INNOVATIVE MINING SOLUTIONS

ENGINEERING CAPABILITY STATEMENT

ABN: 53 634 455 637

innovativeminingsolutiuons.com

INNOVATIVE MINING SOLUTIONS PTY LTD

Fixed Plant
Surface Fleet HME
Maintenance Engineering Support
Intelligent Engineering Design
Engineering Detail Drafting
Manufacturing Deliverables
Reliability Asset Management
Diverse Industrial Application Design

TABLE OF CONTENTS

Welcome to

Innovative Mining Solutions

Innovative Mining Solutions is an independently owned and operated company servicing an array of multi-disciplinary design and consulting services. With over 30 years of conceptual design and manufacturing experience, we are able provide unique solutions to your business operations and planned maintenance strategies. We also provide on-site technical support for reverse engineering, asset optimization and reliability engineering for problematic assets such as fixed plant and heavy mining surface equipment.

IMS adopts an outside the box approach to design solutions from a unique and holistic prospective. This is our competitive edge which benefits the end user: that is you.

IMS provides detailed comprehensive turnkey design solutions and delivers industry recognised design codes and practices certifications. The IMS design philosophy considers all solutions inclusive of ideal cost-effective manufacturing methodologies, trade practices and processes.

Whether we are responding to a reactive breakdown, planning an equipment change, managing structural design, developing subsea ROV componentry or performing crane fatigue analysis we have the capability and expertise to deliver valuable solutions. When you have a technical challenge to solve, we can support you to find an innovative and efficient solution.

Mission Statement

Our “safety-through-design” philosophy is focused on delivering innovative designs which are safe to construct, safe to operate and safe to maintain while complying with all the Acts, Regulations and Standards applicable to the work and site safety standards procedures. We challenge acceptable standards to ensure that “fit-for-purpose” designs and value-for-money engineering deliverables are above client expectations.

Engineering Disciplinaries

Overview

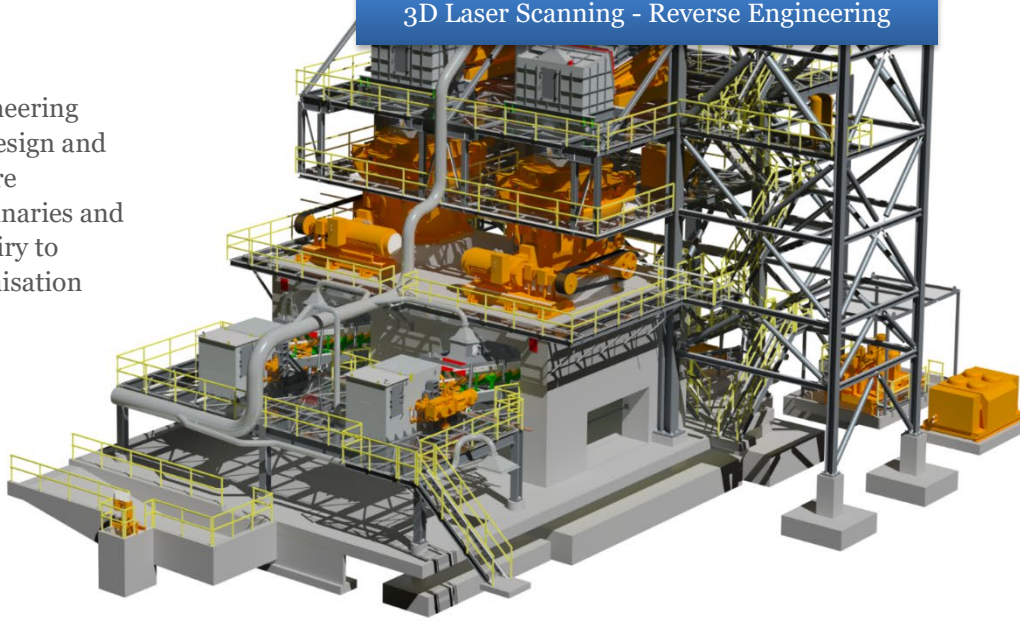
Collectively our team has many years of experience and we adopt a unique approach to application design leading the edge of Mechanical Engineering solutions.

