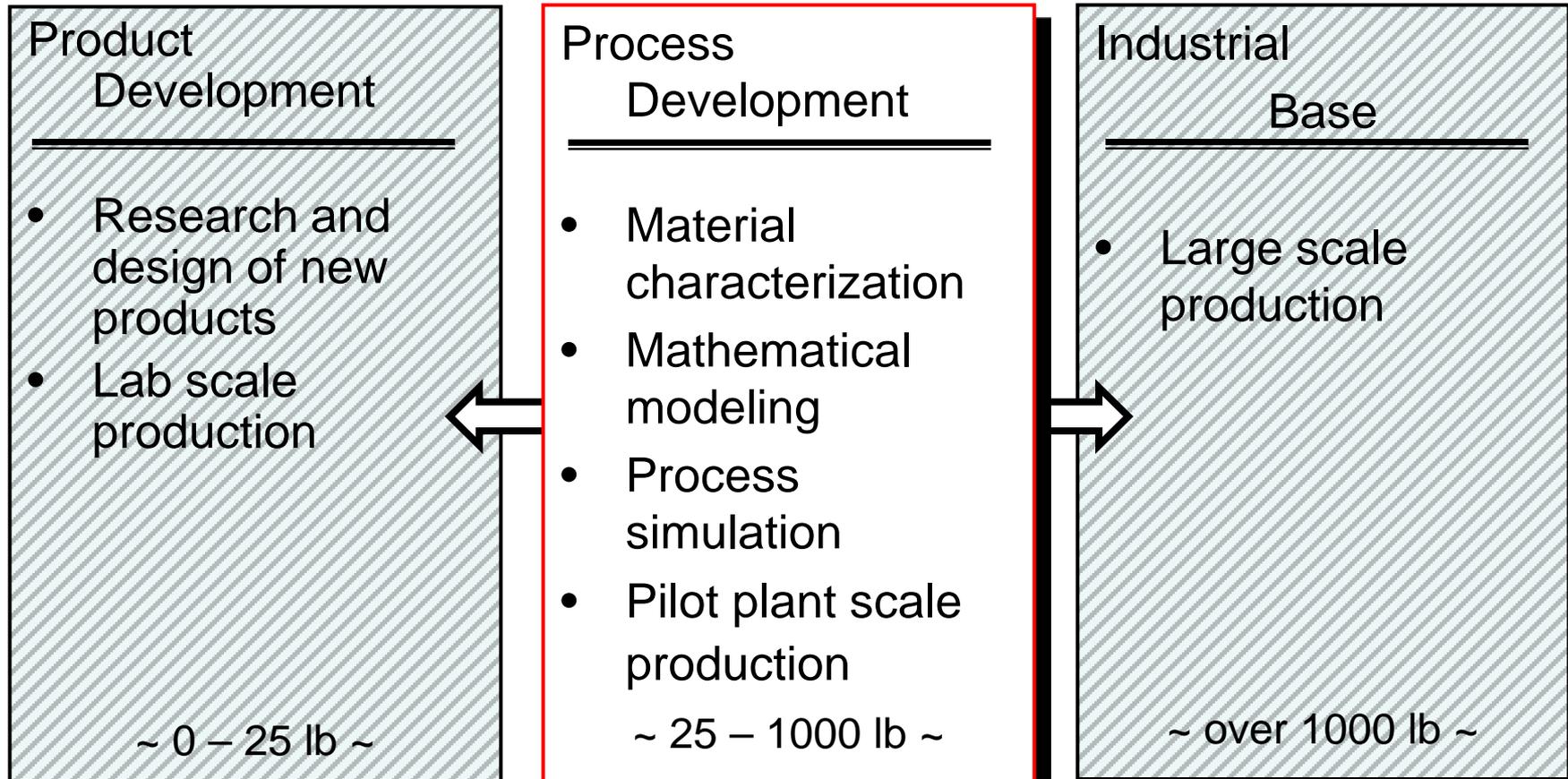
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

