Capabilities in Sugar Industry
About Rockfield

Reimagine / Transform infrastructure through business and engineering analytics and the implementation of disruptive technology

Rockfield Technologies Australia is a specialist high technology company with core skills in advanced computational modelling, sensor technologies, data analytics and engineering design solutions. Right from our establishment in 2000, Rockfield has been assisting clients from across the industrial sectors in better understanding and managing the risk profile of critical assets in terms of capacity utilisation, structural integrity, remnant life and Standard’s compliance.

Computational mechanics is in our DNA. When the company was formed it was tightly integrated with Rockfield Software Ltd. in Swansea, UK. Our proprietary code was ELFEN which had been developed by Rockfield (Swansea) incorporating over a 1000 man years of coding and 100s of completed PhDs (constitutive models and numerical algorithms). ELFEN is one of the FEA codes used by Rockfield Technologies today. Others include Engineer’s Studio (for shear cracking of reinforced concrete), FLAC 3D, UDEC, ELFEN_DEM, Xtract, and Spacegass. All are tightly integrated with CAD (Solidworks). Our staff are highly experienced in FEA and several of them not only have PhD’s in the area but have worked in universities up to Professorial Level teaching, undertaking research and supervising doctoral students. In fact, many of our staff are university medalists with double degrees in engineering and mathematics / physics.

The schematic below describes our storyboard and operational space. New infrastructure is designed to codes of practice where safety factors are chosen based on experimental evidence and
risk aversion to balance load against an assortment of capacity reduction factors. The design life varies depending on requirements and can range from 40,000 h (some mechanical equipment such as heavy gearing and balanced equipment) up to 100 years (public infrastructure such as bridges). Most consulting companies are comfortable in offering services to design new equipment. However, over time, infrastructure is inevitably subjected to increased loading and frequency of loads and also material degradation. Codes used for the design of new assets should be used with reserve when focusing on the operational performance of aged infrastructure. Fortunately, AS ISO 13822 provide asset owners and consulting specialists with a framework for assessing the existing and future performance of aged infrastructure. Rockfield is cognizant of AS ISO 13822 and utilize our core skills spanning nonlinear mechanics, damage models, sensors and data analytics to provide asset owners with operational solutions.

It is our experience that Asset Owners often find themselves in a quandary when trying to balance risk appetite against growth / ROI and management of compliance. Multidisciplinary engineering science tempered through a holistic perspective is required to maximize utilization with minimum intervention.
Design Standards (as new)

Probabilistic approach (aged infrastructure)

Computational Mechanics Capability

- The ELFEN FEA Suite (akin to ANSYS)
- DEM
- ANSYS
- CAD Solidworks
- FLAC3D
- XTRACT/SLAB
- Design Studio

Constitutive laws
- Metals
- Soils

Materials Science

Physical in-field testing

Laboratory Testing

- Full suite of lab tests through university facilities
- We reimagine transform infrastructure through engineering analytics and the implementation of disruptive technology

Our brief is usually difficult problems beyond the scope of most consultants

Our commitment to ourselves and our clients ICARE

Our differentiation

Our people are highly trained, often university medalists, with double degrees in science, engineering, mathematics, Masters, MBA and PhD.
Locations

![Locations Map]

Areas of Specialization

- Thorough understanding and application of engineering standards
- Advanced modelling capability: linear and non-linear; coupled models, structural response; corrosion; crack propagation and fatigue; failure modes; geo-mechanics; thermal analysis; mathematical field problems
- Material science: steel, concrete, aluminium, rubber, FRP
- Sensor technology and big data: tailoring sensors to site application
- Mathematical modelling and computing
- Site preparation, WHS, and client interfacing
- Experimental design and application
- Component design and design optimisation
Industry

Rockfield has been assisting clients from across the industrial sectors through the application of advanced finite element and discrete element methods, experience in field measurements and experimental planning and execution, sensor technologies, structural health monitoring, component design and material selection. General outcomes include a better understanding and management of the risk profile of critical assets in terms of capacity utilisation, structural integrity, remnant life and Standard’s compliance.
Relevant Projects

