



FISCHER

CONSULTING

COMPANY PROFILE

Mining and Industry

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FISCHER CONSULTING

Founded in 1988, **Fischer Consulting** is a management consultancy that researches, develops, implements, manages and operates turn-key projects and solutions.

The composition of the consultancy reflects the diversity of disciplines involved in management. Apart from industrial engineering and business administration, the qualifications of **Fischer Consulting** management specialists encompass electronic engineering, civil engineering, statistics, computer science, the full spectrum of management sciences and other social disciplines. One attribute of the consultancy is its unique ability to marry technology and expertise from a wide range of disciplines to its management consultancy services.

Fischer Consulting and its affiliated organizations have implemented projects in the following industries:

- Mining Industry
- Transport & Automotive Industry
- Education Industry
- Health Industry
- Telecommunication Industry
- Manufacturing Industry

These projects vary from:

- Business Management Consultancy Projects
- Feasibility Studies
- Brown and Green Field Developments
- Information and Telecommunication Management Projects
- Project Specification and Contract Management

OVERVIEW OF EXPERTISE AND SERVICES

MINING & MINERALS

Fischer Consulting has a track record of providing quality project and engineering services to the mining and minerals sector. The company has the capabilities, employees and operational knowledge to deliver innovative value driven solutions to customers.

Projects in the mining and minerals sector are typically highly capital intensive and have long lifecycles. Thus projects require robust planning and design early in the project's lifecycle at a time when the ability to influence changes in design is high and the cost to make those changes is very low. By following this design and planning methodology, potential and substantial savings on project commissioning and operation can be realized.

Fischer Consulting's staff is a multi-discipline team with expertise in the following services:

- Management Consultancy & Project Optimization
- Preliminary and Definitive Feasibility Studies
- Conceptual Design Studies

- Pit to Port Logistics of Minerals, Ores, Coal & Rock
- Front End Engineering Design
- Project Management
- Operations Management & Support
- Risk Management
- Engineering, Procurement & Construction Management
- Project Finance and Due Diligence

PIT TO PORT LOGISTICS

Identifying the optimal pit to port solution is critical to increasing productivity and eliminating waste over the life time of the project. **Fischer Consulting** has a full pit to port solution including preliminary and definitive feasibility studies, concept design, project management and delivery.

The **Fischer Consulting** pit to port specialists analyse a range of feasible project solutions and selects the solution that adds the most value to the project. **Fischer Consulting** pit to port specialists have extensive knowledge in:

- Bulk material logistics & supply chain optimisation
- Simulation modelling
- Lifecycle cost analysis
- Regulatory risk and approval management
- Pit to Port route selection
- Operations automation
- Best of breed equipment suppliers
- Construction estimating database
- Commissioning & construction supply chain

Fischer Consulting also has extensive experience in operation optimisation which is focused on efficiency improvements, waste reduction and facility upgrade projects.

Fischer Consulting takes on pit to port projects as a Logistics Project Management Contractor or an Engineering, Procurement and Construction Management service provider to project logistics. We also form an integrated project management process with other consultants and the customer.

PORTS & TERMINALS

Fischer Consulting's ports and terminals multi discipline team focuses on the long term trend of increasing export demand and a changing global climate when taking on the complex problems facing marine logistics today. By applying mathematical, statistical and computer simulation modelling capabilities and industry know how that cover the total logistics chain, **Fischer Consulting** can evaluate the impact of the projects on current operations, local communities and the environment while adding the most value to the project.

Our services and experience include:

- Feasibility studies, conceptual design, front end engineering design and project management

- Bulk material handling and stockyard facilities planning and design
- Container, bulk and break bulk material handling & stockyard facilities planning and design
- Port operations simulation modelling, including material handling and vessel traffic
- Port and terminal master planning
- Site selection, strategic planning and land use planning
- Operations and capacity optimisation
- Port logistics and material handling automation
- Environmental impact assessment management
- Coastal engineering & dredging project management
- Best of breed equipment suppliers

LOGISTICS & OPERATIONS RESEARCH

In brief, **Fischer Consulting** applies operations research to support its customers in making optimal logistical decisions. Operations research is the discipline of applying advanced analytical methods in decision making. By using techniques such as mathematical modelling to analyse complex situations, operations research gives executives the power to make more effective decisions and build more productive and cost effective systems.

