# WOMA ROBOTIC AUTOMATION TECHNOLOGY

## SEMI AUTONOMOUS UHP & VACUUM WASH BAY

Water as a tool

WOMA®

GLOBAL SOLUTIONS LOCAL INGENUITY

## AUSJET / ADCVA INNOVATION SAFETY AWARDS SUPPLIER CATEGORY

**WOMA (Australia) Pty Ltd**

**Author: Rebecca (Bec) Fowler**

**August 29th 2024**

**BUSINESS IN CONFIDENCE**

## WOMA (AUSTRALIA) SUBMISSION

***Supplier Award Category:***

*Awarded to an organisation that has improved industry safety through innovation, via the introduction of new products or the enhancement of existing products or services.*

*To enter this category an organisation must demonstrate how they improved safety through innovation.*

**SUBMISSION DETAILS**

**WOMA ROBOTIC AUTOMATION:**

**Semi-Autonomous Robotic Ultra High Pressure & Vacuum Encapsulation Wash Bay**

**CONTACT DETAILS**

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**DECLARATION**

I hereby declare the information enclosed herein and all attachments to be true and complete to the best of my knowledge.

I understand that any information provided in relation to this Award will be used by AUSJET and the Assessment Panel for the award judging process.
Upon request and authorization by WOMA (Australia) Pty Ltd, WOMA may authorise the use and public release of some limited information contained within this submission by AUSJET for promotional purposes.

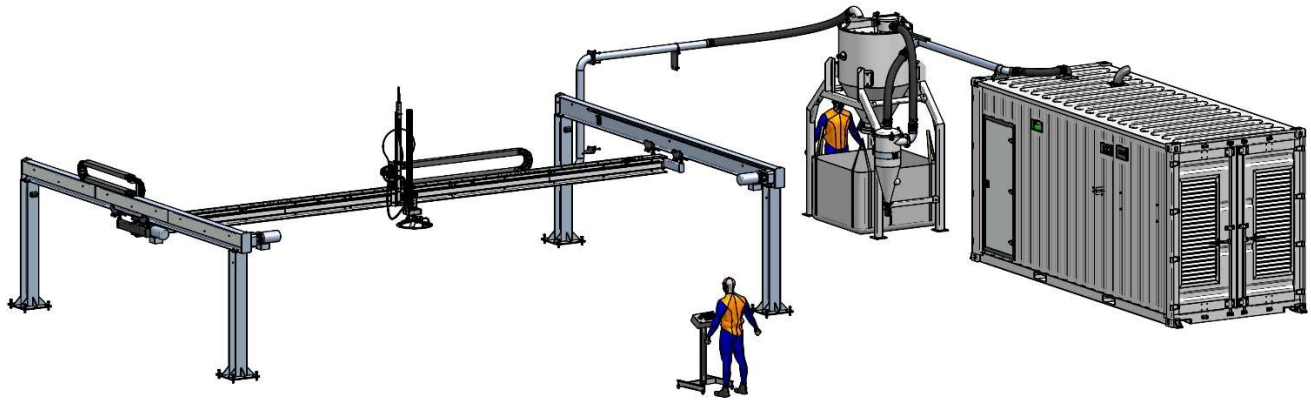
I declare the organisation I am lodging the submission on behalf of does not have any current or ongoing major incident cases open at the time of lodgment. I understand I must notify AUSJET of any incidents and accidents to ensure the betterment of safety and productivity in our industry.

Name: **Rebecca Fowler** Date: **29.08.2024**

Signature: **B. Fowler**

## WOMA (AUSTRALIA) PTY LTD

**WOMA** Australia is an agile, bespoke original Industrial Equipment Manufacturer (OEM). **WOMA's** focus on seamlessly integrating positive displacement, high pressure, steam, vacuum, pneumatic, hydraulic, compressor, generator, explosion protection and related robotic automation technologies with industry is well proven. We offer experienced and dedicated Engineering, Manufacturing, Service, Training, Rental and Customer Support services driven to provide direct technical and problem-solving solutions to our valuable clients. Your critical deliverable is our concern and **WOMA** has the experience, knowledge, resources and skills you can rely on to meet your ESG, Technical and Productivity benchmarks. We aspire to provide improved service to pro-active and dynamic customers working in hazardous & non-hazardous working environments. **WOMA** is a steadfast business partner in the resources sector (Oil & Gas, Mining & Minerals processing), Waste & Recycling, Manufacturing (Cement, Sugar, Fertilizer, Food & Beverage), Shipping, Marine, Defence, Municipal & Civil Construction.



