

## Calibre Rail

### Rail and Drainage Design

END USER: Fortescue Metals Group  
 CLIENT: Calibre Rail  
 START DATE: 2011  
 COMPLETION: 2012

#### CALIBRE SCOPE:

Detailed design of the marshalling yard including track layout, drainage, utilities and allowance for maintenance facilities.

#### 12d DIMENSIONS:

- Rail
- Mining
- Drainage, Sewer and Utilities

## Project Summary

Fortescue Metals Group (FMG) undertook a \$US8.4bn expansion program to triple the size of its operations and take it to 155 million tonnes of iron ore per annum by mid 2013.

FMG had a triplication of their rolling stock fleet. To meet the demand and the growth in associated maintenance procedures, an expansion of their existing facilities at Rowley Yard, Port Hedland was required.

## For more information

To find out more about how you can create better designs faster with the 12d Model solution for civil engineering design, visit [www.12d.com](http://www.12d.com).

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# Port Hedland Rail, Australia

## Rowley Marshalling Yard Upgrade



Iron ore rail facilities

## The Challenge

FMG expansion plans ceased during the global financial crisis. As a result, the study and execution of their ambitious plans ground to a halt. Calibre Rail's role as EPCM contractor was to take these preliminary studies and upgrade the mainline, which started in late 2010.

With construction commencing on the other elements of the mainline (such as the triplication of the load-out loop, a new fuel facility and duplication of the mainline), there was little time to investigate the issues associated with Rowley Yard.

A few of the issues faced include:

- Earthworks modelling of both sub-grade and capping layer
- Drainage issues and tying into the existing network
- Service clashes
- Development of a staged approach to the construction of the yard to minimise disruption.

## The Solution

20 options were investigated using the powerful 'element method' tools within 12d Model's Super Alignment, with the turnout placement function providing a quick and effective method to arrange track layouts.

Storm water drainage design was developed in 12d Model. Three options

were investigated, limiting pipe sizes to 900, 1200 & 1500(mm). A cost/benefit analysis was completed that compared pit and pipe quantities and thrust boring sites.

With the site 1600km away from the nearest pipe supplier, this decision was critical to logistics planning.

*"Using 12d to design this solution saved more than \$AUD2million in capital costs for the project."*

The storm water drainage design was independently verified. Diversion drains were mapped in 12d Model using the HEC RAS writer. Importing the water surfaces from HEC RAS to 12d Model was used to then calculate tail water conditions.

## Result

*"12d modelling isn't just a click of a button. It often takes many attempts to find a solution to a problem. In a brown field environment, where little planning had been done in the past...issues were constantly faced."*

*"It seemed that everything we touched was broken and every solution we tried to implement failed. This led to blowouts in the delivery, but we are very happy with the result thanks to 12d Model and its vast array of tools."*

Chris Compton  
 Fortescue Metals Group



## Roads and Highways

12d Model's design option is the smarter solution for the design, modification and maintenance of Road and Highway projects.

Enjoy advanced 3D tools to design local and major roads, intersections, roundabouts, highways, interchanges and much more.



## Ports and Dredging

12d Model is the solution for port infrastructure and dredging, easily managing the very large datasets and complex volume calculations often required by these projects.

A complete range of flexible and customisable volume calculation tools allow teams to extract and present the information quickly and easily.



## Land Development

12d Model is the most versatile solution for the creation of sustainable land development projects, including residential, commercial and industrial developments, recreational areas, landfills, and agriculture projects.

Easily manage all aspects of your land development project from earthwork quantities, road design utilities and drainage design.



## Airport Infrastructure

12d Model provides a solution for the design, construction and analysis of new airports, as well as the upgrade and maintenance of existing runways and airport infrastructure.

Easily manage large airport infrastructure projects and share data across multi-disciplinary teams.



## Rail

12d Track has been specifically designed for the survey, design and construction of light, heavy and high speed rail projects.

Extensive railway tools in 12d Track allow the rail designer to quickly and easily design their projects. These options are built on the existing 3D modelling and design tools available in 12d Model.



## Mining Infrastructure

12d Model's powerful set of exploration, site investigation, survey and analysis tools are crucial for the initial design, construction and ongoing operation of mining projects.

Comprehensive tools for the survey, design and construction of access roads, railways, earthworks and services allow for the coordinated design and management of mining infrastructure from within 12d Model.



## Drainage, Sewer and Utilities

12d Model provides comprehensive tools for the design, analysis and optimisation of stormwater and sewer projects using rational, dynamic (hydrograph) and 2d drainage methods.

Powerful clash detection management allows for efficient 3D modelling of service networks such as gas, electricity, telecommunications and water prior to construction.



## Surveying

12d Model is a complete surveying package providing the tools to manage all facets of surveyed data including LIDAR, topographical, as-built, conformance, traversing, geodetics, data mapping, labelling and much more.

The 12d Field option runs on a ruggedized tablet and gives the user access to full 12d Model functionality, allowing you to take the entire project into the field with the most comprehensive pick-up and set-out tools.



## Oil and Gas

12d Model assists with the design, construction and mapping of oil and gas pipelines, original site exploration and the wide range of infrastructure required for oil and gas projects.

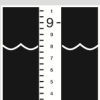
Accurate 3D modelling and the ability to share data between users allow teams to quickly and easily coordinate designs.



## Construction

12d Model is the ultimate software for construction with powerful set-out options, direct interfaces to machine control and detailed conformance reporting and auditing.

Manage 3D data and control volumes, quantities and progress claims with 12d Model. Set-out your project and undertake conformance and as-built surveys live on-site using 12d Field.



## Rivers, Dams and Hydrology

12d Model handles very large datasets and interfaces with a wide range of analysis packages, making it perfect for flood studies and the management of rivers and dams.

12d has partnered with industry leading analysis software, allowing users to apply 2D drainage analysis from within 12d Model.



## Environmental

12d Model's ability to handle very large datasets combined with flexible and comprehensive 3D analysis and modeling tools make it perfect for a wide variety of environmental projects.

Existing workflows can adopt 12d Model easily as it allows users to directly interface with GIS systems and most software packages and file formats.

## Why Choose 12d?

- **Powerful data processing & intelligent functionality.**
- **Modular, easy to update & completely customisable.**
- **Seamless integration with major industry software and hardware.**
- **Used in over 55 countries worldwide.**
- **Friendly support & training from industry experts.**

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