Industrial engineers are trained extensively in operations research. This knowledge and capability is applied in **Fischer Consulting's** projects to ensure that optimal results are achieved.

This knowledge base encompasses the following:

- Statistical analysis
- Capacity planning and scheduling
- Optimisation
- Route Planning
- Queuing theory
- Computerised simulation and modelling of systems

FINANCIAL ANALYSIS

In this field, the combination of industrial engineering and business administration qualifications held by **Fischer Consulting** personnel enables the company to render the following services:

- Privatisation and commercialisation studies
- Feasibility studies
- Capital and cash-flow budgeting
- Zero-base budgeting and control systems
- Financial modelling
- Sensitivity analysis

BUSINESS DEVELOPMENT AND DEVELOPMENT OF MANAGEMENT SYSTEMS

One of the main aims of a management system is to ensure both the effectiveness and efficiency of an organisation. An effective organisation will achieve its mission and goals, and an efficient organisation will achieve its aims at maximum levels, given the restrictions to which the organisation is subjected. Our services include assistance with:

- Environmental analyses
- Strategic planning
- Tactical planning
- Scheduling
- Evaluation and control
- The development of performance improvement systems
- Information systems to support the various aspects of management
- The general management of operations
- The development of management systems, together with computerised management support systems, contributes to increased productivity and improved goal achievement within an organisation.

DECISION ANALYSIS

Decision analysis comprises the use of tools, techniques and scientific and mathematical theories to assist decision-makers in selecting solutions from available alternatives. In other words, decision analysis provides jurisdictions or other agencies with support in tackling difficult decisions. Simply put, the decision analysis process:

- Defines and analyses a decision situation
- Identifies alternative paths and outcomes
- Assesses the associated uncertainties
- Identifies the alternative that most closely matches the decision-maker's value system

Decision analysis is not about having someone else making decisions on your behalf. It is about assisting a decision-maker in systematically and rigorously working through and documenting a decision process, arriving at a preferred and defensible course of action.

Decision analysis:

- Empowers you to make effective decisions
- Assists you to work through and document a decision process systematically
- Shows you how to reach a course of action that is justifiable

INFORMATION SYSTEMS

Fischer Consulting's information systems services are not limited to computerized systems, but include the development of manual systems and the seamless integration of manual and computerised systems. The following services are offered individually or combined as a suite of services:

- User requirement definition

- Functional and system specification
- Compilation of tender and contract documents
- Tender evaluation
- System design and development
- Compilation of design documents and system/user manuals
- Training of users
- Implementation of systems
- System maintenance

OTHER SERVICES

- Due Diligence
- Facility planning and conceptual layout design
- Production management and inventory control systems
- Risk Assessment and Management
- Reliability analysis
- Development and implementation of quality and productivity management systems
- Development of a communication programme
- Project management
- Contract administration
- Analysis of legislation and judicial systems from an operational perspective

Recent Projects

Fischer Consulting has been actively involved in the following projects:

- The economic and financial analysis of a number of toll roads to determine their feasibility, including sensitivity analysis of financial parameters and capital and cash-flow budgeting
- The analysis of the provincial authorities' financial systems and funding policy as applied to road traffic law enforcement
- The development of a business plan and cash-flow analysis for the Road Traffic Infringement Agency
- The preparation of scoping studies and mining feasibility studies for new and developing projects, due diligence assessments and analysis of existing operations to improve performance and profitability.

Namibian Marine Phosphate

Fischer Consulting Namibia (Pty) Ltd was appointed by Namibian Marine Phosphate (Pty) Ltd to carry out a feasibility study in the handling, transportation and storage of the phosphate between the Plant and the Port of Walvis Bay, including the storage of the phosphate in the harbour and loading of the phosphate onto vessels. It was required that a start-up phase of 0.5 mtpa and full production phase of 3 mtpa be investigated to determine whether capital expenditure may be delayed and therefore reduce cost per ton in the start-up period.

The scope of the feasibility study was to identify and evaluate the alternative options for material handling, transportation, buffer storage and ship loading of the phosphate product from the Namibian Marine Phosphate Plant to NamPort Walvis Bay and to provide an estimated of associated cost.

The feasibility study also included conceptual designs that minimise the capital and operational expenditures, but also to provide a functional solution to ramp up the production from 0.5 mt in year one to full capacity of 3 mtpa in year 3. Risks associated with the project implementation and operations were also identified and evaluated.