**In-Situ Semi Autonomous Ultra High Pressure & Vacuum Encapsulation Wash Bay**
**A Schenk / Sandvik Project**

## EXECUTIVE SUMMARY

The permanently installed **WOMA Semi-Autonomous Ultra High Pressure & Vacuum Encapsulation Wash Bay was designed, manufactured, installed, commissioned and now maintained by WOMA (Australia) Pty Ltd for Schenk / Sandvik in Western Australia.** This development represents optimised safety, productivity and quality control capacity for the client. It meets strict environmental and social governance (ESG) performance criteria in that it ensures 'lifecycle' product management, from cleaning (removal of scale and rubber), through non-destructive testing (NDT) to final waste encapsulation, collection and disposal. Its programmed robotic high performance ultra-high-pressure cleaning capacity (43 litres per minute at 2800Bar) enables precise and cost-efficient product removal exampling a selection of pressure (for appropriate penetration) and volume flow per minute (for productive removal rates). This initiative removes the operator from any interface with ultra-high pressure or vacuum and simultaneously minimises water wastage and environmental contamination. The programmed, integrated vacuum recovery system ensures product capture and packaging/bagging for appropriate disposal.

## WOMA - CULTURE AND LEADERSHIP

**WOMA** has worked extremely diligently to develop an open-minded, transformative Company culture focused on Customer deliverables and appropriate product development. Specifically, **WOMA promotes**;

- **Positive safety, product development and customer-focus culture**, including demonstrated engagement of internal business unit managers and external business partners with the hosting on an Annual Strategic Planning Event

- **Demonstrated company-wide focus on safety performance** with regular Toolbox Safety Meetings

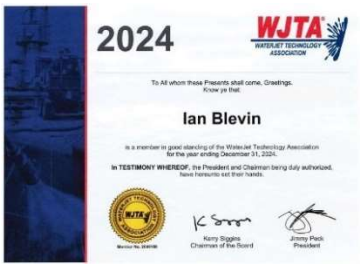
- **Demonstrated consultation and engagement with its workforce, contractors and customers** with regular **WOMA** / Client Continuous Improvement Consultations

- **Support to Staff (e.g. induction, training and professional development), including Technical & Leadership development training**
  - **WOMA** does not overlook the importance of workforce training in process optimization. We equip our team with the skills and knowledge they need to embrace new technologies and methodologies. Continuous training ensures that everyone is proficient in the latest techniques and tools, which is essential for maintaining an innovative and competitive edge in production and as an industry technology partner.

- **Contribution to Industry and Industry Associations** for example AUSJET, WJTA, ACRA, ACA, CCI and other industry leading entities

- **ESG & Sustainability Focus** - innovation isn't just about efficiency—it's also about sustainability. WOMA designs processes that are not only cost-effective but also environmentally responsible. We look for ways to reduce energy consumption, minimize waste, and use materials more efficiently. Sustainable practices can lead to significant long-term savings and a stronger brand reputation for **WOMA**, its clients, their clients and for future generations.







## WOMA – PRODUCT DEVELOPMENT

**WOMA** as an OEM works diligently to develop an open-minded, transformative Company culture focused on Customer deliverables and appropriate product development. Specifically, **WOMA promotes the following Principle stages;**

- **Industry Consultation & Collaboration** – by analyzing the data available to us; via Site consultation or Scope of Work (SoW) briefings and documentation, we draw on leading edge global solutions and apply local-knowledge and ingenuity to innovate operational processes and solutions for our clients.