We have an enthusiastic attitude delivering unique Mechanical Engineering expertise to:

- Conveyor Design Improvements
- Crushing and Screening improvements
- Bulk Materials Handling Systems
- Process Plant Design
- Stacker and Reclaimer Improvements
- Safety maintenance initiatives FXP & HME
- Auxiliary changeout handling fixtures/tooling
- Custom lifting apparatuses and structures
- Custom hardstand structures

IMS is seasoned in an array of engineering disciplinaries, materials handling design and critical engineering solutions. We are specialised within the below disciplinaries and cater from the most simplistic enquiry to delivering full turnkey capital optimisation projects.

- 3D Conceptual Design
- 3D Computational Modeling Design
- 3D Model Clash Detection
- FEA Certification
- DEM Optimised Flow Analysis
- AS1100 Engineering Drafting
- 2D Detail Drafting
- 3D Detail Drafting
- 3D Animation and Presentation Drafting
- 3D Laser Scanning - Reverse Engineering



In-House

Computer Aided Design

The IMS design approach focuses on a multitude of design variables inclusive of best practice manufacturing methodologies. These principles are often overlooked—however, with over 30 years of custom numerical manufacturing and fabrication construction expertise, IMS will deliver the most cost-effective solution. To undertake such a variety of design requirements, IMS utilises a multitude of CAD software packages specific to the design requirements.

Design Verification & Certificate Compliance Deliverables

IMS is compliant with Australian Standard Design conformities such as AS1100, AS1170, AS1252.1 AS1657, AS1665, AS1657, AS3990, AS4100, AS4991, AS1418:2002 Crane Code and National Transport Commission. Certification is an industry compulsory requirement. Our certification process consists of both scientific FEA and manual calculations relevant to the design application and we can certify a wide range of mechanical and structural equipment both existing and non-compliant assets. All designs are certified by a chartered MIE professional engineer (CP Eng. Mech/Struct.).

Mechanical Engineering

The IMS team provides professional consultation advice and delivers sound solutions in Mechanical Engineering, Mechanical Design and Drafting disciplinaries.

Mechanical application design

Mechanical design coupled with auxiliary fabrication is a common material handling state of equipment. The IMS study of application design revolves around multiple operative variables controlling the design target. As such the need to adopt innovative solutions through CAD design has become critical when undertaking such mechanical/process design optimisation.

Structural application design

Structural Integrity Management is becoming increasingly important for resource assets reaching their end of original design life. Such structures are generally high risk being highly specialised, heavily loaded and subjected to demanding operative conditions. To manage structural fatigue/risks IMS undertakes comprehensive audits, inspections, advanced structural analyses, calculations and engineering reporting for a range of process plant steel structures common within the resources sector.

Design Certification

CAD software is the means of design verification and is achieved by way of computational simulation and or physical testing of completed manufactured designs.

Calculations

Such calculations are derived based on current Australian Standard Practices. Analysing structural equipment or mechanical design must ensure compliance and that best practices are maintained to achieve fit for purpose results. After the calculation summary has been completed IMS will provide a detailed report forming part of the certification process.

Finite Element Analysis (FEA)

Finite element analysis (FEA) is the process of simulating the behavior of a component or sub-assembly under given conditions so that it can be manipulated using finite element methodologies and variables tools.

The FEA simulates all external remote acting force and torque variables built in and applied in its operative fit for purpose state to validate the design purpose.

Discrete Element Modeling (DEM)

In the scenario where major modifications or new designs are recommended, Discrete Element Modelling software is recommended to validate an optimal design. Realtime DEM variable tools allow such designs which are simulated in their natural flow control state. The analytical data feedback generates impact, shear energy, ore trajectory, impact locations and ore velocity demonstrating the flowability of the design.

Design

Drafting

IMS offers a comprehensive suite of Design Drafting services developed from the latest 3D CAD design software, BIM systems and laser scanning technology.

The IMS collective multi-disciplinary drafting team is comprised of Structural and Mechanical design engineers. We have significant experience in generating high standard drawings and deliverables for both fabrication and mechanical projects.

Innovative Mining Solutions is committed to ensuring you receive cost effective deliverables without compromising on quality and deadlines. We ensure all drawing deliverables are developed in accordance with AS 1100: *1992 series* standards and emphasise on shop detail drafting to ensure manufacturing transparency is maintained.