RDECOM-ARDEC 40 mm Twin Screw Mixer/Extruder Facility

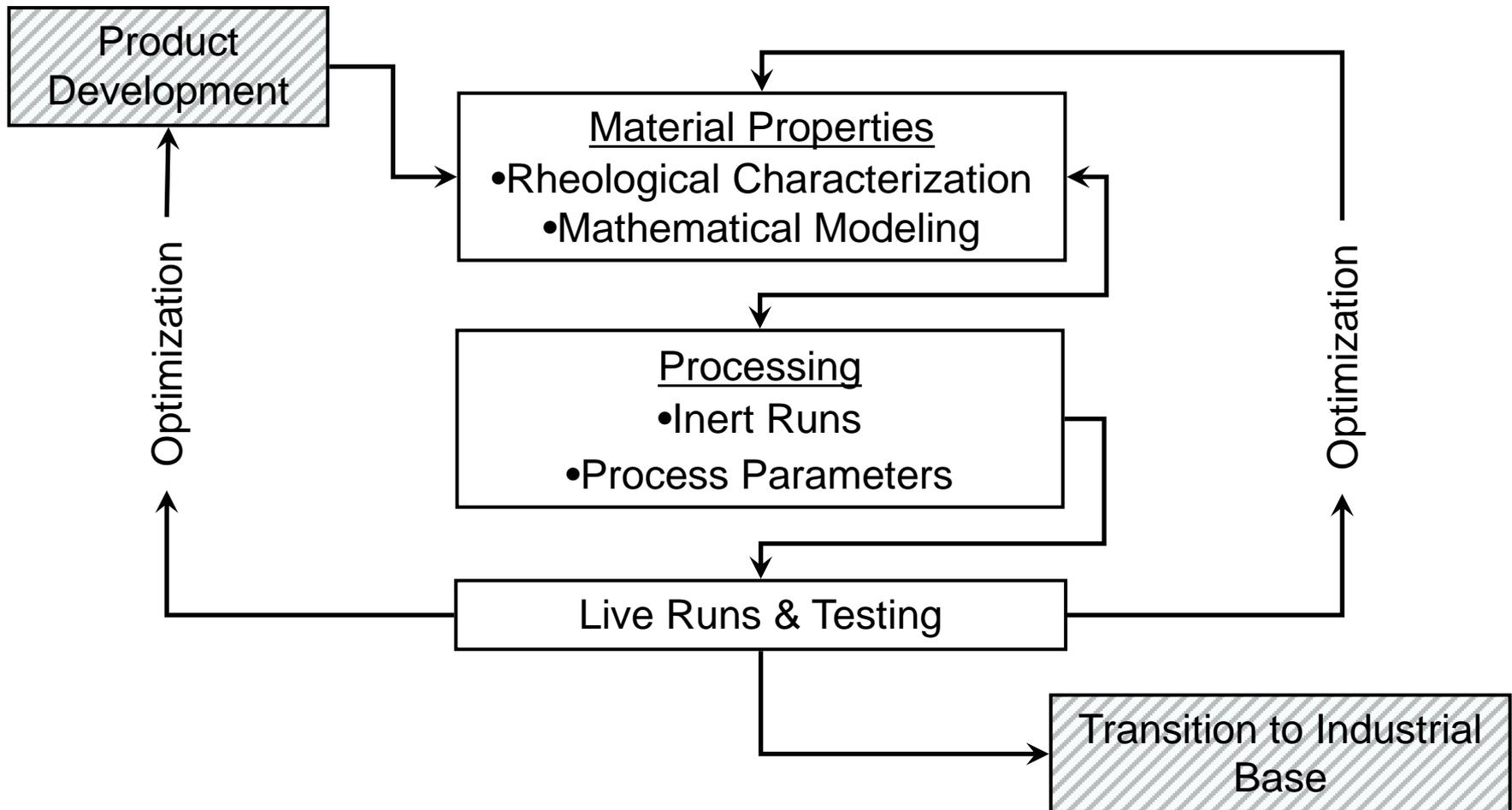
Users Group 10-22-09

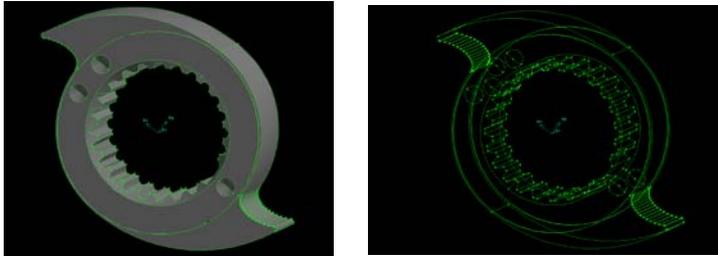
Overall Project Development Strategy



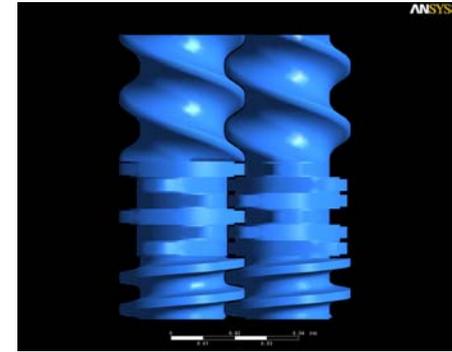


Science Based Approach

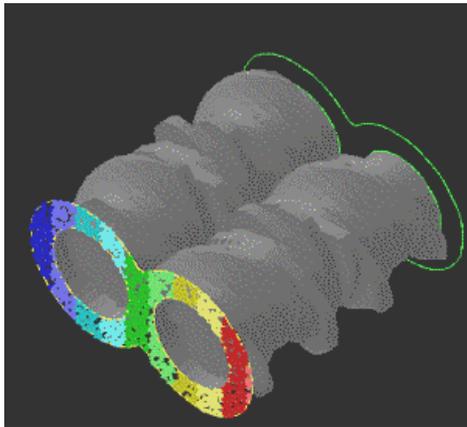
