

# PERMAS AT PORSCHE

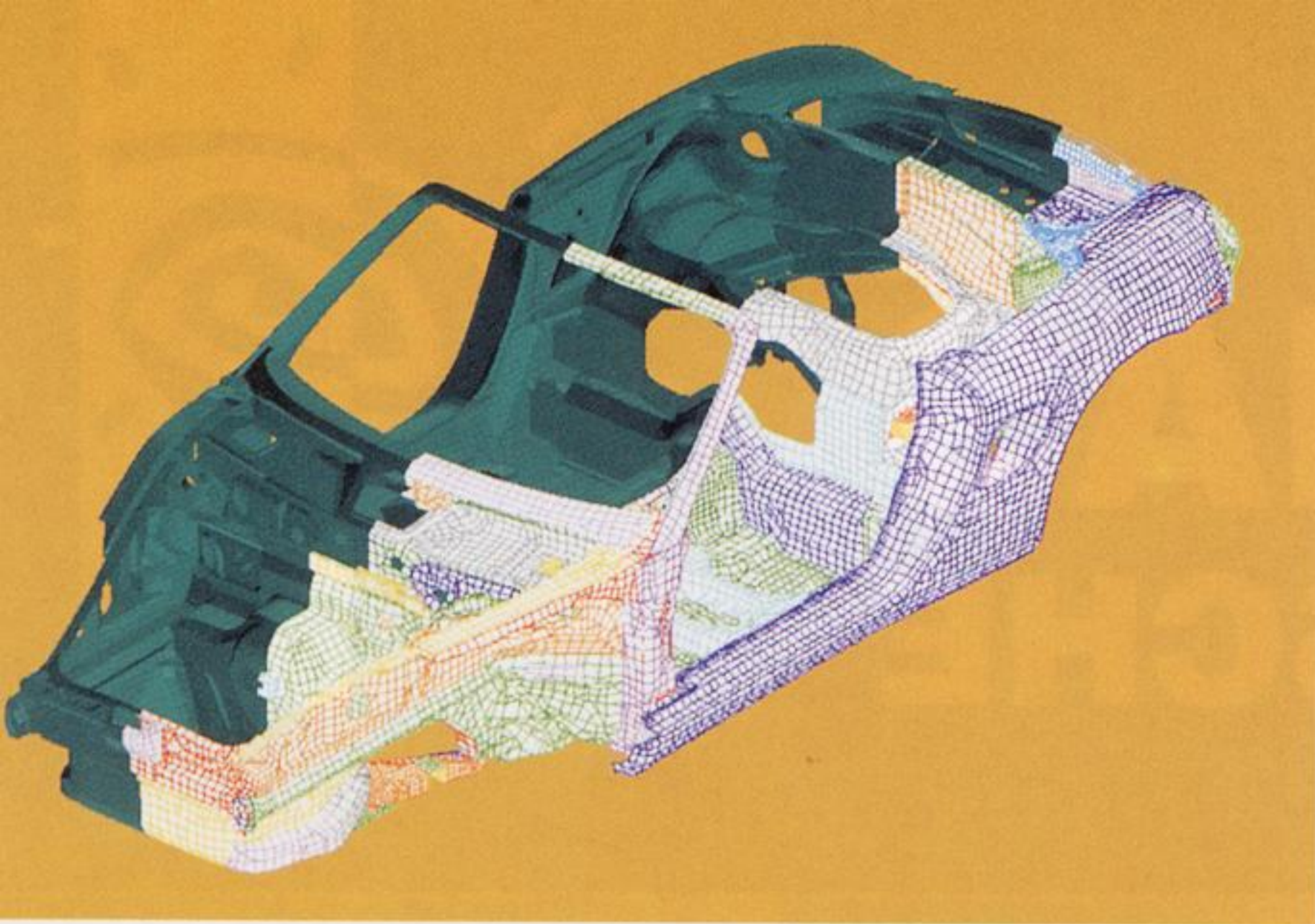


Porsche Boxster: A technically perfect car.

Congratulations to the development team!

The short development time required for the Boxster could only be achieved by the intensive use of numerical simulations. Here PERMAS was used for all linear FE analyses for car body, power train, chassis, and full vehicle. Beside classical analyses of stresses and deformations, the facilities of PERMAS are particularly used to handle contact problems, sizing optimisation and dynamic behaviour in the time and frequency domain.

We at INTES are proud of our software PERMAS.

