PROGRAMA BICULTURAL DE ALCANCE INDUSTRIAL, VERANO 2016

Case New Holland.
Design of the Front Support for a new agricultural tractor

TEAM MEMBERS

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ABSTRACT

This is the culmination of the team's work with the design and analysis of the new front support for a New Holland tractor. Over the last 8 week the team has been preforming the final stages of the engineering design and FEA of the 2WD/HD, and 4WD models.

OBJECTIVES

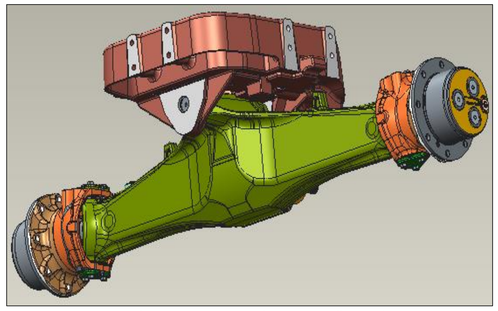
- To design a common front support casting so that one casting can be machined to accommodate the 4 different tractor models of the tractor.

BACKGROUND

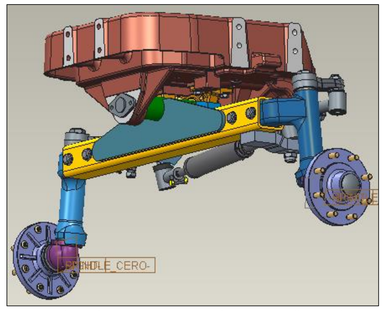
- CNH Global NV the holding company is a multinational manufacturer of agricultural and construction equipment.
- CNH had been in Mexico since 1981.
- At CNH, our mission is to find SMARTER, better and faster ways to make technology simple, accessible and easy to use.
- This project simplifies the manufacturing processes of the front support to save time, money and offer a smart solution for the given problems.

METHODS AND MATERIALS

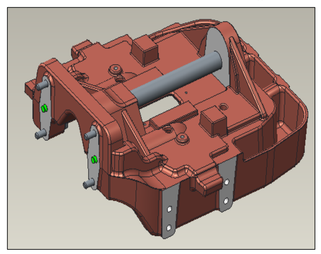
- To guarantee a good design, a DFMEA was developed.
- Used a design processes similar to the engineering design for 2WD/HD front support and Trunnion, to address clearance issues.
- Testing 4WD and 2WD/HD front support and Trunnion in FEA (Pro E, ANSYS)
- Front support and Trunnion is made of gray cast iron grade (best on compression).



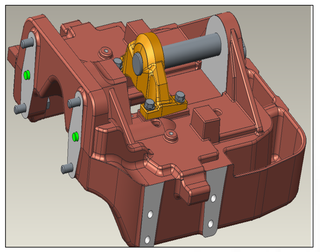
4WD front support and axle configuration



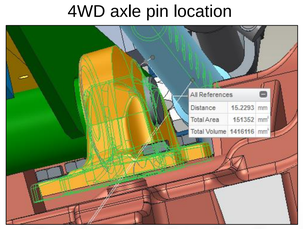
2WD/HD front support and axle configuration



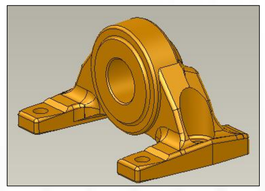
4WD axle pin location



2WD/HD axle pin location



Trunnion Clearance issues



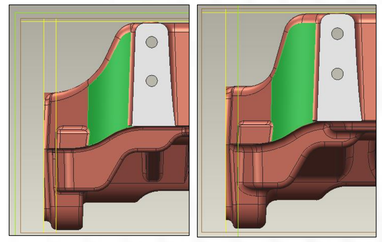
2WD/HD Trunnion

RESULTS

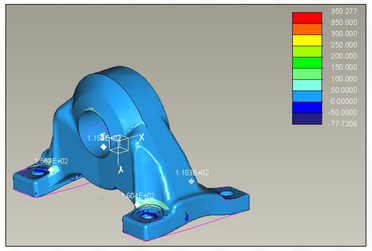
- Finished the DFMEA.
- FEA results for the front support (4WD, 2WD/HD) and Trunnion (2WD/HD) are within the CNH limits.
- 2WD/HD clearance issues have been resolved.

CONCLUSIONS

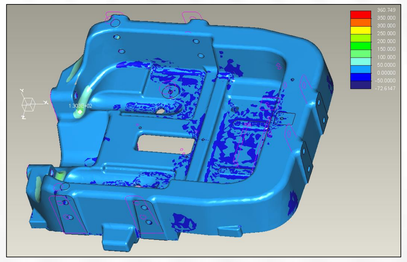
- Multiple machining processes are necessary in order to accommodate the different axle configurations.
- The 4WD front support fit the geometry requirements, and had a good performance in FEA.
- The 2WD/HD front support and trunnion fit the geometry requirements and had a good performance in FEA.
- Recommend optimizing the Trunnion for less material cost
- The main objective was met in the fact that the front support for all models has one single casting.



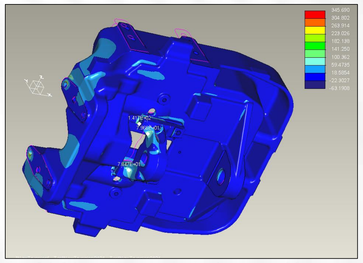
Comparison before (left) and after (right) the modifications of the 4WD front support.



Max principle. Stress of Trunnion downward force



04-04 test, max principal stress of front support in 4WD configuration.



04-04 test, max principal stress of front support in 2WD/HD configuration.

REFERENCES

1. Loads test GPAS from CNH.