

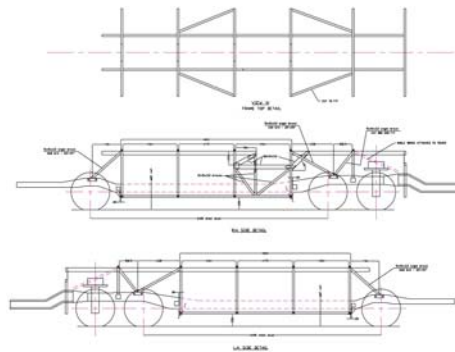
SPACE FRAME DESIGN

TSV was commissioned by Kiwi Bus Builders, one of its long-term customers, to aid in the design of a \$600,000 tour coach built on a Volvo B12 chassis.

The brief was to take the existing bare chassis and to cut and extend the wheelbase while allowing for 3 x 1.4 meter wide lockers to be positioned through the body in the mid wheelbase position.

This meant that the chassis would have to go around the luggage bays while still providing the necessary strength. A further requirement was to specify the bus frame to meet the strength determined by the PSV rule.

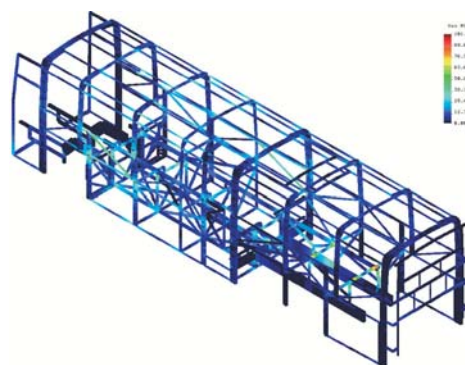
The existing chassis was measured, and drawn in AutoCAD. Using the design brief parameters, a concept drawing was developed incorporating the client's requirements - such as locker size, wheelbase and maximum frame height - while ensuring it complied with LTSA criteria. The client then reviewed the design concept and gave approval for the next stage.



Conceptual drawing

The design concept was first analyzed using hand calculations to determine roughly the member sizes and design geometry. The design was then modeled using a Finite Element Analysis (FEA) package to provide a far more accurate assessment of the structure.

This degree of analysis was necessary as the true load on the space frame was hard to determine due to the body contribution. FEA also enabled simulation to be done for the effects of uneven road surfaces.

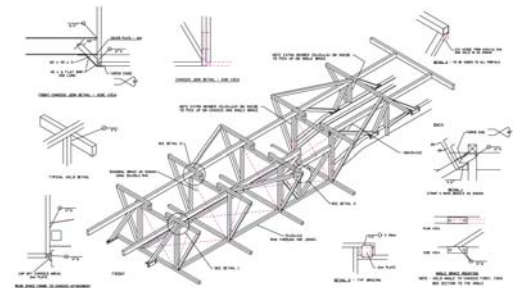


Stress plot from finite element package

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.



Once the design was verified, a full set of manufacture drawings were produced,



Weld detailing drawing

The chassis modifications were carried out by a local manufacturer under close supervision from TSV. The chassis was then transported to the body builders to complete the body and its interior.

BUDGET

An assignment like this one can be delivered for around \$10,000

KEY BENEFITS

Hand calculation methods used previously took longer and were less accurate.

Using FEA allows more accurate prediction of possible failure points which can be designed out before manufacture –not only providing big cost savings but pre-empting possible liabilities.

FEA enables the removal redundant members, or reduced section sizes. This results in a lighter design and higher payloads.

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.