Our Design Drafting service includes:

- 3D modelling
- Mechanical detail drafting
- Fabrication detail drafting
- End user compliance electronic data management (EDM)
- Laser scan point cloud data manipulation
- GIS, mapping and alignment plans
- Fabrication Inspections
- Multi-discipline drafting team
- 3D CAD design reviews
- VR animations and walk-throughs
- 'As Built' back drafting
- Manuf. fabrication dxf/nc/nwi export data

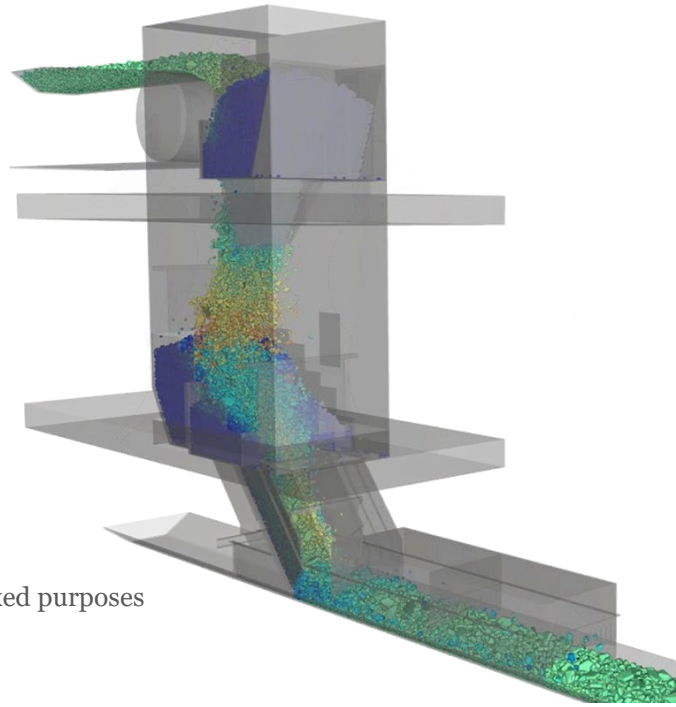
Process Design Optimisation

Wear Solution Improvements

Wear improvement solutions is what IMS takes seriously. With more than 15 years of industrial related expertise, compliance and industry practice IMS shall demonstrate significant cost saving attributes to your process consumable overheads. Through CAD and DEM processing we will evaluate pre- and post-results when determining the ideal wear solution package for individual applications shown below. IMS provides improvement to current materials handling assets and new build design requirements.

Bulk Material Handling Design

- Head chutes
- Deflector chutes
- Impact plates
- Transfer chutes
- Sample Stations
- ROM infrastructure wear improvements
- Optimised rock box and cascade application design
- Scrubbing and product screening discharge chutes
- Cost of ownership studies
- Planned maintenance shutdown cost reductions.
- Safety initiatives and maintenance apparatus SWP
- Specialised lifting apparatus equipment
- Custom access and maintenance platforms: mobile and/or fixed purposes



Wear Solution OEM material options based on design and application

- Chrome White Iron
- Ceramic
- Weld Overlay Plate
- Composite White Iron
- Quench and Tempered (Q&T)

Most sustaining process plant builds require rectification surrounding problematic handling transfer chutes excessive liner wear, unperfected chute designs, belt tracking/wear, intermittent chute blockage/spillage and restricted operational maintenance access. The IMS materials handling expertise includes the entire plant transfer infrastructure from run of mine through to TLO rail loading and ship loading assets. IMS shall deliver through practical operational experience and theoretical computational solutions providing reliable transfer chute performance throughout an array of operational parameters specific to multiple applications.

Discrete Element Modelling (DEM) techniques are recommended to assist in the pre- and post-designing solutions. IMS has extensive experience with various industry wear liners and their respective advantages and limitations. We provide our clients with unbiased and independent recommendations for optimal liner selection and preventive maintenance planning strategies. Historically IMS has delivered significant improvements resulting in improved reliability, reduction in downtime and preventive maintenance planning costs.

To comprehensively understand the current process deficiencies, IMS would undertake site audits and report such findings amongst the key stakeholders for the purpose of benchmarking and recommend the proposed redesign remedies. This process would ultimately determine the root cause and deliver ideal solutions based on industrial practice and experience on similar issues.