- **Design Concept & Modelling** - tools like Siemens Solid Edge 3-Dimensional (3D) Design software and associated Finite Elemental Analysis (FEA) or Computational Fluid Dynamics (CFD), enable monitoring and analysis of structure and design options, identifying areas of advantage, waste and inefficiency.
  - FEA is the process of predicting an object's behavior based on calculations made with the finite element method (FEM) analyses and optimizes our designs with weld modeling, complex load path analysis, and more. Advanced technology allows for quick and precise structural and thermal analysis.
  - In a CFD software analysis, fluid flow and its associated physical properties, such as velocity, pressure, viscosity, density, and temperature, are calculated based on defined operating conditions. In order to arrive at an accurate, physical solution, these quantities are calculated simultaneously.

- **Early Concept Primary Design Review** – clear understanding of the current state of a client's operational intent and a 3D designed solution model, enables the development of targeted strategies for solution improvement. This stage enables cross-checking and refinement both internally and externally with their own client and the operational challenges at hand.

- **Prototype Manufacture & Market Testing** - embraces lean manufacturing principles to eliminate waste and optimize our production processes. This approach focuses on value creation for the end customer with minimal waste. We identifying non-value-added aspects or activities and find ways to reduce or eliminate them.

- **Secondary Design Review** - adopting a mindset of continuous improvement is a cornerstone of industrial engineering. **WOMA** encourages small, incremental changes on a regular basis rather than waiting for a major overhaul. This philosophy fosters a culture of innovation and helps to sustain gains in efficiency and productivity over time. Employing FEA, CFD and other automation technologies, we can optimize production. Integrating semi-automation and full robotics automation, we can increase safety, precision and operational consistency while reducing human error and labor costs. Automation also allows **WOMA** and its clients to collect data in real-time, providing valuable insights that can drive further innovation in our processes and solutions.

- **Product Development and Market Release – WOMA's Roadmap to Release** is multi-staged, as best as possible ensuring that the Refine and Release stage is perfecting the product based on real-world feedback and then launching it into the market in a way that maximizes its chances of success. It's not just the end of the product development process, but also the start of the product's life in the market.

**WOMA Semi-Autonomous Ultra High Pressure & Vacuum Encapsulation Wash Bay – illustrates;**

## SAFETY THROUGH INNOVATION

**Operational Challenges, Solutions and Advantages at a glance:**

The Client (Schenk / Sandvik) was constructing a new state-of-the-art mining services, turn-around facility that would integrate all aspects of Shaker Beam (and other mining product) manufacture, refurbishment and commissioning / supply. **WOMA** tendered for and was awarded the contract to design, manufacture, install, commission and thereafter provide ongoing maintenance for the provision of a futuristic yet robust and reliable blast room / pad that would be integrated within the greater facility alongside other activities, from administration to logistics and from fabrication to mechanical fitting.

| Operational Challenge | Solution | Advantage |
|---|---|---|
| Operational Containment | A purpose-designed and constructed tilt-panel concrete blast room to be built within the overall facility. | Absolute containment of activity and related factors of ingress, egress, robotics, uhp, vacuum etc. |
| **Safety** | By robotizing the entire operation, Operators are removed from direct interface with UHP, Vacuum etc. | Safety, Productivity and Quality can be measured, predicted and guaranteed. |

| | | |
|---|---|---|
| **Noise** | The inclusion of acoustic paneling, doors, windows and other sound attenuation technologies – essentially creating a sound-proof environment. | Noise limited to 85dba external to the Blast Room. |
| **Vapour / Atomisation and Over-Spray control** | The design and installation of a high-volume ventilation system complete with extraction and insertion filtration. | Ensures all atomized particulate (inert and active) are effectively captured. |
| **Waste collection** | The design and implementation of a ducted vacuum system which encapsulates removed waste scale and rubber, which once captured, feeds directly via cyclonic separator / interceptor directly to either Bulk Bags, Skip Bins or other appropriate vessel. Water is separated for recycling or clean disposal. | Enables single system handling and its packaged preparedness for cost effective and efficient Recycling / Disposal. |
| **Waste Handling** | All waste water and solids contained. | All waste water and solids filtered and available for recycling. |
| **Recycling** | All waste water and solids contained. | All waste water and solids filtered and available for recycling. |
| **Productivity Measurement / Monitoring** | Automations are PLC controlled which enables the recording of numerous Key Performance Indicators (KPI's) ie: UHP Pump hours (Pressure and Pressureless UHP Pump hours (Pressure and Pressureless), Waste volume by weight, various Time / Performance measurements. | Accurate performance information at the Clients 'fingertips' facilitating diagnostic assessment, decision-making and reporting. |