... every asset has a story ...
Sugar Train Rail Assessment

Key challenges

- Reduce the down time and related expenditures in the Australian sugar cane industry, it is important to assess the tracks and conduct repair activities periodically
- Existing track assessment methods are often complex, time consuming and costly exercises

Our approach

- Unique instrumentation techniques were used involving the installation of sensors and data loggers to a cane wagon. The sensors measured and recorded physical parameters relevant to assess the rail infrastructure
- Data analysis of the raw data recorded from cane fields
- Instrumentation involved using GPS sensors amongst displacement and load transducers. Hence, measurements could be correlated to precise locations.

Outcomes and benefits

- A combination of unique field measurements and data analysis techniques produced accurate track assessment
- Rockfield’s engineering solution enabled the client to prioritize the track repair activities based on the severity of existing track damage
- Smarter budgeting for future rail infrastructure asset management
Willison Coupling Enhancements

Key challenges

- Understanding operational loading and movements of coupling components
- Restricted design envelope
- Operational considerations

Our approach

- Laboratory testing
- Infield sensor measurement
- 3D cad and finite element analysis
- Tailored experimental apparatus and testing

Outcomes and benefits

- Improved overall assembly
- Well known load capacity and limitations
- Reduced tolerances which have resulted in less ‘slop’ in bin rakes
Willison Coupling Centring Spring Innovation

Key challenges
- Solving long term accepted centring issue with automatic couplings
- Wide range of operating conditions in industry
- Restricted design envelope

Our approach
- Discuss maintenance procedures and related details with mill staff
- Apply knowledge and experience with elastomer products
- Adopt SWOT analysis to determine most likely design option to develop
- Design and plan specific durability testing to shorten trial period

Outcomes and benefits
- Simplified internal cast components and assembly procedure
- Improved reliability of centring behaviour of couplings
- Simplified maintenance procedure as draft gear does not have to be removed from bin
Sugar Cane Wagon Design

Key challenges

- Understanding typical loading (infield, track haulage, tippler station)
- Narrow gauge tracks and associated derailment proneness
- Wide range of wagon (bin) designs, couplings, filling methods, track conditions, etc.
- Trends to increase payload to tare weight ratios

Our approach

- Extensive in-service sensor measurement
- Finite element analysis of all components (chassis, wheel-sets, couplings, wall panels)
- Consultation with mill staff in charge of rolling stock

Outcomes and benefits

- Improved understanding of wagon design intricacies, load paths, areas for improvement
- More durable cane wagons for specific operating duties
- Enhanced fabrication details to reduce manufacturing costs and complexity
Sugar Cane Wagon Upgrades

Key challenges

- Designing upgrades / retro-fits for old (30+ years) and damaged wagons
- Establishing clear objectives from client in terms of expectations

Our approach

- Use knowledge acquired from past design and measurement projects related to wagons
- Finite element analysis of components to determine capacity limits
- Simplify modifications and on-site works in cognizance that process will be repeated potentially 1000+ times across wagon fleet
- Host intermediate project meetings to get ‘buy-in’ from all stake-holders

Outcomes and benefits

- Life extension of otherwise condemned wagons delaying replacement process
- Maintaining fleet capacity whilst new wagons are introduced to system
- Minimised cost through innovative designs
**Shredder Hammer Optimisation**

**Key challenges**
- Understanding severe operating environment and loading conditions
- Wide range of hammer designs, shredder arrangements, grid bar settings, operational controls, etc.
- Overcoming deep-set beliefs on hammer designs, whether credible or simply passed down between mill engineers

**Our approach**
- Manage industry survey to establish design variation and typical operating conditions
- Revisit past technical papers on shredder hammer design and evolution
- Consultation with mill staff to understand maintenance and failure statistics
- Application of finite element techniques and traditional engineering analysis

