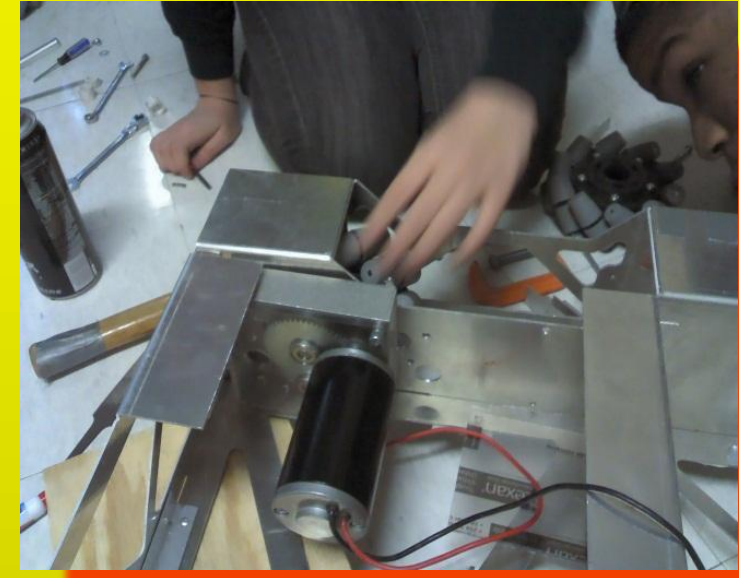




## Old (2013) Design/Manufacture Process

## New (2014) Design/Manufacture Process



- Informal student CAD group
- Limited team-wide use
- CAD of only the chassis plates.

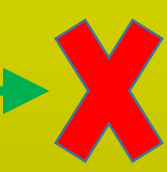
- Off-season CAD training
  - Sponsored by TEDCF Publishing
  - More students involved
- New CAD subteam
  - At least one student on each sub-team
  - CAD mentor
  - Standard parts library
  - File sharing via Autodesk 360
- Documented "best practices" on team website ([firstteam1719.org](http://firstteam1719.org))
  - Enforced those best practices with formal design review

- Formal CAD team
- Better design principles
- CAD of entire drive



Significant re-work of parts before assembly

Part rework was *totally* eliminated thanks to the improved design process

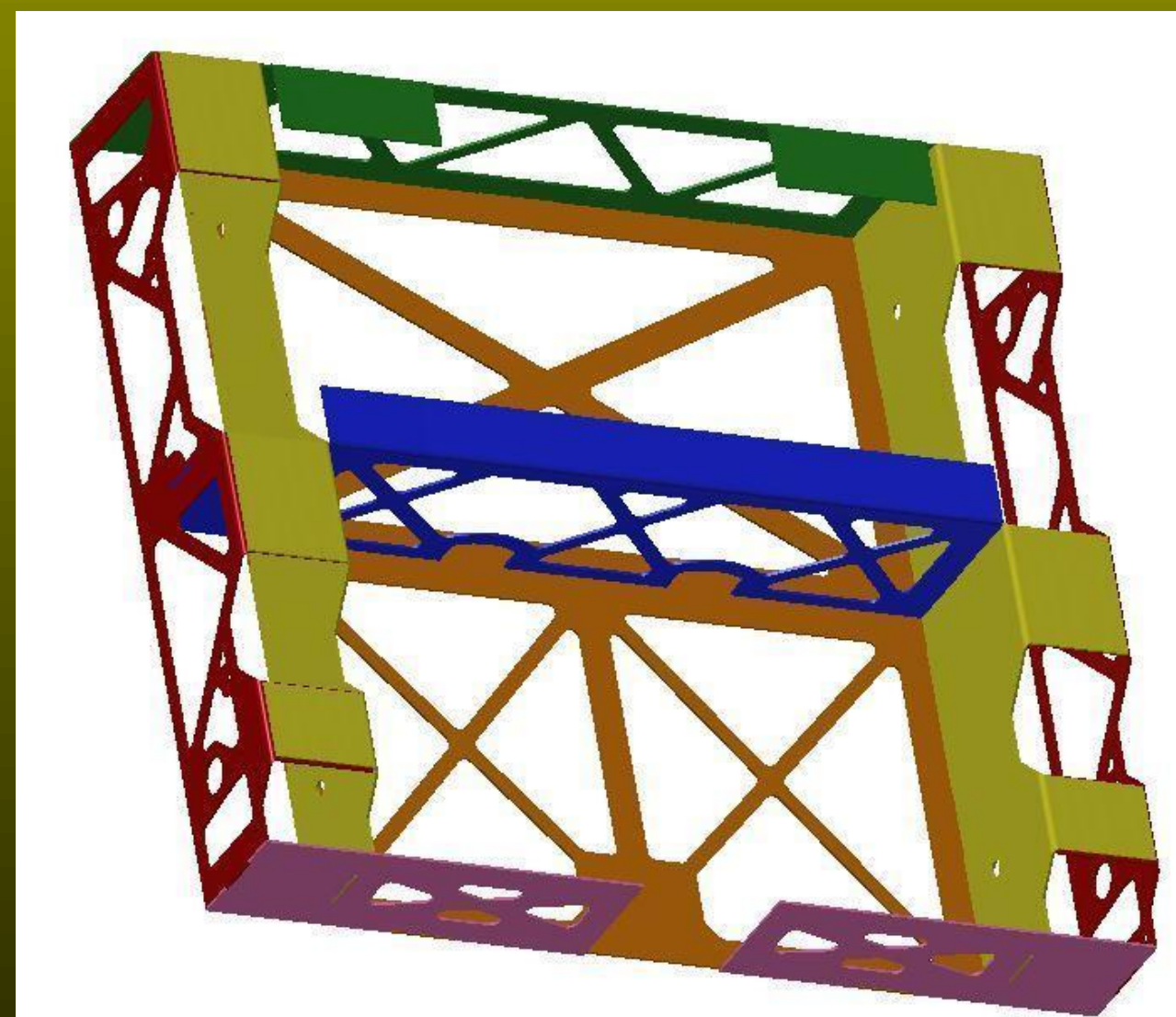
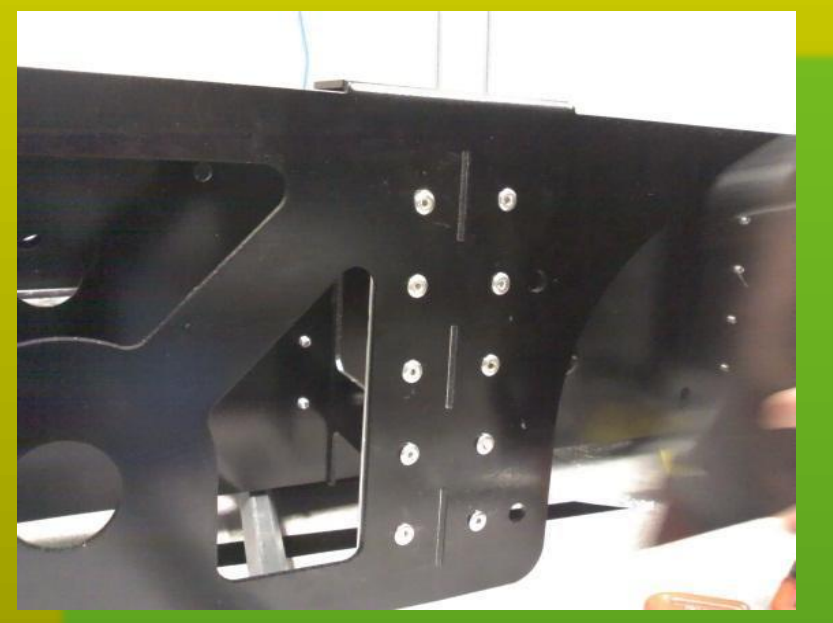


