



# Novak Universal T18 Transmission

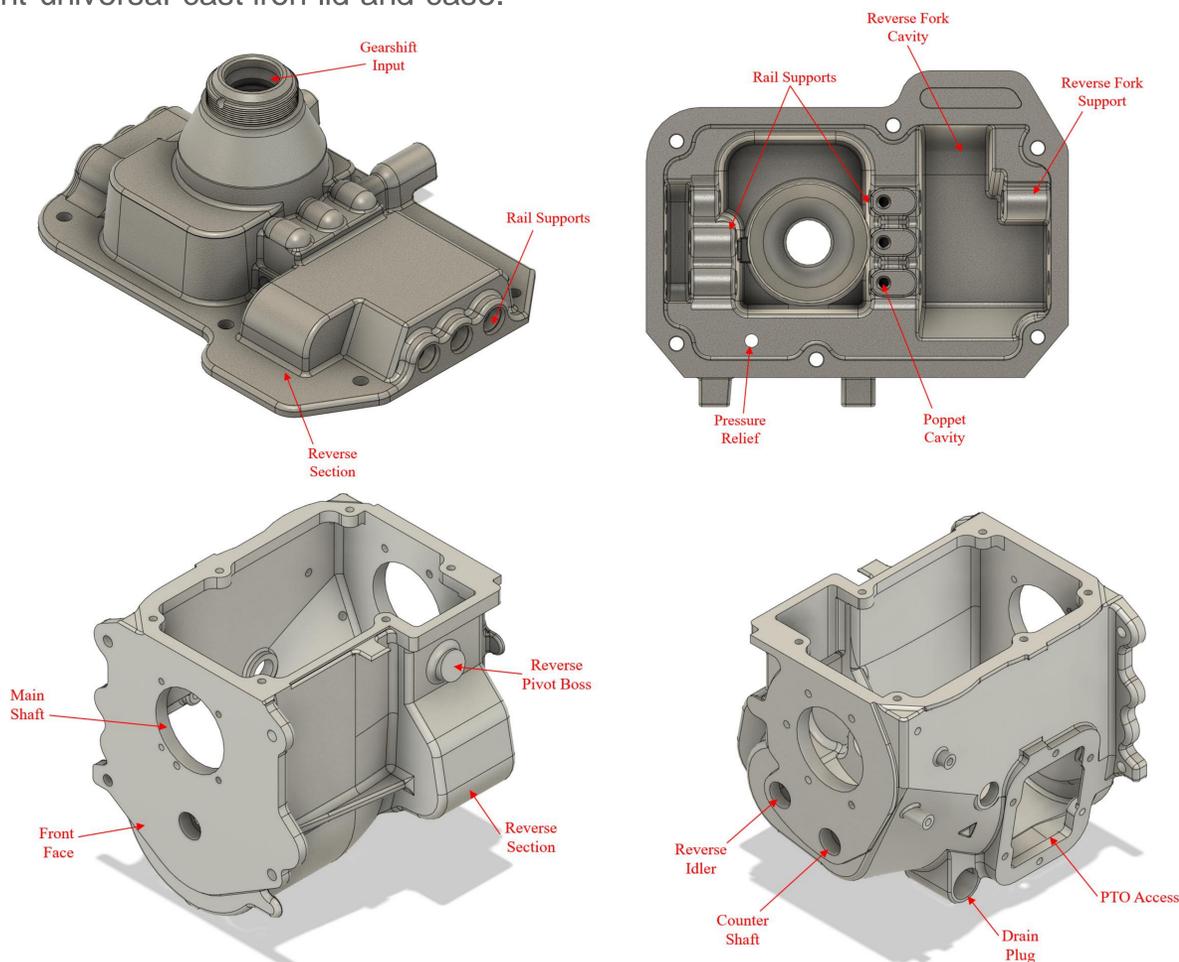


## Project

Novak Conversions is one of the only companies that rebuilds and modifies T18 transmissions. The purpose of this project was to combine two sand casted transmission cases and lids, an early and a late T18 style, into one 'universal' T18 transmission case and lid. The combined design was required to accommodate both styles of internals as well as both mounting hole patterns. A material change from cast iron to aluminum was also desired. Novak anticipates the universal design will reduce procurement costs and improve customer reach.