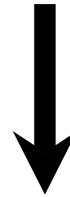




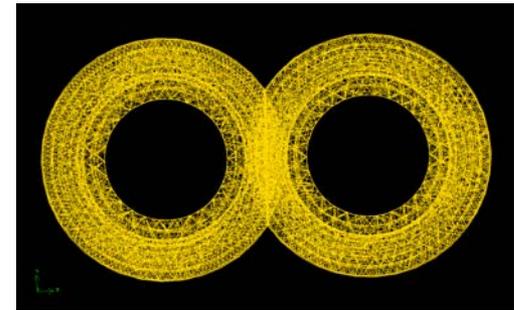
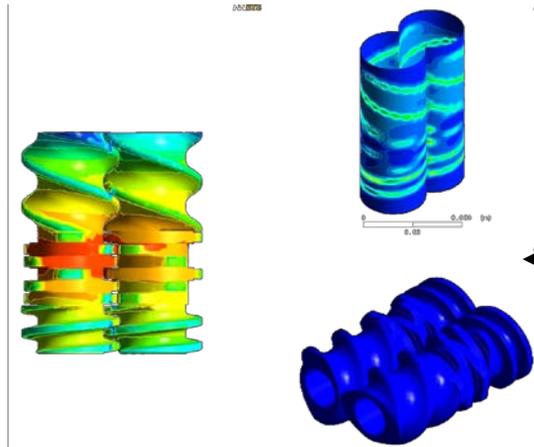
CAD File Imported into Geometry and Mesh Generation Software



Screw Segment Assembly



Export Mesh File into CFD software for simulation parameter selection, data compilation, and analysis.