**Outcomes and benefits**
- Improved understanding of shredder hammer designs and influence of associated equipment
- Elimination of several distorted beliefs on hammer designs
- Advancement towards standardised hammer design to reduce inventory requirements
- Hammer design that has a marked improvement in fatigue resistance
Shredder Hammer Failure Investigations

Key challenges
- Understanding design intent of current hammer design that is failing / cracking
- Establishing mill-specific operating conditions and historic maintenance details
- Ascertaining design restraints to inform design improvements / recommendations

Our approach
- Meet with mill staff to obtain all necessary information to progress project
- Use knowledge acquired from past design work related to hammers
- Application of finite element techniques as part of a root cause analysis
- 3D cad simulation to ensure proposed hammer design has correct range of motion

Outcomes and benefits
- Improved hammer design with no reported failures (old design accounted for five complete failures per season)
- Explanation why new butterfly tips were failing when attached to old hammers
- Hammer design copied and used at other neighbouring mills due to massive improvement in reliability and associated reduction in unplanned shutdowns
Shredder Hammer Tile Upgrade

Key challenges

- Understanding operating environment, loading conditions and tramp iron impacts
- Wide range of tip / tile designs incorporating various grades of WC or white iron
- Overcoming deep-set beliefs why particular tiles fail at certain mills

Our approach

- Revisit past technical papers on hammer tip design and evolution
- Consultation with mill staff and manufacturers to establish typical operating lives and failure statistics
- Application of finite / discrete element techniques to better understand the physics behind tramp iron impacts on a range of tile designs (material and geometry)
- Design of specific testing apparatus to replicate high velocity impacts on a range of tile designs to complement numerical analysis

Outcomes and benefits

- Improved understanding of tile designs and influence of geometry, material and brazing attachment
- A tile design that increased the replacement period from 200,000 to 850,000 tonnes of cane during mill trials
- Elimination of several distorted beliefs on tile designs and WC selection that were responsible for excessive maintenance and operating costs
Sugar Cane Wagon Bearing Suspension

Key challenges

- Understanding required operating characteristics of bearing suspension
- A need for simplistic low cost design with minimal requirement for wagon modifications
- Restricted design envelope and need to interface with bearing box

Our approach

- Discuss maintenance procedures and related details with mill staff
- Apply knowledge and experience with elastomer products during design phase
- Make incremental design changes intermixed with analysis to converge on most effective design with the desired stiffness characteristics and required durability

Outcomes and benefits

- Suspension bearing that maintains centre position between horn cheeks
- Dual stiffness bearing that provides required stiffness for both empty and full wagons
- Bearing design that eliminates abrasive wear which limits the life of the existing bearing design
- Simple installation as bearing plates have locating tabs
Mill Roller Design

Key challenges

- Myriad of roller designs used throughout the sugar industry
- Complex loading of rollers due to torsional drive inputs, floating bearings (tailbar misalignment and induced bending) and variations in prepared cane properties

Our approach

- Revisit past technical papers on mill roller design and evolution and crushing theory
- Application of finite element technology to determine induced stress levels in both the shaft and shell from shrink fit assembly superimposed with operational loading
- Use of fracture mechanics to allow prediction of remnant life of cracked rollers based on crack size and location, shaft material and operating loads
- Material testing to establish fracture related properties of shaft steel

Outcomes and benefits

- Improved understanding of load, material and geometry associations in terms of induced stress levels and the associated fatigue life estimations for roller shafts
- Improved specification of stress concentration related design features (eg. journal fillets, shrink fit end zone geometry
- More informed understanding of crack propagation rates in rollers and critical crack sizes to allow load reduction to extend operational life whilst planning replacement
Carrier and Chain Link Assessments

Key challenges
- Determining operational loads for both chain and chair links
- Redesigning components given a set of geometrical restraints

Our approach
- Application of finite element technology to determine induced stress levels in both the components under a suite of feasible operating conditions
- Adoption of standard fatigue analysis to determine stress limits / targets to employ when modifying the existing link geometries
- Apply knowledge and experience gained through design work associated with other cast steel components