Fluorspar Loading at Walvis Bay

Fischer Consulting services to Namibian Marine Phosphate included the following:

- Identifying and evaluating alternative Logistical Solutions including capital and operational costs of the solutions.

- Preparing a concept design and cost estimate for the recommended Logistical Solution as well as an interim solution to be implemented during a start-up production year that is scheduled for 2013.
- Prepared a Definitive Feasibility Study for the recommended Logistical Solution as well as an interim solution for the start-up production and supply by,
 - Modelling the harbour operations and activities for establishing a base line in order to simulate the impact when introducing the material handling and shipment activities for the product volumes including handling and shipment.
 - Determining the impact of market and production variances as well as harbour operations on the Logistic Solution as well as on the production throughput, plant storage, transport rate and harbour storage capacity.
 - Determining the definite feasibility of the Logistical Solution based on the capacity requirements of the optimal solution where a realistic projection is made regarding market demand and production variances.
 - Recommend changes to the plant and harbour product storage facilities.



NamPort Walvis Bay

Holcim Cement: Plant & Logistics

Logistics capacity assessment, costing and operations plan to import cement through East London harbour. The complete bagged cement import supply chain was designed, including logistics capacities from alternative ship loads, off-loading interfaces, stevedores, materials handling and temporary storage in the harbour to vehicle loading.



East London Port

Requirements analysis, simulation model and facilities plan for capacity upgrade of packaging, palletising, finished product storage & handling and delivery vehicle access and movement at Roodepoort Plant.

Cement production capacity and logistics assessment simulation model for Brakpan plant. The model include all operations, including material offload via rail and road, material storage in silos, mixing, product buffer storage, bagging, palletising and vehicle loading and turnaround times.



Cement Manufacturing Plant & Cement Product Storage

Facilities plan and feasibility of the relocation of the Queenstown depot. All logistics aspects include rail and road interfaces, storage capacities and vehicle loading and dispatch were included in the evaluation to relocate to alternative sites.

Turnkey Project: Simulation, Development, Implementation & Commissioning of Truck Weighing and Tracking Solution

The Beit Bridge Traffic Control Centre of the South African National Roads Agency (SANRAL) is located on the N1 freeway on the South African border with Zimbabwe¹.

This macro facility includes screening lanes on both approaches to the site, where **vehicles are weighed whilst travelling at speeds below 40 km/h** and 2 cameras take photographs of each vehicle on the screener - one employs optical character recognition to recognise the number plate of the vehicle and the other records the context of the vehicle from front to back including the number of axles, shape of the vehicle, colour, make, etc for verification purposes. Detection equipment installed on the main (N1) road sounds an alarm and photographs heavy vehicles that bypass the screener lanes, for prosecution purposes.

From the screeners, the vehicles queue in the inspection lanes for an **RFID tag** to be placed on each vehicle and the documentation of the vehicles, drivers and load (permits) to be verified, whilst a superficial inspection of the roadworthiness of the vehicle is performed too. Vehicles that comply in all respects (not overloaded on the screener, roadworthy and documentation in order) are allowed to re-join the main road and proceed with their journey. Vehicles that do not comply in any aspect are directed to the static scale for weighing and/or the vehicle testing station and/or the holding yard, where the prosecution documentation is issued, overloads corrected and serious roadworthy issues corrected before being allowed to re-join the main road.

RFID readers and direction or traffic lights have been installed at all the intersections that determine the direction in which a particular vehicle is to travel and the opening and closing of booms ultimately direct the vehicles to where they are intended to go.



Beit Bridge Traffic Control Centre

¹ It is envisaged that cross border road transportation permits and compulsory road user charge toll fees in respect of all heavy vehicles will be charged in future at this facility to remove the incentive for such vehicles to use secondary roads in an attempt to evade the toll plazas and paying toll fees along the N1 between Beit Bridge and Johannesburg (Gauteng Province).



Beit Bridge Traffic Control Centre

Notwithstanding the fact that the traffic flow in terms of the seasonal and monthly/weekly/daily patterns and number of vehicles per hour are virtually the same in both directions of travel, 7 inspection lanes have been constructed in respect of vehicles approaching from Zimbabwe whilst only 4 inspection lanes have been constructed to deal with vehicles from South Africa on their way to Zimbabwe to save on both capital and operating costs.