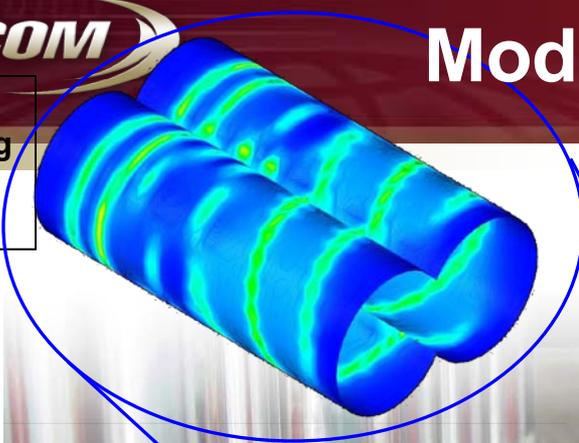


Screw Segment Meshing

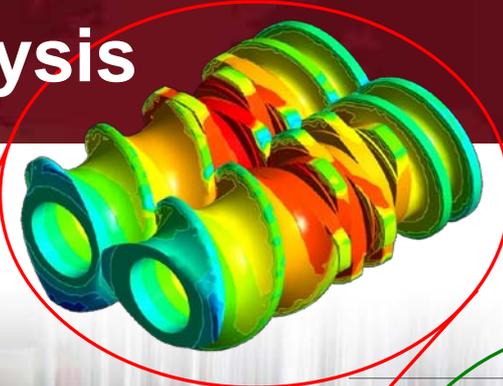
Model Analysis



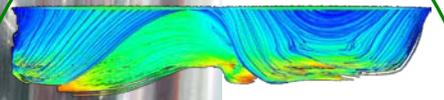
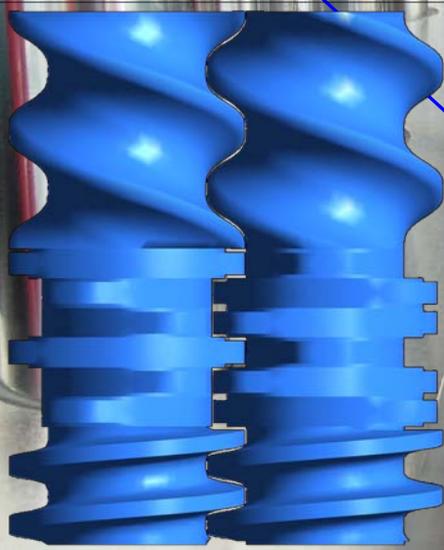
Shear Rate Profile along Barrel Section