Outcomes and benefits
- Improved chain and chair link designs that incorporate features with inherently reduced stress concentration factors
- No increase in component mass
- More uniform thickness throughout components to minimise casting defects and residual stresses
Boiler Stack Design Reviews

Key challenges

- Undertake an independent design review into the suitability of the proposed boiler station stack and ducting concept design utilising the existing foundations
- Insufficient geotechnical data

Our approach

- Apply governing standards to: assess the dominant loading cases to use; the foundation requirements from a capacity and utilisation percentage standpoint, and; minimum shell thickness and hold-down bolt size requirements
- Application of finite element analysis to determine induced stress levels in stack and, in particular around the boiler inlet openings, under a suite of feasible operating conditions
- Through modal analysis, determine the lower natural frequencies of the proposed stack to calculate of wind pressure loading and wind velocity that coincides with vortex shedding

Outcomes and benefits

- A third party review of an important asset providing confidence in final design specifications
- A stack design with appropriate shell thickness with an allowance for future thickness loss from dew-point corrosion
Boiler Stack Strengthening

Key challenges

- Developing cost effective retro-fit steelwork to extend the life of boiler stacks that have been compromised by cyclone damage or internal dew-point corrosion on unprotected welded connections

Our approach

- Using finite element methods assess the remnant strength of the compromised stack structures under cyclonic wind conditions which are known to be governing load case
- Tailor proposed modifications / strengthening works to the client’s budgets and also to the strength capacity requirements

Outcomes and benefits

- A complete set of engineering sketches and material selection to use in tendering process
- Strengthening of stacks to extend their useful life to allow time for the client to organise a full replacement (if deemed necessary) once funding becomes available
Infield Cane Tipper Design

Key challenges

- Consideration of both client’s design requests and vehicle restrictions imposed by Department of Transport
- Re-engineering of partly completed design concept

Our approach

- Review current tipper offerings in industry and adopt necessary features and functions
- Hold regular meetings with client / manufacturer to maintain project focus and progress
- Utilise 3D software to develop complete design to minimise part clashes and rework during build phase
- Establish ‘battery limits’ to ensure tipper interfaces seamlessly with tractor hitch and hydraulics

Outcomes and benefits

- A complete set of fabrication drawings and part specifications
- A tipper design with maximum capacity (16 tonne, original 12 tonne) for registered vehicle specification and correct wheel load sharing
- Tipper design which suits full range of cane harvestors and cane wagons
4000T Molasses Tank Restoration

Key challenges
- To develop a novel way to replace corroded strakes on a tank without the need for removing the roof and associated costly carnage
- Tight timeframes for engineering design works

Our approach
- Adoption of governing storage tank standards (API650) to determine the correct thickness of the replacement shells to specify for the works
- Hold regular discussions with the client and the fabricator to ensure the proposed works procedure is achievable and cost effective

Outcomes and benefits
- A set of detailed drawings and work procedure to allow accurate costing and project planning
- Works were completed successfully and without incident and during the allotted time
Key Staff CVs
Dr Jeffrey Loughran
Executive Chairman
Email: jeff.loughran@rocktech.com.au
Direct: +61 7 4409 2033 | P: +61 7 4725 5874

Qualifications
PhD (Mechanical Engineering) – University of Queensland – 1991
MEngSc (Mechanical Engineering) – University of Queensland – 1981
BEng (Mechanical) – CQ University – 1977

Affiliations
Adjunct Professor – James Cook University
Fellow, Engineers Australia
Member, College of Mechanical Engineers, Engineers Australia
Member, Australian Association for Computational Mechanics
Member, National Professional Engineers Register
Registered Professional Engineer Queensland
Member, Australian Institute Company Directors

Key Skills
Computational mechanics
Fatigue analysis
Nonlinear, large strain analysis

Professional Profile
Professor Loughran worked at James Cook University for 23 years across a range of academic and administrative portfolios before retiring in July 2015. During that period he developed an international reputation in finite element modelling with specific specializations in: geomechanics, plasticity and discontinuous media; large strain coupled porous media mechanics; discrete element modelling with application to ground engaging tools and bulk solids handling; fatigue and design analysis. He has published well over 100 articles across journal, conference and technical reports to industry. During this period he played a major role in leading Faculty to position James Cook University as an exceptional research performer on the world stage in high quality science research.