## SUPPORTING INFORMATION

The entire **WOMA** Semi-Autonomous Ultra High Pressure & Vacuum Encapsulation Wash Bay system includes the following major aspects / components;

- Concrete Tilt Panel Blast room complete with;
  - Industrial Ventilation system
  - Sound attenuation
  - Mobile Robotic Control Station
  - Robotically applied UHP Water Jetting (X, Y & Z plane operations)
  - Robotically applied, ducted Vacuum encapsulation system
  - Filtration mechanisms
  - Safety Interlocks
- Industrial Ultra-High-Pressure Water Jet System – Containerised external to building.
- Industrial Vacuum System – Containerised external to building.
- Industrial Cyclonic Vacuum Interceptor and Bagging Unit.

Following we have pictorially provided insight to the overall project.

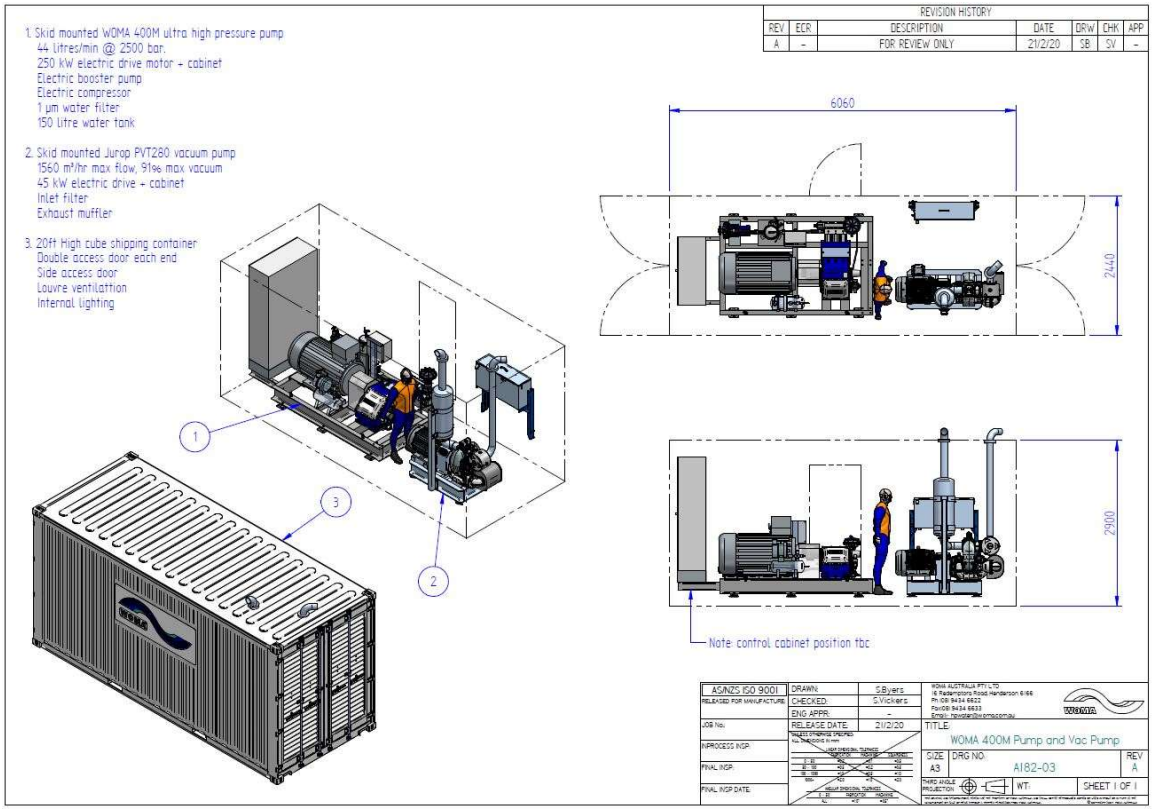



**Illustration above:** Ultra High-pressure unit, Vacuum Unit and Switch Board all robust and securely housed in a ventilated container enabling protection from the elements, tamper-proof security and ultimately mobility if it had to be relocated.

