Case Study: Stuart Yard
Rail Yard Capacity Model

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- Australia's largest rail freight operator
- Commodities:
  - Coal
  - Iron ore
  - Minerals
  - Agricultural
  - General freight
- World's largest rail transporter of export coal
• Australian based international consulting company
• Part of the Worley Parsons Group
• Project & Business advisory services in the infrastructure & resources sectors
• Australian distributor of AnyLogic

Offices:
• Sydney
• Brisbane
• Melbourne
• Perth
• Hong Kong
• Shanghai
Employees: ~370
• Australia’s largest rail freight operator
• Commodities:
  • Coal
  • Iron ore
  • Minerals
  • Agricultural
  • General freight
• World’s largest rail transporter of export coal from mine to port

Tonnes hauled: 250 million tonnes pa
Locomotives: 746
Wagons: 16,800
Employees: 8,000+
Track managed: 2,600 km
Queensland
Area ≈ 1.85 Million km²

Germany
Area ≈ 0.36 Million km²
QR National's Challenge

- Capacity of Stuart Yard
- Whether addition operations could be moved to the yard
- What additional Infrastructure was required (if any)

Scalability
- The model needed to be constructed in a modular fashion to allow it to be
  - easily expanded
  - incorporated into a larger model

Timing
- The model needed to be completed in a relatively short period of time
Solution

- Simulate the current operations, using Anylogic’s Rail & Enterprise Libraries

- Benchmark the model against current operations

- Determine the current capacity

- Identify what additional operations could occur

- Test additional infrastructure & operations
Model Overview

Locomotive Preparation
- Positioning
- Washing
- Brake Testing

Locomotive Maintenance
- Inspections
- Repairs
- Heavy Maintenance

Wagon Maintenance
- Inspections
- Wagon Inspection
- Lift Car Maintenance

Reliability Examinations
- Track Inspection

Solution
Locomotive Preparation

- Provisioning
- Washing
- Brake Testing
Locomotive Maintenance

- Inspections
- Repairs
- Heavy Maintenance
Wagon Maintenance

- Inspections
- Wagon Overhaul
- Fuel Car Maintenance
Reliability Examinations

- Train Inspections
Model Logic

Solution
Reusable Components

Track Parking

Stuart Yard

5 Speed Line
Modelling Issues

**Data**
- Single spreadsheet
- Collection of data from numerous sources
- Easily solved using Anylogic’s resource components

**Logic**
- Avoiding deadlock within the yard
- Giving the main line the priority over exiting traffic from the yard
Capacity

Utilisation & Waiting time

Time Distributions

Queue & Stowage

Yard Score
Outcomes

- Determined the capacity of the yard
- Identified where additional activities could occur
- What additional infrastructure was required

- Available options for the yard
- Logic & assumptions to upper management as well as the yard operators

- Completed 2 weeks ahead of schedule
- Easily expanded
Next Steps

- Include the yard model within a detailed model of the Mt Isa Line
- Inclusion of Townsville's Jetty & Port operations
- Testing of different operation regimes
- Operational planning tool
- Use model components within other yard models
The model allowed the:

- Capacity of the yard to be determined within the required time frame
- Proposed options to be evaluated
- Best option to be selected with an increased level of certainty
- Opportunity for the model to expanded & components to be reused in the future