Today, Professor Loughran chairs the Board of Rockfield Technologies Australia, a small company with a big mission - to be the dominant player in Australia and South East Asia in extending the life of aged infrastructure. We live in an age of austerity, conservatism and technological disruption. Industrial codes are indeed highly conservative due to their nature. Rockfield is appreciative of the need for conservatism but is also acutely aware that codes juxtaposed with high end computational modelling, field measurements through wireless sensor technology (IOT) and big data can revolutionize the way we manage infrastructure today.

Professor Loughran's other areas of interest include travel, keeping fit and enlightening today's youth around future challenges and opportunities.

Work History
Jul 1992 to Jul 2015: Deputy Vice Chancellor / Pro Vice Chancellor / Head of School / Professor / Associate Professor / Senior Lecturer – James Cook University
1982 to 1992: Senior Research Engineer / Research Engineer – Sugar Research Institute
1978: Manager – Hancock Bros Pty Ltd
1977: Design Engineer – Plywood Association of Australia
Dr Govinda Pandey
Chief Executive Officer / Director
Email: govinda.pandey@rocktech.com.au
Direct: +61 7 4409 2027 | P: +61 7 4725 5874 | M: 0459 028 049

Qualifications
PhD (Concrete) – Saitama University (Japan) – 2004
MBA (General) – James Cook University (Australia) – 2015
MEng (Structural) – Asian Institute of Technology (Thailand) – 2001
BEng (Civil) Hons – NIT Silchar (India) – 1998
Graduate – Australian Institute of Company Directors – 2014

Affiliations
Adjunct Associate Professor – James Cook University
Advisory Board Member – Australian Network of Structural Health Monitoring
Advisory Board Member – JCU Civil Engineering Committee
Member – Institution of Engineers Australia
Chartered Professional Engineer
National Professional Engineers Register
Registered Professional Engineer of Queensland (11785)
Registered Building Practitioner Victoria (EC 40392)
Reviewer of Engineering Structures and ACI Structural/Material Journal
Advisory Board Member Australian Network of Structural Health Monitoring
Member - International Association for Bridge Maintenance and Safety

Key Skills
Application of FRP in structural rehabilitation
Non Liner Modelling of Reinforced Concrete Structure
Structural Dynamics
Forensic investigation and root cause analysis
Buried metal structures and reinforced earth walls
Durability of concrete

Professional Profile
Govinda is a passionate engineer and a business leader who values creativity, innovation, empowerment and excellence. He possesses a breadth of experience from his international training/practice in Australia, Japan, Thailand, China, India and Nepal together with his experience from academia and manufacturing industry. He believes in maximising utilisation and extending lives of existing engineering assets to help make our built environment more sustainable. Govinda sits on James Cook University School of Engineering Advisory Board Civil Engineering Committee. He is actively involved in the local professional bodies such as Engineers Australia (2009 Chair) and Concrete Institute of Australia. Govinda also sits on the Advisory Board of the Australian Network of Structural Health Monitoring. As an Adjunct Associate Professor at JCU, Govinda supervised PhD students and coordinates the Engineering Project Management subject. The practical insights, authenticity, and the exposure to current socio-technical challenges that Govinda has brought in have been appreciated by the University. Over the years, Govinda has published more than 35 articles in technical journals and conference proceedings. Govinda aspires to becoming a role model within the community, industry and the society at large to impart positivity to the future generations. His passion in education has driven him to continue lecturing at the university, supervising undergraduate and postgraduate students, mentoring student engineers and visiting schools.

