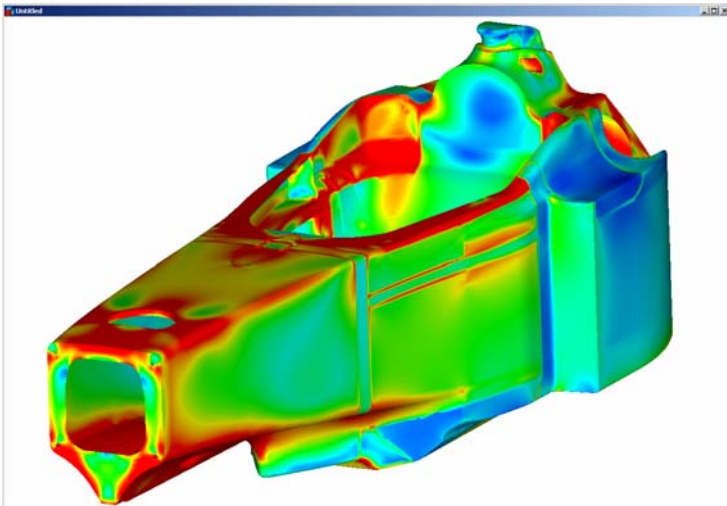


Automotive Case Study (Minardi F1 Team – Chassis Design)



The chassis design is the central theme in the structural design of the Minardi F1.

The monocoque chassis of a F1 car is a sandwich structure, made out of high performance carbon-epoxy composites facesheets and aluminium or aramidic honeycomb core. High modulus and high strength composites, with aerospace-class toughened epoxy resins are used in order to obtain the maximum safety-performance/weight ratio. All the attachment points (engine, suspensions, rollhoop, etc.) are made through inserts embedded in the lamination stack during the production phase. In order to minimize weight, thermal expansion differential, and maximize the adhesion, also the inserts are made out as thick (about 18mm) laminated composites plates (to be machined to the required dimensions/thickness).



Various general requirements regarding the global shape itself of the chassis, safety regulation requirements, and other performance requirements were simulated in the FEA environment. NEi Nastran software package was used for static analysis (stress, stiffness), buckling (linear/nonlinear, especially on crash cones), and surface contact (rollbar crush). All the calculations were correlated with experimental measurements, thus enabling a continuous refinement of methodologies, material data, etc. In order to meet all the requirements, several optimization runs were made to modify the material choice, layup sequences, local reinforcements, foams, bulkheads, and inserts.

Minardi benefited from the use of NEi Nastran due to a reduced modeling time, surface contact feature, robustness of the nonlinear analysis setup and solution, accuracy (results compared well with test results), and seamless data access (input-output data generated by NEi Nastran and the previous Nastran package were shared without incompatibility issues).

NEi Software, Inc. is aggressively focused on commitment to the customer. Detailed documentation, customized on-site training, and comprehensive technical support ensures that you will see immediate return on your investment.

For more information about our company or our products, please contact:

Headquarters:

NEi Software, Inc.

5555 Garden Grove Blvd., Suite 300

Westminster, CA 92683-1886

USA

Phone: +1.714.899.1220

Fax: +1.714.899.1369

Email: info@neisoftware.com

Website: www.NEiSoftware.com

Europe:

NEi Software EMEA Office

The Old Barrel Store

Draymans Lane, Marlow

Buckinghamshire, SL7 2FF

United Kingdom

Phone: +44.0.1628.400.645

Fax: +44.0.1628.891.701

E-mail: emea@neisoftware.com

Website: www.NEiSoftware.com/emea

Asia:

NEi Software Asia Office

Shinjuku Park Tower

N30th Floor 3-7-1 Nishi-Shinjuku

Shinjuku-ku, Tokyo, 163-1030

Japan

Phone: +81.03.5326.3062

Fax: +81.03.5326.3001

E-mail: asia@neisoftware.com



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From NEi Software, Inc.