Asset Reliability Engineering Solutions

- HME and or Fixed Plant Assets
- Reliability Centered Maintenance (RCM)
- Root cause analysis (RCA)
- Fail mode effect analysis (FMEA)
- Fault tree analysis (FTA)
- Criticality analysis CA identification
- Change management initiations (CM)
- Safe work instructions modifications and development (SWI)
- OEM project liaising interactions and support networking
- Reliability Engineering (RE) asset reporting/actioning

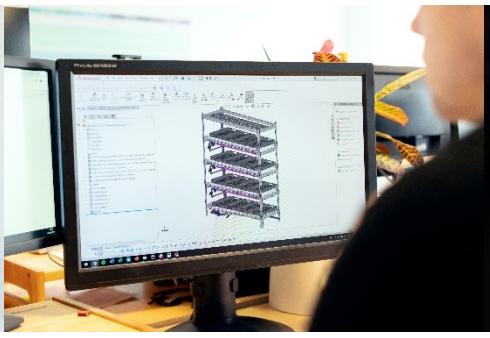
On-Site Engineering Secondment Support

IMS caters for AD HOC site mechanical engineering and or reliability engineering contract support within critical engineering disciplinaries. We provide temporary short- and long-term secondment resources for both fixed plant and surface mining assets.

- Project Engineering - Lead Execution
- Mechanical Engineering support
- Mechanical Engineering maintenance support

Turnkey Project Management

- Reverse engineering and 3D scanning utilising the latest FARO Focus M70 Laser Scanner
- Technical engineering support and proposed processing practices
- Reliability Optimisation and maintenance strategy studies
- Shutdown asset scoping and commissioning methodologies
- Wear liner management and optimisation maintenance strategies
- Wear liner management inspections, 3D laser wear monitoring shutdown reporting
- End to end turnkey project management execution

Application Engineering

As process plant technology demands increase within the resources sector, client design solutions and expectations demand precise cost-effective deliverables. IMS is experienced within in its suite of design CAD tools utilised to accommodate a multitude of engineering solutions:

Dedicated Engineering Programs

- Siemens Unigraphics
- Solid edge
- Solidworks
- Geomagic Wrap
- Geomagic Design X
- Revit (AutoCAD)
- MicroStation
- Inventor (AutoCAD)
- Space Gass
- Navisworks

3D Visualisation Software

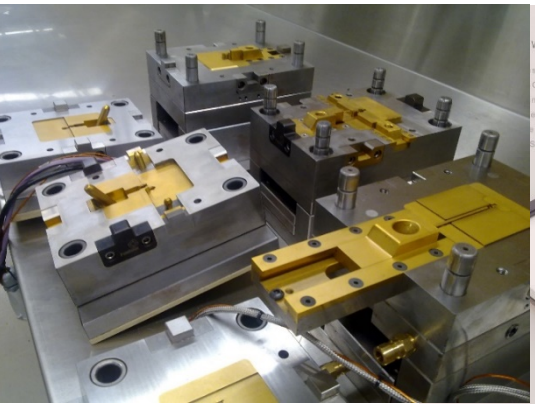
- Rocky DEM
- Blender
- Substance Painter
- Photoshop
- After Effects
- Premiere Pro
- Quixel
- Sketchfab
- Marmoset