Work History
Dec 2010 to Present: Senior Engineer / CEO - Rockfield Technologies Australia
Oct 2008 to Dec 2010: Senior Engineer - Atlantic Civil Products
Jan 2007 to Oct 2008: Lecturer - James Cook University
Oct 2004 to Dec 2006: Postdoc Researcher – Saitama University
Scott Anderson
Principal Engineer
Email: scott.anderson@rocktech.com.au
Direct: +61 7 4409 2021 | P: +61 7 4725 5874

Qualifications
- MEngSc (Mechanical Engineering) – James Cook University – 2000
- BEng (Mechanical) Hons Class I – James Cook University – 1992

Affiliations
- Member of the Institution of Engineers Australia
- Chartered Professional Engineer
- National Professional Engineers Register
- Registered Professional Engineer of Queensland (10081)

Key Skills
- Computational mechanics
- Large strain problem solving
- Fatigue life assessment
- Discrete Element Modelling

Professional Profile
Scott Anderson has applied Finite Element Methods (FEM) to many industrial problems since 1993. Specific specialisations include: computational and experimental mechanics; solving large strain industrial problems with evolving boundary conditions; modelling of hyper-elastic materials; application of discrete element modelling (DEM) to simulate the flow of sticky materials; fatigue and design analysis of ferrous and non-ferrous machines, structures and components. Refereed publications (journal and conference) exceed 10 and more than 100 technical reports have been written for industry. He holds the position of Principal Engineer at Rockfield Technologies Australia Pty. Ltd., a company with a mission to advance industry through application and adoption of state-of-the-art finite element / discrete element technologies. Scott Anderson oversees the company’s Quality Assurance program and takes a very active role in project work and mentoring all engineering staff. His additional responsibilities include technical support for the finite element / discrete element code ELFEN, delivery of training courses on the use of the ELFEN software, and application of the software to challenging industrial and research and development problems in: Welded structure analysis; Component design; Geo-mechanics, mining and predictive geology; Packaging; Defence; Process Industries; Vibration isolation technology; and Bulk materials handling.

Work History
- Jul 2000 to Present: Principal Engineer / Engineer - Rockfield Technologies Australia
- Sep 1997 to May 2000: Computational Engineer – Applied Simulation Technologies (JCU)
- Dec 1992 to Dep 1997: Research Officer / Research Associate - JCU
Chris Coulson
Senior Mechanical Engineer
Email: chris.coulson@rocktech.com.au
Direct: +61 7 4409 2024 | P: +61 7 4725 5874

Qualifications
BE (Mechanical) – James Cook University – 2006

Affiliations
Member, College of Mechanical Engineers, Engineers Australia

Key Skills
Finite Element Analysis (FEA) - large and small structures, machine components, non-linear/large displacement and advance modelling methods
Fatigue Life Assessment – remnant life assessment of aged assets
Computer Solid Modelling – machine design, FEA pre-processing, drafting
Instrumentation – strain, acceleration, pressure, load cell, displacement measurement system design and fitment
Information Technology - working knowledge of computer and information technology systems

Professional Profile
Chris Coulson has worked for over nine years primarily in the field of mechanical engineering design. In that time he has completed the design of agricultural equipment for the sugar industry and mining equipment for coal and silica mines and ports. This design experience includes the design and analysis of steel structures, conveyors and large bulk materials handling equipment such as stackers, stacker/reclaimers and ship loaders. Chris Coulson is proficient in the use of Solidworks, ANSYS, ELFEN and Microsoft Office Software. He also has a working knowledge of Matlab, Mathcad and Microsoft Windows Operating Systems including server operating systems. Today Chris Coulson is a senior mechanical engineer and his responsibilities include; mechanical engineering design, mentoring junior staff, developing project proposals and internally managing the IT systems for the company.