The motivation supporting this difference in the design is that all vehicles entering the country should be fully inspected whilst those leaving the country may be subjected to a less stringent process. The challenge that it offers from an operational point of view is how to deal with such stringent process without clogging the facility. The software controlling the flow of traffic and the level of inspection afforded to a vehicle caters for a variety of scenarios and parameters that determine the intensity of inspection and time spent on a vehicle. The parameters can be set at different levels for vehicles entering South Africa relative to the vehicles leaving the country.

To determine the optimal combinations of the scenarios and the desired configuration under different loads of traffic, a simulation of the facility was developed and made available to the operational staff to continually refine the parameter settings in the software.

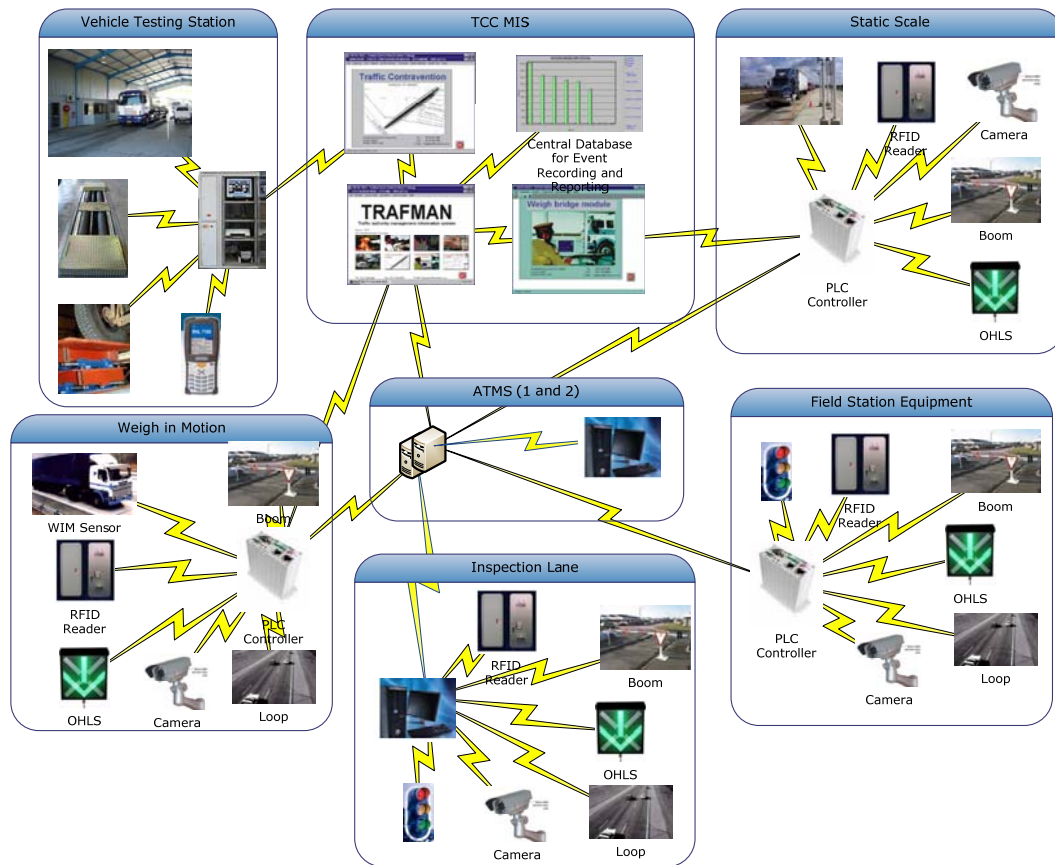
The exact layout of the site, duration of each of the processes and the appropriate probabilities that characterises each have been set up in the simulation model, also taking into account the travelling times between the various processes. Undesirable outcomes, such as vehicle queues stretching onto the main road have also been recorded in the model.

The following systems were integrated to supply the total solution:

- Vehicle Tracking System
- Vehicle Identification System
- Driver Identification System
- Traffic Control Equipment
- Vehicle Weighing Equipment

- Vehicle Testing Equipment
- Automated Traffic Management System (ATMS)
- Integration: Control and Operations Software
- Communication Infrastructure
- Site Security Surveillance
- Access Control System
- Electrical Infrastructure

A Logical Solutions Architecture diagram illustrating the holistic integration of the various systems and sub-systems directly related to “overload control and management” is provided:



Simulation Project: Pharmaceutical Warehouses of the Eastern Cape Department of Health

The Eastern Cape Department of Health announced a tender for the rehabilitation, refurbishment and operation of two pharmaceutical depots in Port Elizabeth and Mthatha. To determine the optimal layout of the refurbished warehouses, this project focused on simulation modelling of order processing, in particular order picking and packing.



