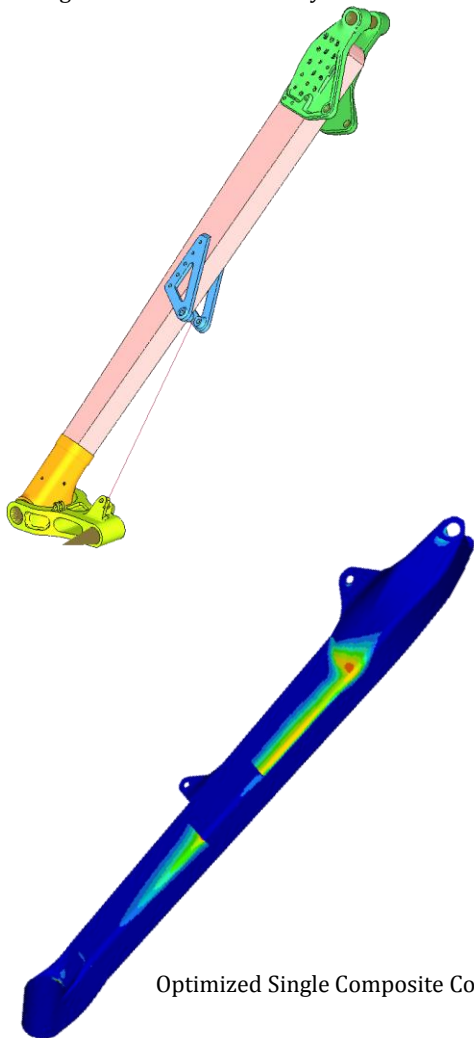**ATI**
Applied Technology Integration

Objective:
- Design a one piece composite strut that would replace a 26 lb. multi part assembly

Constraints:
- Optimized Design must be less than 20 lbs.
- Optimized Design must meet or exceed baseline design performance
- Optimized Design must maintain package space

Original Multi Part Assembly

Optimization Approach:
- The original multi part assembly was used to create a finite element model to verify the loading to be used in the optimization process
- Design Variables were determined (Thickness, Material, Geometry Constraints, Size Limits, etc)
- Responses were defined (Mass, Stress, Deflection, etc)
  - o Constraints were placed on the responses establishing acceptable values
- An Optimization study was performed using HEEDS
  - o HEEDS actively explored the Design Space, automatically considering multiple Design Variables and identified potential solutions which satisfy the Constraints
  - o HEEDS intelligently identified relationships between Design Variables and Responses to dynamically alter the search strategy
- Utilizing the HEEDS results a new one piece design of the part was modeled
  - o For ease of manufacture the composite design was further optimized to maintain constant thickness

Optimized Single Composite Component

Results:
- Single Composite Design achieved
- Weight reduced to approximately 19.44 lbs.
  - o 25% reduction in weight
- No composite fiber failure