Work History
April 2008 – Present: Junior/Senior Mechanical Engineer – Rockfield Technologies Australia, Townsville
March 2007 to March 2008: Graduate Design Engineer – Corradini Engineering, Ingham
Daniel Stephenson  
Senior Engineering Consultant  
Email: Daniel.stephenson@rocktech.com.au  
Direct: +61 7 4409 2025 | P: +61 7 4725 5874

Qualifications  
BEng (Civil) Hons Class I – James Cook University – 2008  
Bachelor of Science (Physics) – James Cook University – 2008

Affiliations  
Member of the Institution of Engineers Australia  
Registered Professional Engineer of Queensland

Key Skills  
Bridge analysis and design  
Steel structures  
Aluminium structures  
Bulk materials handling equipment

Professional Profile  
Daniel has over seven years of experience performing design of various structures including reinforced concrete, steel & stainless steel, masonry, timber and aluminium. His technical skills include proficient understanding of structural software packages such as Space Gass, LIMCON, Strand7, RAPT, Xtract, Engineers Studio and AutoCad. He also has good knowledge of Microstran, Slabs and has interests in Revit, Solidworks, ANSYS and Inventor. A thorough ability to use Microsoft Word, Excel, PowerPoint and MATLAB are amongst his skill set. Daniel has been involved in the development of structural spreadsheets, in particular Pre-stressed Girder, Gantry Crane, Pallet Racking and Aluminium Member designs. He is an important member of the structural design team and completes projects efficiently and in a timely manner. He has also been involved with the project management role of engineering, including liaising with clients, and coordinates resources to ensure design work is completed to best quality.

Work History  
2012 to Present: Senior Engineer / Engineer - Rockfield Technologies Australia  
2008 to 2012: Engineer / Graduate Engineer - AECOM
Thomas (Tom) Bainbridge
Operations Manager / Engineering Consultant
Email: thomas.bainbridge@rocktech.com.au
Direct: +61 7 4409 2028 | P: +61 7 4725 5874 | M: +61 424 520 188

Qualifications
BEng (Mechanical) Hons Class I – James Cook University – 2013

Affiliations
Member of the Institution of Engineers Australia
Media Liaison – Engineers Australia Townsville Regional Group

Key Skills
Finite Element Analysis (FEA)
Fatigue Life Assessment – remnant life assessment of aged assets
Computer Solid Modelling – machine/component design and drafting
Instrumentation – strain, acceleration, pressure, load cell, displacement measurement system design and fitment

Professional Profile
Tom Bainbridge has near to three years’ experience in the field of mechanical design engineering. Throughout this time he has completed projects designing mining equipment for coal and silica sand mines and ports. This experience includes analysing existing structures of port cranes and trolleys to assess their remnant lives and compliance to current standards, and designing components of bulk materials handling equipment such as reclaimers, ship loaders and conveyor equipment. Tom has designed and commissioned instrumentation systems to conduct controlled load testing on various bridges and machines as well as standalone systems that remotely monitor loading data to help inform asset owners and support decisions. Tom is proficient using Solidworks for 3D design modelling, Solidworks and ANSYS for FEA, and has used ELFEN for Discrete Element Method problems. The Microsoft Office suite is used extensively daily with some exposure to supplementary software such as Mathcad/Matlab. Tom still takes part in active projects, however; now draws on his engineering experience and previous management roles as the Operations Manager at Rockfield. He oversees daily processes, manages resources and assists the CEO as/when required. Other responsibilities consist of business development, including the preparation of project proposals as well as various marketing documents and/or media, and client correspondence/satisfaction.

Work History
Dec 2012 to Present: Engineer / Graduate Engineer / Undergraduate Thesis / Undergraduate Engineer – Rockfield Technologies Australia
Jan 2013 to Dec 2013: Project Management Tutor / Materials Science Tutor / ACTFR Research Assistant – James Cook University
Jan 2007 – Dec 2008: Assistant Manager - Hospitality Business, Qld, AUS
Jodish Thomas
Engineering Consultant
Email: jodish.thomas@rocktech.com.au
Direct: +61 7 4409 2029 | P: +61 7 4725 5874

Qualifications
BEng (Mechanical - Production) Hons Class I – Anna University, India – 2007

Affiliations
Member of the Institution of Engineers Australia

Key Skills
Mechanical system – Design & Analysis
Construction & Mining Equipment
Bulk material handling equipment

