



Frontal Support for 125 hp Tractor

TEAM MEMBERS

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ABSTRACT

Redesign of a previous frontal support to be used in a new model of tractors Case New Holland is working on. Firstly, to make geometrical changes to the support to remove unnecessary components and accommodate for new accessories in the tractor assembly to fit to the front support. Also reduce or keep the same mass. Then to perform finite element analysis on the front support using standards given to us by the company, to determine the safety and reliability of the frontal support. Also during the finite element analysis the group is to run the simulation on two different materials and to see if one yields better results than the other.

OBJECTIVES

The objectives of this project are to deliver new redesigns of the frontal support, verified by finite element analysis and test out two different materials.

BACKGROUND

The frontal support is used to join the engine with the front axle, absorb impacts from the motion of the tractor, and take allowable stresses from the counter weight and any attachment tools.

Characteristics

- Made from gray casting iron
- One single piece
- Two designs for 2WD and 4WD
- Mass needs to be 223 kg or less

METHODS AND/OR APPROACH

To acquire reliable results we are following the method presented

3D Modeling

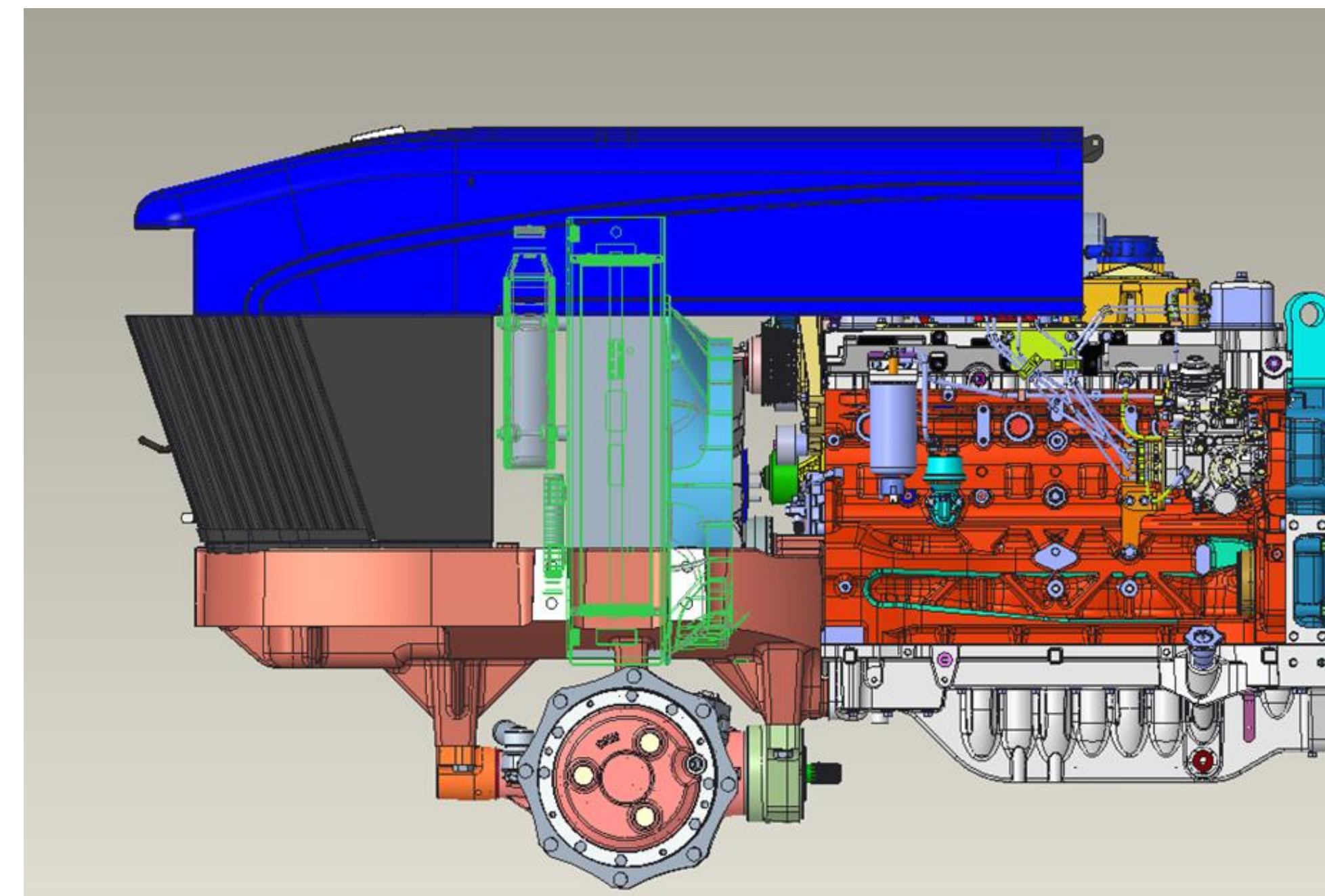
- Using Creo Parametric we modified the geometry of the frontal support to fit the previous design into the new specifications.

Comparison of Materials

- Gray casting iron has previously been used and the company likes their results with it.
- Compare gray casting iron to nodular iron which has a larger ultimate strength the could reduce thickness but cost more per kg.

Finite Element Analysis

- Using ANSYS we simulate testing conditions given by the company standards.



Geometrical changes to hood and fan with original frontal support

RESULTS

It is expected for July 24th to deliver to CNH two models (2WD and 4WD) that have passed tests in a virtual environment, with a definite material.