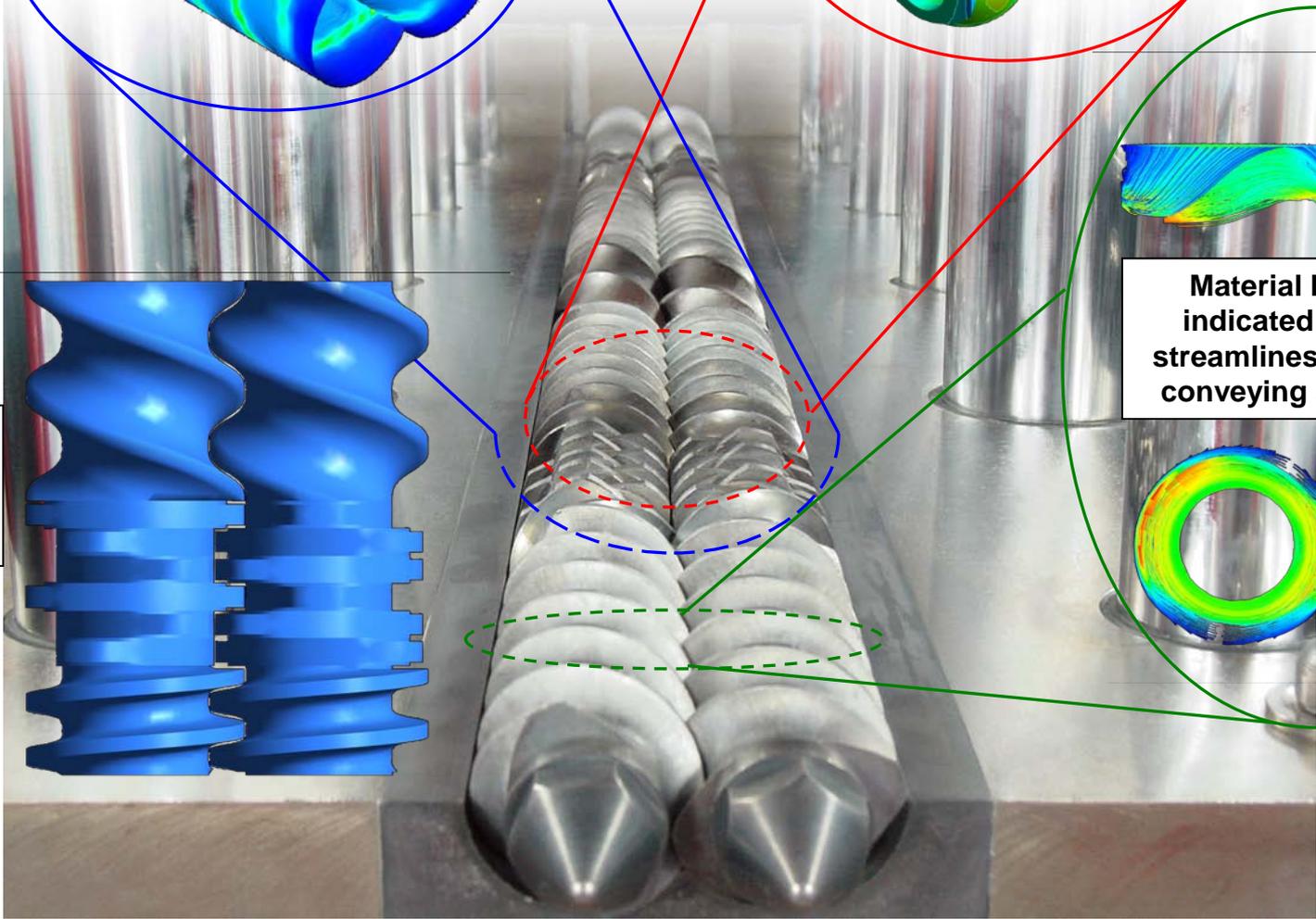
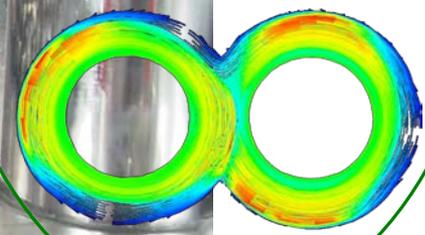
Temperature Profile along screw segments



Screw Elements Model for Analysis



Material Flow, as indicated through streamlines, of screw conveying segments





Co – Rotating

Twin Screw Extruder

- 40mm
- Fully Intermeshing
- Segmented Screw
- Clam Shell
- Continuous product flow (~35 lb/hr)
- Variable feed inputs
 - Five powder ports
 - Ten liquid ports
- Safety
 - Open product flow channel
 - 2-3 lb of in-process material
- Process control
 - Five T/P Transmitters
 - Two Torque Sensors