Professional Profile
Jodish Thomas has over eight years of experience preforming design of various mechanical systems. Mechanical design including systems and sub systems of bulk material handling equipment (wagon tippler, stacker reclaimper, shiploader etc.), construction and mining machineries. He is an expert in hydraulic excavator dig systems, dump truck bodies, buckets etc. Jodish has also designed systems for agricultural and road machines (cane tipper, pneumatic tyre roller etc.). Jodish has very good skills in conducting mechanical and structural integrity audits combined with mechanical instrumentation technics and problem solving skills. He has also very good knowledge and past experience in fatigue life assessment and analysis of structural steel systems, pallet racking design and hydraulic system design. His technical skills include proficient understanding of mechanical design and analysis software packages such as Solidworks, Pro-E, ANSYS and Solidworks Simulation. He also has good knowledge of AutoCAD. A thorough ability to use Microsoft Word, Excel, PowerPoint and MathCAD are amongst his skill set. Jodish has been involved in the development of kinematic linkage sheets, in particular (excavator dig system linkage sheets, pallet racking testing spread sheets etc.). He is an important member of the Rockfield mechanical design and FEA team. He is also involved with business development, including liaising with clients and preparing proposals.

Work History
May 2012 to Present : Engineer - Rockfield Technologies Australia
2010 to 2012: Design Engineer (C&F Division - Hydraulic Excavators) – Deere & Company (John Deere), India & US
2007 to 2010: Design Engineer (Product Development - Construction Equipment Division) - Larsen & Toubro Pty Ltd, India
Lachlan Plumb
Engineering Consultant
Email: lachlan.plumb@rocktech.com.au
Direct: +61 7 4409 2023 | P: +61 7 4725 5874 | M: 0417 069 875

Qualifications
BEng (Mechanical) Hons Class I – James Cook University – 2014

Affiliations
Graduate Member of the Institution of Engineers Australia
Secretary – Engineers Australia Townsville Regional Group

Key Skills
Finite Element Modelling
Solid Modelling
Bulk Materials Handling Equipment
Root Cause Analysis
Industrial Mechanical Design

Professional Profile
Lachlan has 1 year of experience as a recent graduate at Rockfield operating in the bulk materials handling and asset management sectors. Projects in this space require the application of finite element modelling software (ANSYS) combined with other data sources to model the behaviour of engineering assets. This technique has been used to obtain a variety of outputs including condition assessment, root cause analyses and remediation procedures. Lachlan has sound knowledge of supporting software such as SolidWorks and Space Gass to validate the finite element modelling process. In addition, Lachlan has mechanical design experience for systems involving AS4324 Mobile Equipment for Continuous Bulk Material Handling as well as supporting structural design knowledge from AS4100 Steel Structures.

Work History
Jan 2015 to Present: Engineer - Rockfield Technologies Australia
Timothy Saunders
Graduate Engineer
Email: tim.saunders@rocktech.com.au
Direct: +61 7 4409 2032 | P: +61 7 4725 5874

Qualifications
BEng (Mechanical) Hons Class I – James Cook University – 2015

Affiliations
Graduate Member of the Institution of Engineers Australia

Key Skills
Computational mechanics
Finite Element Modelling

Professional Profile
Tim is a graduate engineer who has a passion for solving complex problems, particularly with the insight that can be provided through the use of computational techniques. He understands the caution and care which should be taken when using these techniques to ensure that a realistic scenario is accurately modelled. His undergraduate honours thesis was on the topic of vehicular impacts into portable water filled safety barriers and the simulation was conducted through the use of the LS-DYNA package. During the course of Tim’s work with Rockfield he has worked on a range of projects and gained proficiency with a number of programs such as SolidWorks, ANSYS and SPACE GASS. He is also highly proficient in the use of the Microsoft Office package to present the clearest and best deliverables for clients. He is motivated and enthusiastic about the use of engineering techniques, experience, understanding and innovation to improve the sustainability, useability and design life of assets and the built environment.

Work History
Jan 2016 – Present: Graduate Engineer- Rockfield Technologies Australia
Dec 2014 – Feb 2015: Vacation Work Student- Rockfield Technologies Australia