Standards of the Company to be approved

- Cyclic loads applied to the front axle
- Cyclic loads applied on the counterweight
- General tractor bending

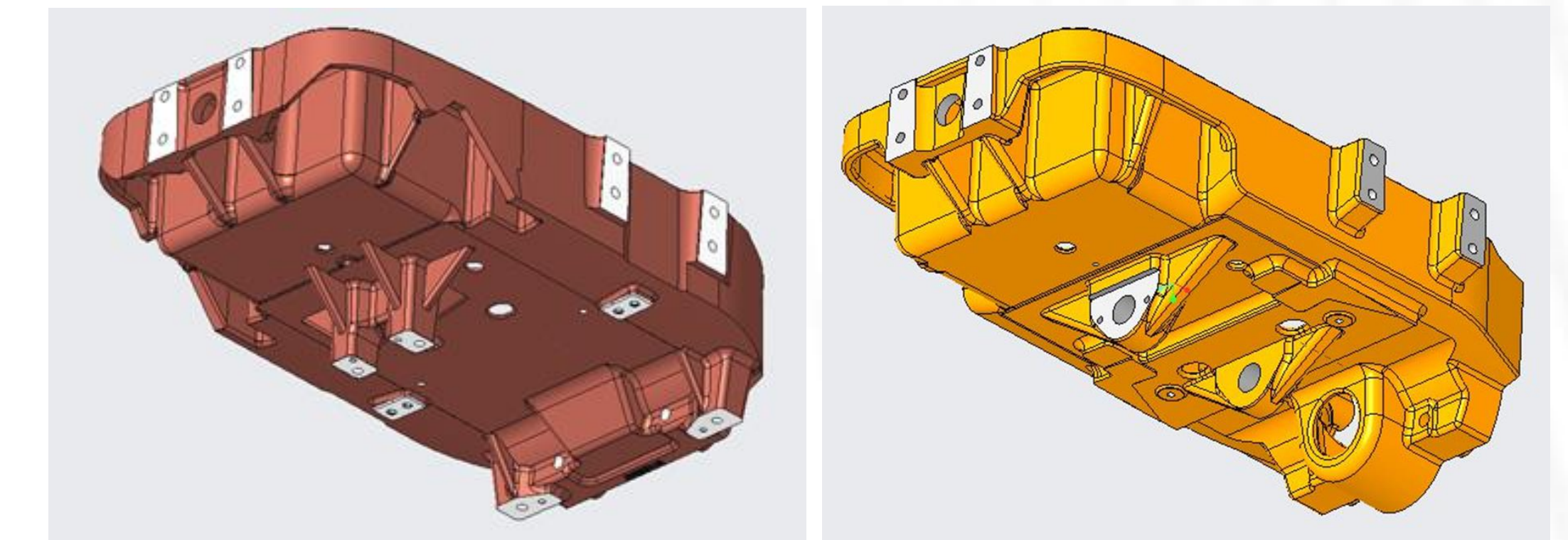
Deliverables

- 3D models for both tractor designs
- Mass of the frontal support
- F.E.M. results

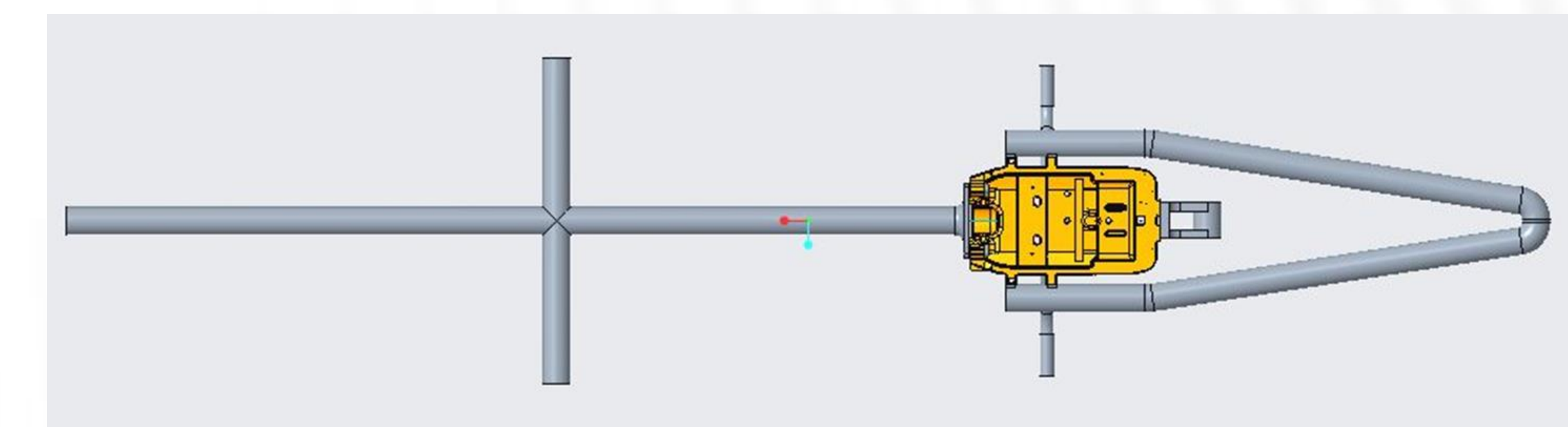


CONCLUSIONS

The new model of tractor proposed by CNH requires more power than the previous version, so this structural part must improve its performance without any risk of failure. It must also cost the same or less to allow CNH to profit from the change in models, making the company products more competitive in the market.



4WD and 2WD frontal supports



Test structure for simulation environment

REFERENCES

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2. E. Brighenti and P. Henne. (2009) *Test Procedures 04*. Internal documents from Case New Holland.
3. Manual del Operador New Holland. (2012) Document from Case New Holland MX