Mthatha Warehouse

Project Aim

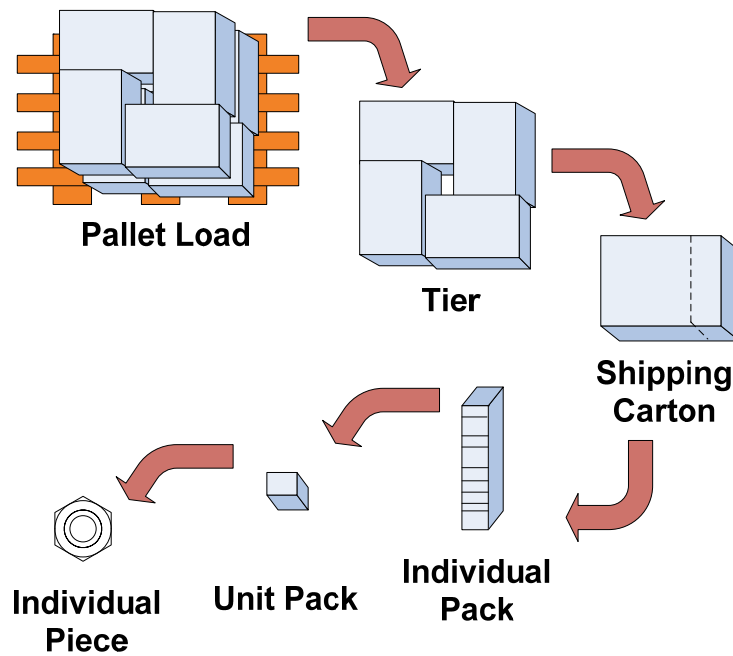
- To illustrate which method of order picking represents the most efficient option of operation of the warehouses for the given demand. This is achieved by designing appropriate processes and layouts for order picking operations within the warehouse and testing the effectiveness thereof by means of a simulation model.
- It is envisaged that the results of the simulation indicate problem areas within the preliminary design of the refurbished warehouse for correction before implementation.
- Since only limited historic data on product demand is available, a flexible design is needed to enable adaptation later on.

Project Scope

- Simulate the picking and packing of orders from demanders, replenishment of stock to the fast picking area from bulk storage.
- Only selected products representative of the low, medium and high end of demand are used in the simulation model.

Basic Warehouse Processes

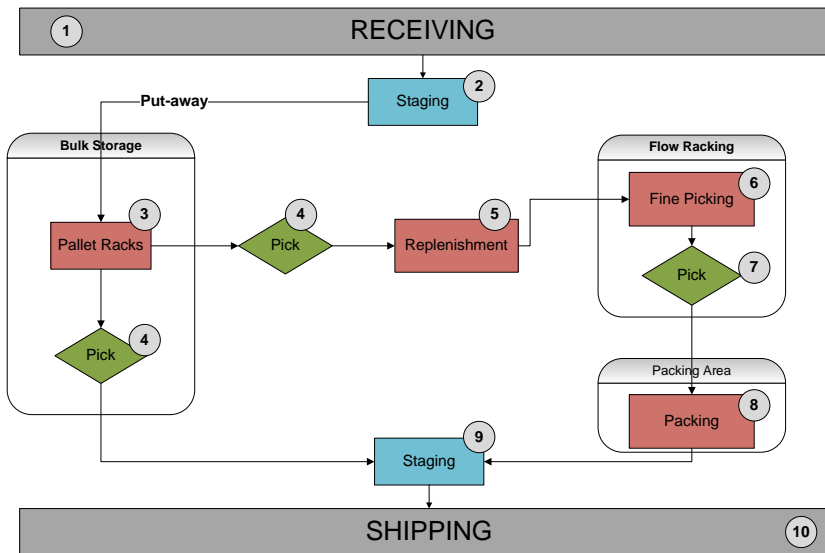
Before any consideration was given to the designing of the two warehouses' layouts, it was essential to understand the basic processes which occur within the warehouses. Due to the large variety of stock items in the pharmaceutical warehouses, the units of handling in respect of each item, referred to as a "stock keeping unit" (SKU) was determined. This is the smallest physical unit of handling of a product inside the warehouse. As the product moves through the supply chain, the unit of handling becomes smaller.