## Design

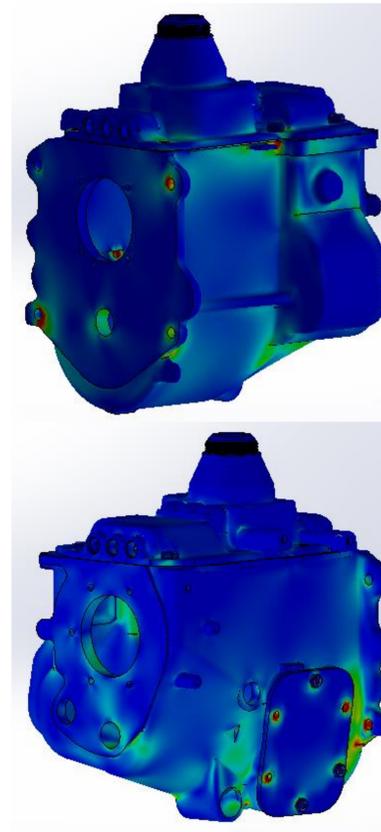
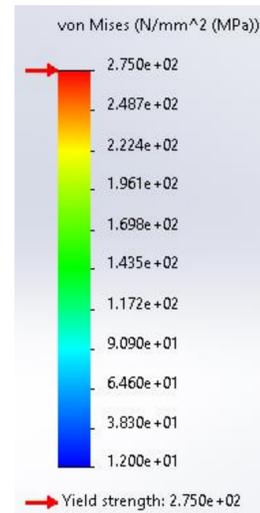
To create the universal design, the team first had to model both styles of cases and lids. Then by overlapping the models, they were able to create a universal design in which all features were captured or could be with a simple machining operation. The following are the resultant universal cast iron lid and case.



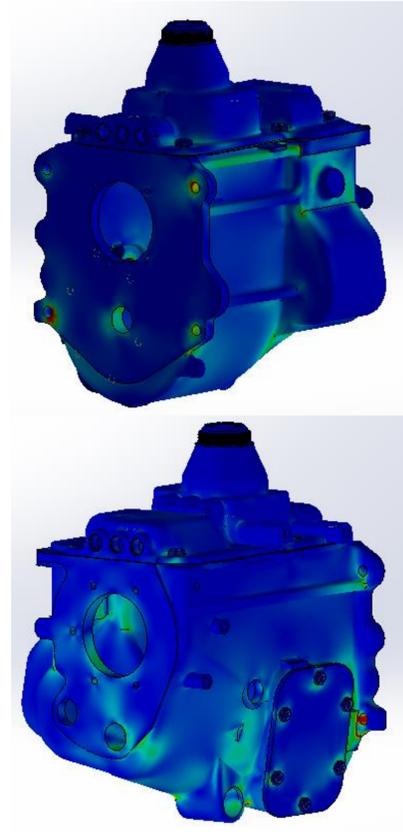
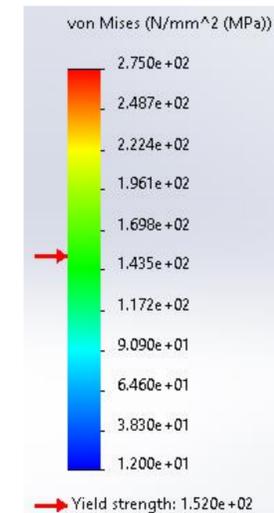
## Analysis

An intent of the project was to switch the casting material from cast iron to aluminum. So, an analysis was required to determine the relative strengths of the materials and identify stress locations. Three ribs were added to the aluminum case to stiffen areas that showed high stress.

### CAST IRON



### ALUMINUM



The analysis above shows that the as-built cast iron model met its yield strength in a few areas under expected loading. The aluminum model saw some improvement in those areas, but failed around the PTO access port. The three additional ribs added some strength to the case, which reduced stresses around the PTO by approximately 50 MPa.

## Conclusion

This universal T18 transmission is capable of accommodating both styles of internals and all possible bolt patterns with just a few machining operations. The students found they would have to create more extensive support structures to make the aluminum model strength comparable to the cast iron. The added ribs did strengthen the model, but further analysis and work will be required if Novak does choose to cast in aluminum.