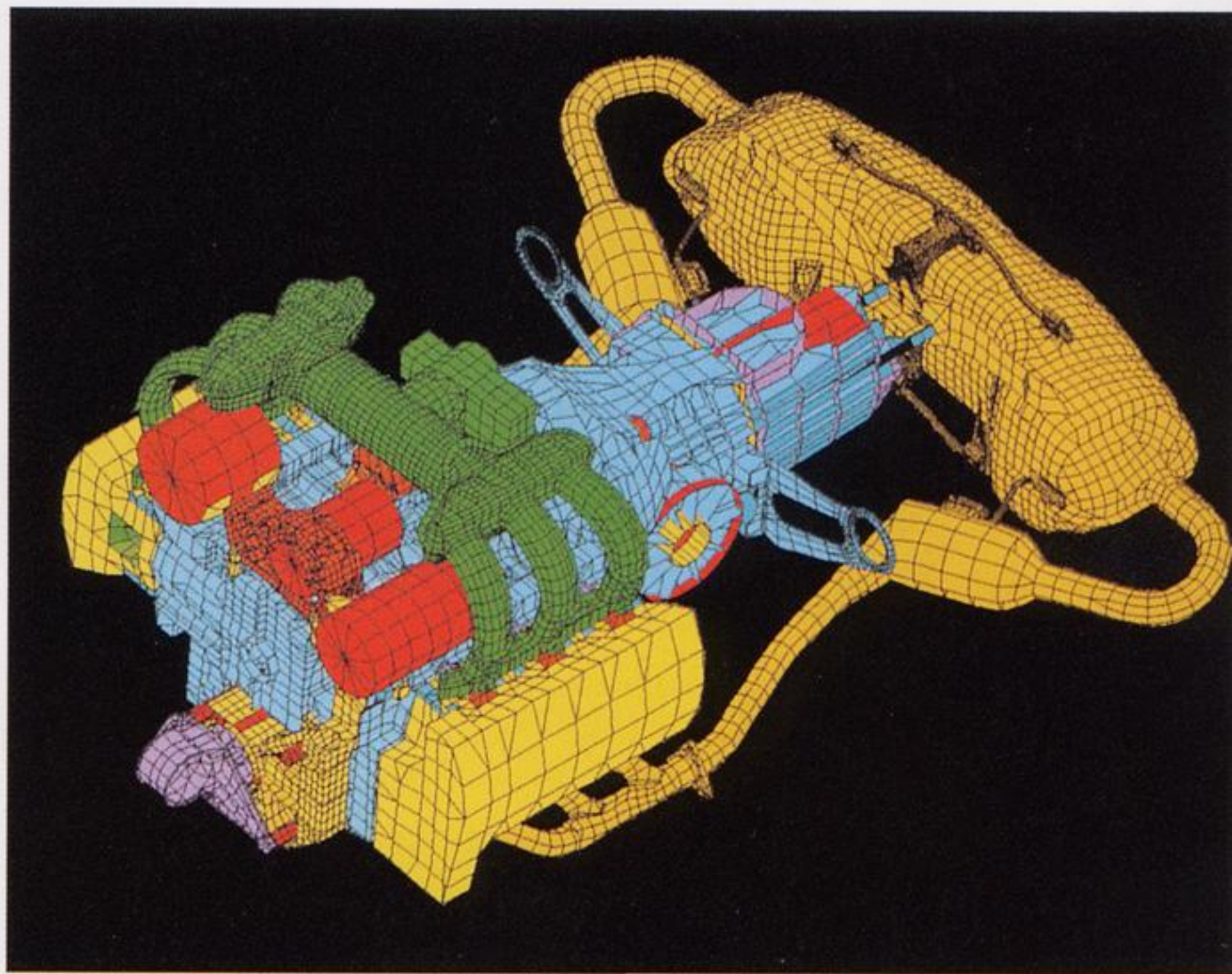


*Model of Body-in-White  
with about 300,000 degrees of freedom*

When designing state-of-the-art car bodies, there is always the typical conflict between the requirements for high stiffness and low weight. In the different development phases of the Boxster, different FE models with up to 400,000 degrees of freedom based on CAD surface data were generated. Using these models, stiffness and mass were optimised. On numerous parts, strength of sheet metal was calculated and load application areas were dimensioned.