- No pre-assembly
- Assemble with C-clamps

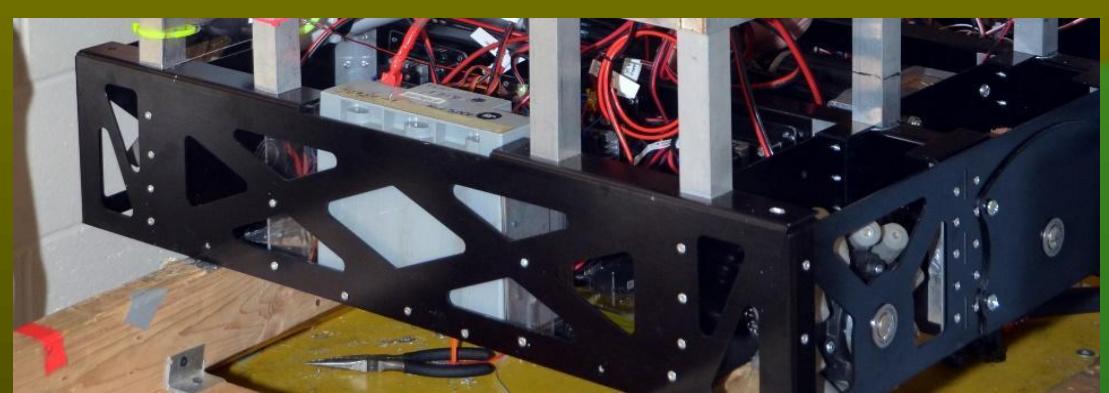
- Specialty tooling developed
- Allows for easy pilot-hole drilling
- Used extensively in the aerospace industry

- Develop new assembly procedure with Cleco fasteners and pilot holes
- Also use extensively in the aerospace industry

- Pre-drill angle joints
- Pre-assemble wheels, gearboxes
- Assemble with Cleco fasteners



**2013 RESULT:**  
 Part Rework time: 1 week  
 Chassis assembly time 3 days.  
 ONE completed drive by week 5, with many deficiencies in terms of structural stiffness and wheel alignment



**2014 RESULT:**  
 Part rework time: none!  
 Chassis assembly time: ~1 day  
 TWO completed drives by week 4, with vast improvements in structure, part alignment, speed and reliability.

