

VEHICLE PITMAN ARM REMANUFACTURE

BRIEF

The object of this project was to convert a truck with a 6x4 configuration to an 8x4: that is, to add an additional steering axle to a vehicle with only one. As this had never been done to this make and model of vehicle TSV was contracted to engineer the solution, working with specific guidelines from the client,

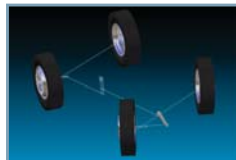


The vehicle before a second axle is fitted.

DESIGN PROCESS

The first step was to simulate the steering geometry in a 3D modeling package to check that the vehicle had the correct Ackermann angles (the relationship of the wheels complementing each other wheel negotiating

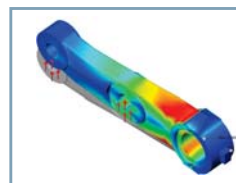
an corner, ie turned at a specific angle which corresponds to the circle diameter of that specific tyre).



The simulation established that 'off the shelf' items would not provide to correct ackermann angles for the desired wheel base and axle spacing, so it was decided to remanufacture the main steering box Pitman arm to meet the design need. The original arm was copied with the addition of the required features.



The first step was to create a geometrically correct 3D model.



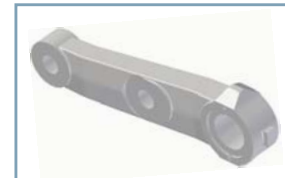
This was analysed for strength using a Finite Element Analysis (FEA) package.

The 3D model was then refined to avoid any 'hot spots'.

MANUFACTURE

TSV also managed the manufacturing. A foundry with full CAD/CAM capability was selected, and given a 3D model of the casting, in an oversize condition, which then could be machined off the models geometry by a suitable CNC machine. The same company was able to perform the machining, using data converted from the 3D model. A tapered spline was machined into the larger bore by another subcontractor.

TSV are consulting mechanical engineers providing a wide range of engineering design and analytical services, ranging from specialised rollover protective structures to process engineering solutions.



TSV supervised the fitting of the arm and its corresponding retrofitted components.

The installation was inspected and tested on completion. TSV also certified the installation met LTSA requirements.



Completed frame on machine

BUDGET

The project was completed with a design cost less than 50% of traditional hand based methods.

KEY BENEFITS

- Specialised TSV expertise in transport engineering
- Use of 3D modeling saved time in the design process
- Preliminary design verification
- Minimum downtime for vehicle
- Virtual prototyping using 3D modeling and Finite Element
- Analysis provided significantly greater accuracy in design and confidence in the performance of the physical component
- Precise specifications and streamlined manufacture and machining of the final component

Computer aided design and engineering

TSV brings to bear the powerful combination of AutoCad, 3D solid modelling and Finite Element Analysis (FEA). FEA saves time and money, reduces risk, and optimises performance of parts and assemblies. Prototyping is minimised, materials and weight are optimised, performance is predicted. Rapid analysis and revision turns days of hand calculation into hours, hours into minutes - and all with vastly greater accuracy.