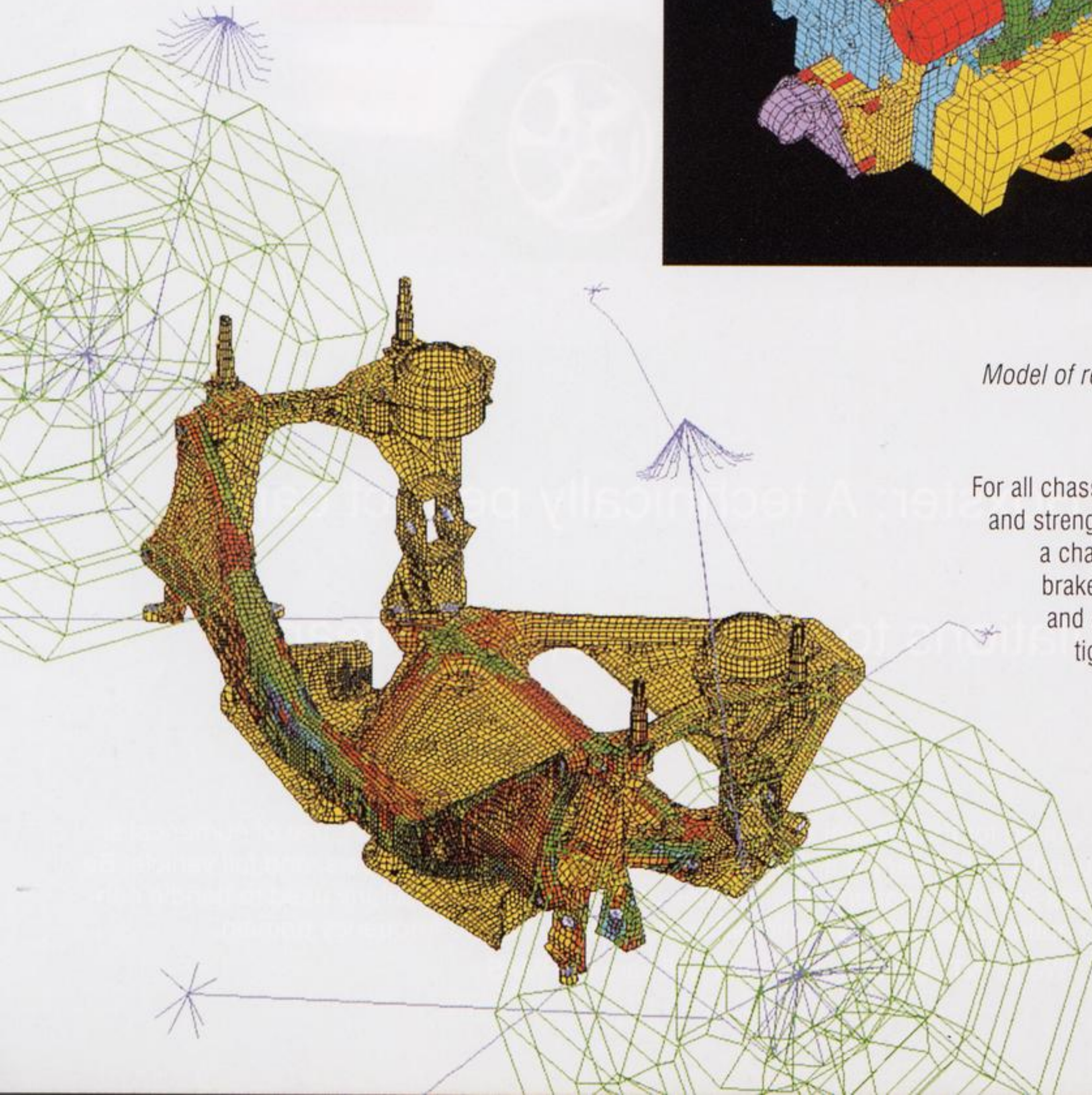
*Model of power train with about 37,000 elements*

For the new engine, concepts of the main supports were designed, and cylinder deformations with pre-stressed bolts and under operational loads were calculated. In addition, the contact of head sealing between engine block and cylinder head was optimised as well as the vibrational behaviour of the full system, for example.



*Model of rear axle with about 77,000 elements  
and 400,000 degrees of freedom*

For all chassis parts, linear analyses of stiffness and strength were performed. When designing a chassis unit, among others the effect of brake loads and cornering on wheel track and camber is of crucial importance. Fatigue strength was evaluated in numerous analysis variants.



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