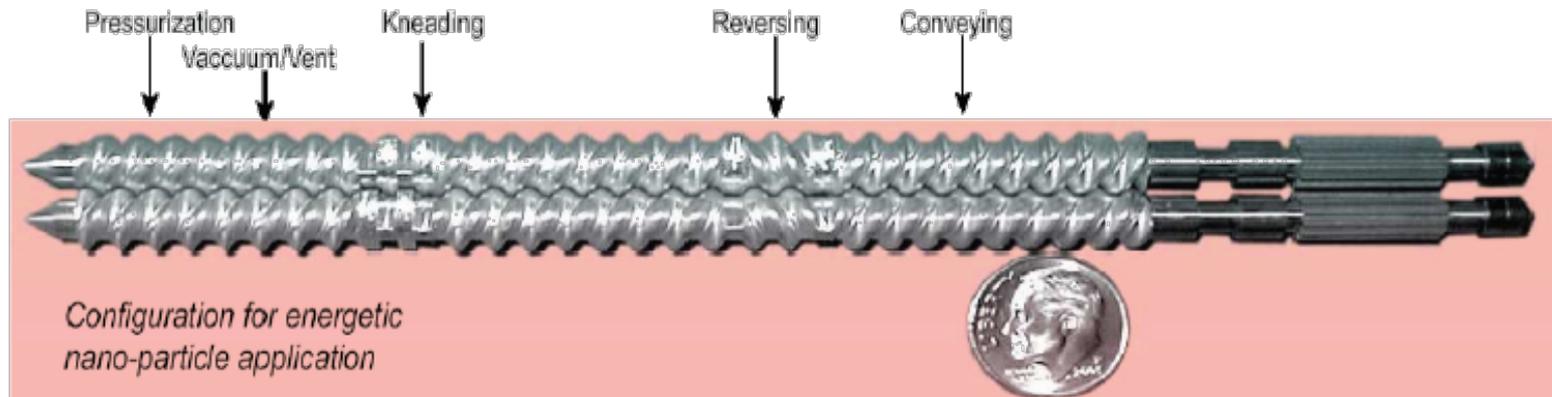
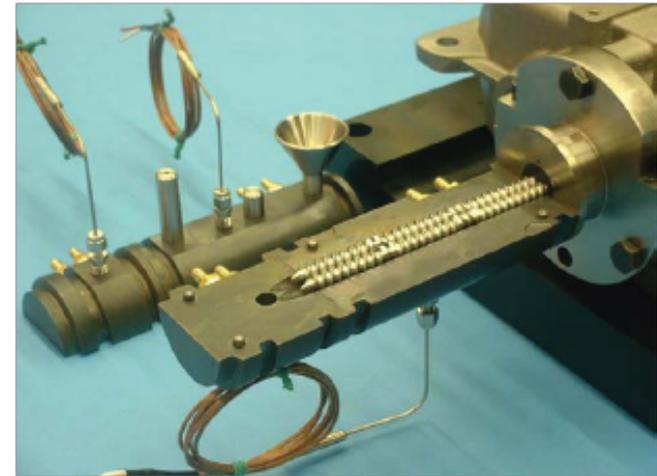


Single Screw Extruder:

- 40mm
- Fully Intermeshing
- Segmented Screw
- Clam Shell
- Continuous product flow (~20 lb/hr)
- Variable feed inputs
 - Five powder ports
 - Ten liquid ports
- Process control
 - Five T/P Transmitters
 - Torque Sensor

7.5 mm Twin Screw Mixer / Extruder

- Fully Intermeshing, Co rotating, bore diameter of 7.5 mm, screw diameter of 7.38, and clearance is $D/128$ (+/- 60 microns)
- Screws monolithic, made from cast iron, possessing kneading and reversing sections, 3 sealed mixing and vacuum zones



40 mm TSE

- Black Powder Alternative

- CMC 50 lb

- NC 50 lb

- PAX – 3 4000 lb

- PAX – 30 15 lb

7.5 mm

- Nano Material Dispersion

- PAX – 3 5000 lb
- PAX – 30 1000 lb
- JSX – 1 250 lb
- PAX – 46 250 lb
- Nano Dispersion
- Low Temperature Coefficient Propellant
- Green Single Base Propellant