

Finite Element Analysis (FEA) Capabilities Statement

MISSION STATEMENT

To deliver results of business advantage for our customer through the application of world class technical computing solutions backed by leading professional expertise, responsive customer relations and long-term business partnerships

SOFTWARE SOLUTIONS

Abaqus/Standard, Abaqus/Explicit, Abaqus/CAE, Abaqus composite modeller
UGS femap, NX Nastran

EXPERTLY TRAINED AND EXPERIENCED CAE PERSONNEL

Don Campbell

- BSc, BE(Hons), PhD, MIPENZ (Mech), CPEng, IntPE, NAFEMS Advanced Registered Analyst, over 30 years CAE/FEA experience across many industries.

Paul Bosauder

- BE(Hons), NAFEMS Advanced Registered Analyst, over 8 years FEA/CFD experience, specialisation in CFD, heat transfer, non-linear, and composites.

James Cheng

- BE(Mech), ME(Mech), over 13 years in FEA, fracture mechanics, material and structural failure analysis, pressure vessel design, plastics injection molding.

James Hamilton

- BE(Hons), PhD, over 10 years FEA, experience in acoustics, aerospace and software customisation.

EXAMPLE FEA CONSULTING PROJECTS

Power Generation

- Non-linear static analysis of generator end rings allowing for shrink fits, centrifugal loads and thermal loads due to differential expansion
- Stress and fatigue analysis of hydro intake screen bars subjected to hydrostatic pressure and cycle loadings due to vortex shedding
- Static analysis of turbine blade to compare different repair scenarios
- Low speed shaft and gearbox casing fatigue analysis for wind generator

Plant and Process

- Explicit dynamic analysis of tube bundle impact onto safety net structure
- API579 code life assessment analysis, corroded pressure vessel and thick tubesheet, non-linear elastic/plastic large displacement analysis
- Elastic plastic analysis, autoclave with refractory lining under swell, thermal and internal pressure loads
- Stress wave propagation in rock crusher under severe impact loading
- Non-linear post-buckling analyses, thin walled vessels under high loads
- Non-linear heat transfer/thermal stress analysis, furnace fan taking into account radiation, convection and conduction
- Combined solid/shell analysis of pressure vessel in region of nozzle
- Several linear stress analyses, pressure vessels to BS5500 and ASME VIII where the dimensions or position of the nozzles lie outside the code
- Design/explicit impact analysis of safety structure for process industry
- Design/optimisation of sheet metal vessel for transporting milk powder

Continued/2

WE UNDERSTAND TECHNICAL COMPUTING

FEA Capabilities Statement, *continued*

EXAMPLE FEA CONSULTING PROJECTS, *continued*

Biomedical and Healthcare

- Highly non-linear analysis of hyperelastic membrane for squeezing the aorta
- Non-linear analysis of flexible membrane structure with initial pre-stress
- Design and prototype manufacture and testing of flexible ankle walker

Marine

- Composite FEA of high-speed launch under hog, sag and bow slam
- Composite analyses of Volvo 80 racing yacht using inertia relief
- Static analyses for Team NZ campaigns since 1995, yacht hulls and keels under hydrostatic pressure, mast and stay loads. Detailed analyses of masts.

Geotechnical

- Non-linear analysis of tunnel intersections allowing for account compressions only soil springs
- Undersea pipeline analysis, to determine stress concentrations in pipe with proposed cut-outs for cathodic protection
- Response spectrum analysis of dam taking into account the water mass

Automotive and Transportation

- Non-linear elastic plastic analysis of roll over protection structures
- Contact analyses of wheels, detailed stresses on bolt-hole region
- Contact analysis with bolt pre-load of cast cross-member for a vehicle
- Numerous fatigue analyses of cast aluminium wheels
- Optimisation of car wheel, raise natural frequency and minimise weight

Engineering Design

- Creep analysis of plastic component for proposed motor
- Dynamic analysis of appliance balance ring
- Dynamic analysis of compressor flapper valve
- Long term creep of plastic water tanks
- Design of new roofing profile (with patent), subsequent physical testing

Defence

- Non-linear impact analysis of missile container with shock mounts
- Transient dynamic analyses for the ANZAC Frigates. Work verified by Amecon, Blohm & Voss and the Australian Defence Force

OTHER CAE SERVICE

- Introductory and advanced training courses on CAE methods
- Benchmark evaluations of CAE methods, applications and software
- On-site CAE best practices seminars, workshops and tutorials

ADDITIONAL CONSULTING CAPABILITIES

- Computational fluid dynamics
- Composites analysis
- Moldflow injection moulding simulation
- Design & optimisation
- Fitness for service assessment

WE UNDERSTAND TECHNICAL COMPUTING