As the starting point for designing the layout of the warehouses, the basic requirements (needs) for the warehouses have been described in terms of the following:

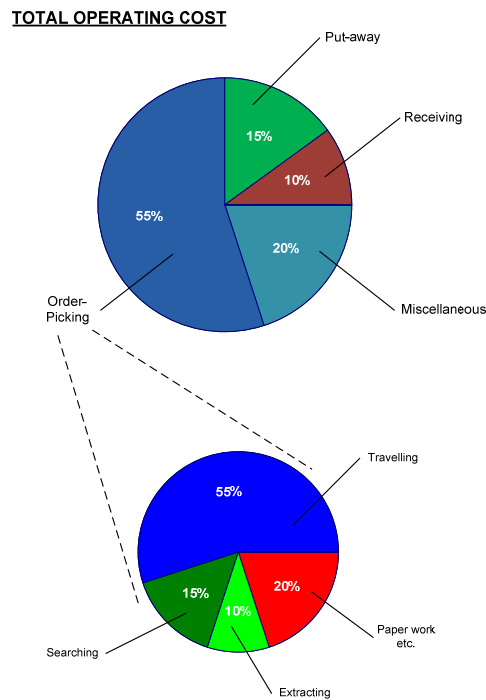
- FEFO (First Expiry date First Out)
- Maximum space utilisation
- Minimum aisle space
- Maximum use of equipment
- Maximum use of labour
- Maximum accessibility of products
- Logical and efficient flow of goods
- Maximum height utilisation
- Fast moving SKU's must be stored in the most convenient spaces
- Minimum travelling distance

Amongst others, the following basic processes within the warehouses were determined before the model was constructed:



From initial observations, the footprint of the current facilities appeared to large for the throughput in terms of modern warehouse best practice, but due to the lack of reliable data, it was decided that the design of the warehouse layout must allow for flexibility, as the exact amount of area needed for bulk storage, picking and staging will only become clearer upon introduction of a state of the art warehouse management system upon completion of the refurbishment.

To give a cost perspective on the most important areas in the warehouses, the following diagram illustrates the contribution each of the specific areas has to the total operating cost of the warehouse.



From the above diagram, it is clear that order-picking should be most important area of focus, as most of the costs are expended in that area.



Port Elizabeth Warehouse

The Model

A computer simulation model was developed in order to create a model representing real world scenarios that can be used to analyse preliminary designs and generate results to assess process capability.

Sensitivity Analysis

A sensitivity analysis was performed to review the feasibility and practicality of expanding the preliminary simulation model to represent a full scale functional distribution centre.

The sensitivity analysis examined four scenarios in which the number of orders were increased from the actual demand data, the item volume per order was increased and a combination of both increases over the following three models:

- basic piece picking operation,
- zone picking operation, and
- wave picking operation.

Conclusion

The sensitivity analysis results generated by the simulation model show that wave picking is the best method of order picking for a high volume, high throughput system.

The simulation model provides insight in respect of the complex processes at work within the warehouse and the results generated by the model can be used to select the alternative layout that provides the optimal performance against the criteria identified.

The results obtained from the sensitivity analysis confirm the important role of simulation modelling to analyse different design options at a low cost in order to determine the most effective layout of the pharmaceutical warehouses, before more a significant investment in the design is made.



Pharmaceutical Warehouse Picking and Packing Layout

BevServ (SABCO): Conveyor System Upgrade

Project planning and implementation of Electronic Bottle Inspection (EBI) equipment and related conveyor system upgrade for Namibian Beverages, Windhoek.



Xstrata Coal South Africa:

Establishment of Opencast Mine and Associated Infrastructure



Construction of Low Level Stream Crossing and Haul Roads



Construction of Conveyor and Feeder Breaker

Denel Saab Aerostructures (Pty) Ltd: Facility Upgrade Project (Green and Brown Field Development)



Rigging and positioning of CNC Equipment



Installation of Ipsen Furnace



Installation of new Shotpeener
(Before and After)

Supreme Spring (Pty) Ltd:

Implementation of Cold Coiling Line (Green Field Development)



Cold Coiling Equipment



Fully automated Robot Cell

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