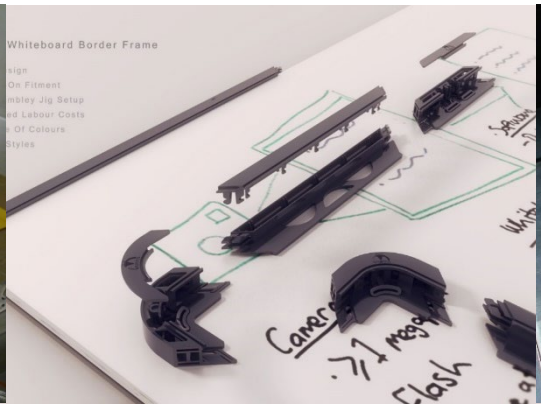
Extended Industrial Design

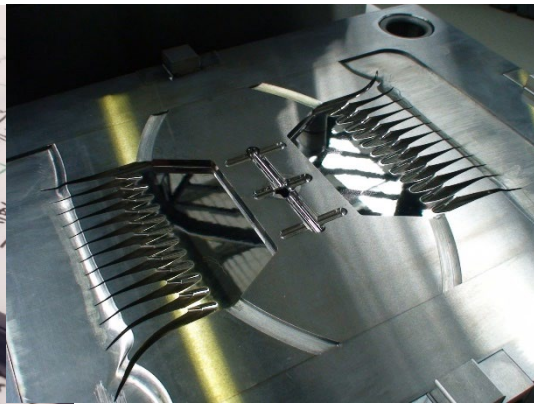
Application Services

Innovative engineering history highlights IMS' extended capabilities and prior unique engineering design expertise within an array of industries enables IMS to bring attention to detail for complex infrastructure within the process mining fraternity.

- Concurrent industrial design engineering
- Innovative intellectual property designs (IP)
- Patent attorney PCT drafting
- Complex fabrication design and unique manufacturing methodologies
- Design/manuf. Injection mold and press tool design
- Automation - Jig and fixture design/assembly optimisation
- CAD-CAM componentry _ custom design/manufacturing





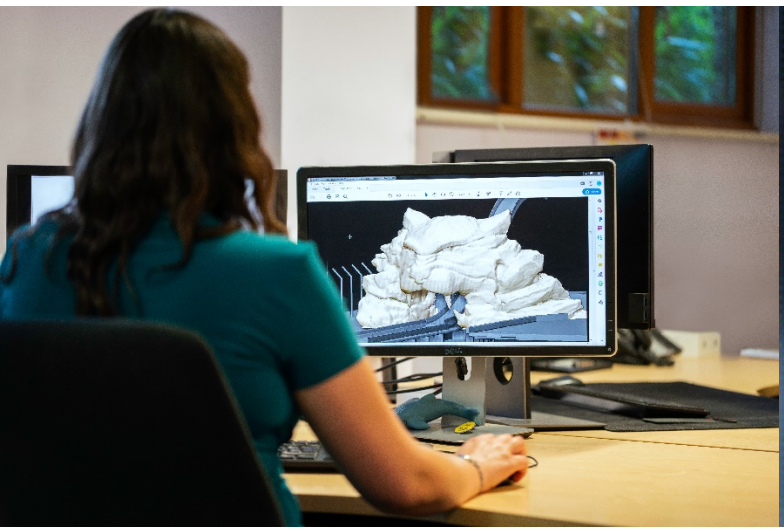


3D Animation, Presentation &

Promotional Material

We provide even more:

- Engineered Design Presentation Documentation.
- Engineered Animated 3D walkthroughs.
- Production of informative 3D animation demonstrating product viability and feasibility studies.
- Generic native model data converted into high resolution Illustrations.
- Interactive 3D turn-around showcasing your model/concept including annotations displaying interactive snippets of critical information as the user views your model. Turnkey animations can also be included.
- (SWI), (SWP) pure VR training high risk maintenance task experience using new technology. This unique process is not yet employed within the mining sector and allows maintainers to learn valuable high-risk installation methodologies/skills in a safe environment. Designed to run on low-medium hardware specifications and requires a VR headset or compatible device to operate.



IMS Deliverables &

Client Benefits

Client benefits include:

- Cost effective fit-for-purpose design improvements that deliver challenging service conditions.
- Turnkeyed optimised design, manufacturing, installation support and accountability.
- Successfully delivered sustaining projects improving plant reliability, optimising capacity and minimising preventative maintenance budgets.
- Reduced operational / maintenance risks through safe design philosophy.
- IMS strives to act with integrity, deliver value to our clients and understand our stakeholder's needs.

Research and Development Projects

IMS is actively and continuously pursuing safety design initiatives surrounding mine maintenance and current shutdown installation decommissioning techniques. The very essence of safety is the driving force behind all IMS innovations. To-date IMS have successfully implemented such innovative rollouts throughout Rio Tinto maintenance operations. This has showcased our holistic approach to solution development ensuring maintenance techniques on site are safe, efficient and user friendly. IMS welcomes all high-risk maintenance task issues raised that require R&D solutions to mitigate personal risk assessment scenarios.

Contact

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