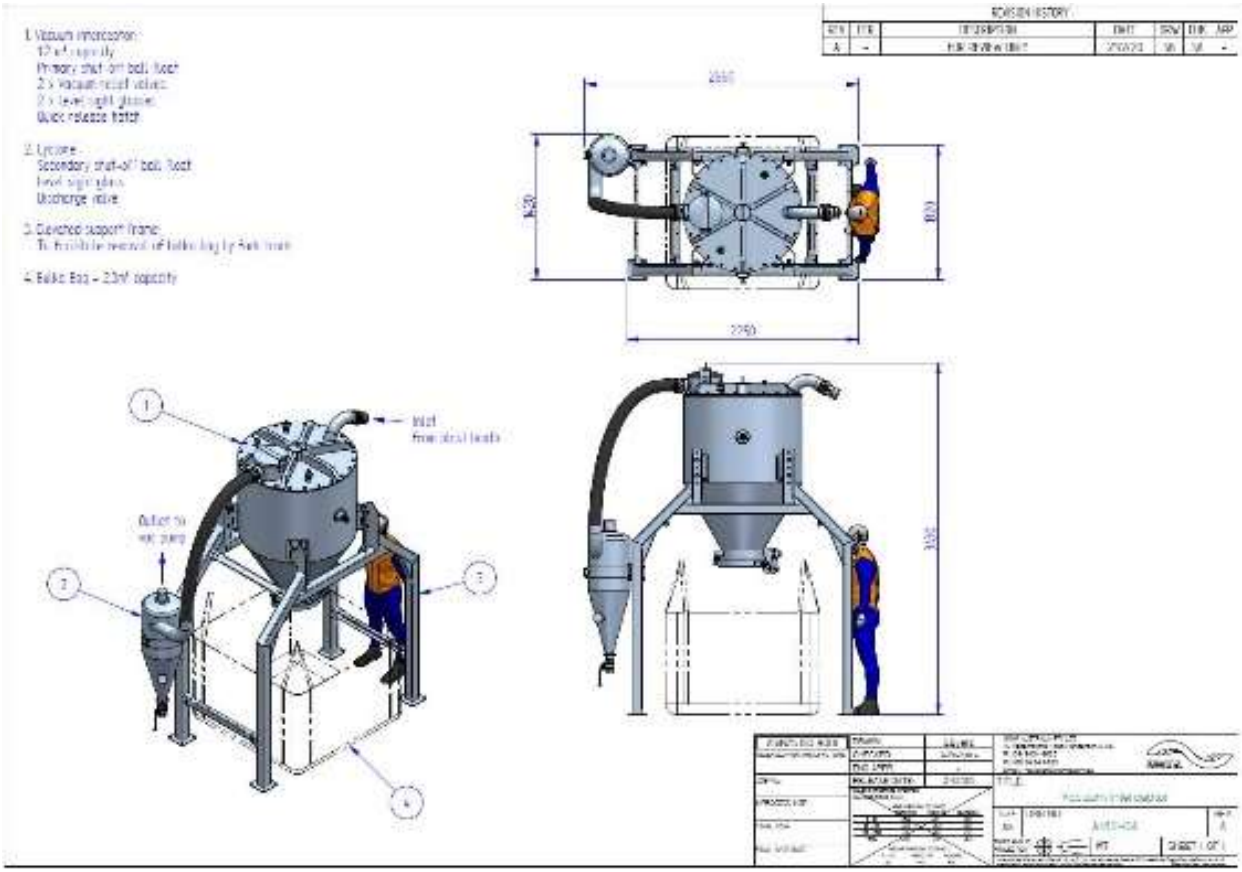
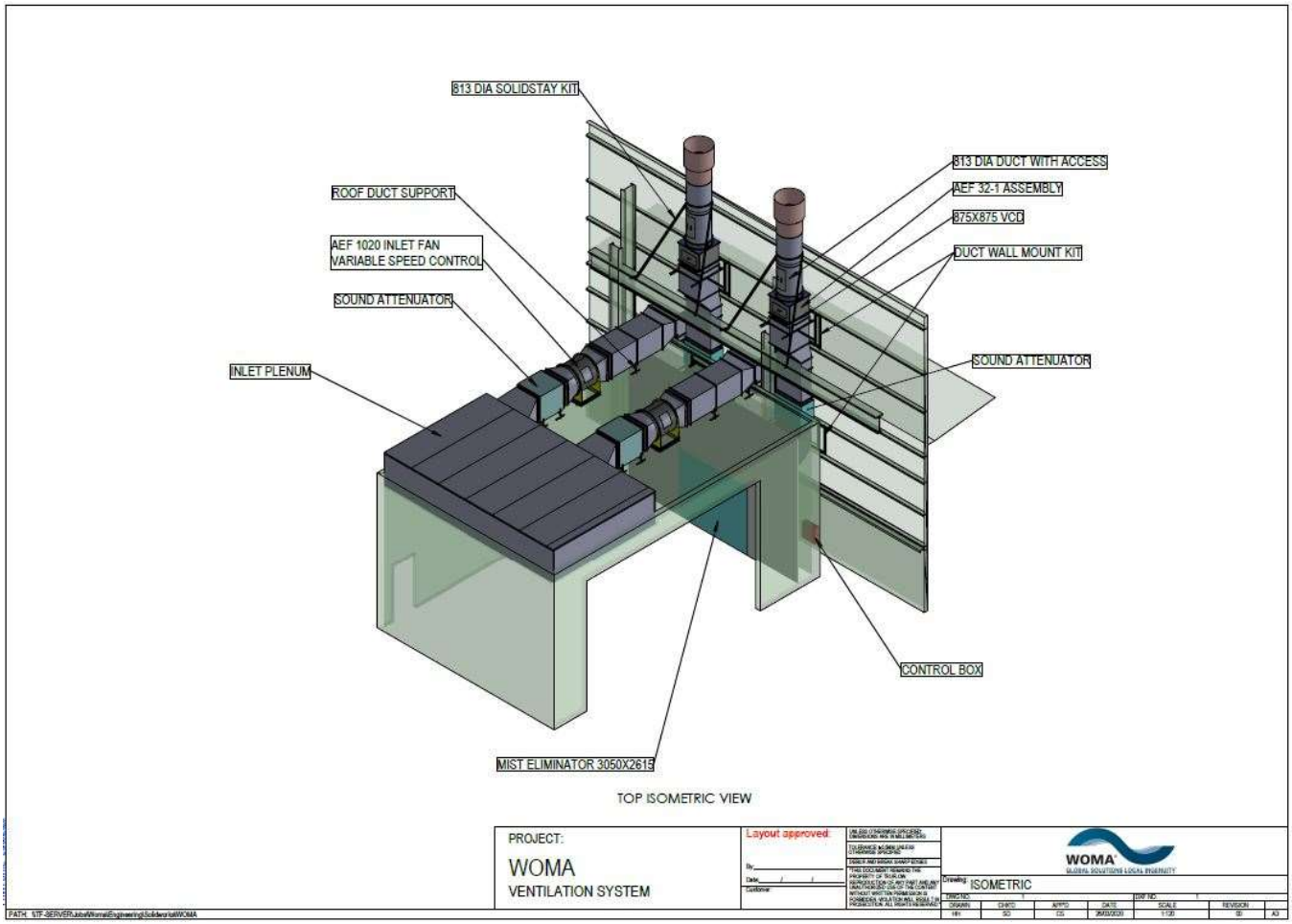


**Illustration above:** Vacuum cyclonic separator / interceptor directing waste product to either Bulk Bags, Skip Bins or other appropriate vessel.




**Images Above & Below:** Industrial forced ventilation (injection & extraction) system complete with automated control system, inflow filtration, exhaust filtration and sound attenuation.

**Images Above & Below:** Installation of inflow supply and exhaust air ducting.

**Images Above & Right:**

Fully enclosed automated UHP & Vacuum blast chamber complete with impact resistant windows, acoustic doors and lining, industrial forced ventilation (injection & extraction) system complete with automated control system, inflow filtration, exit-flow filtration and sound attenuation.

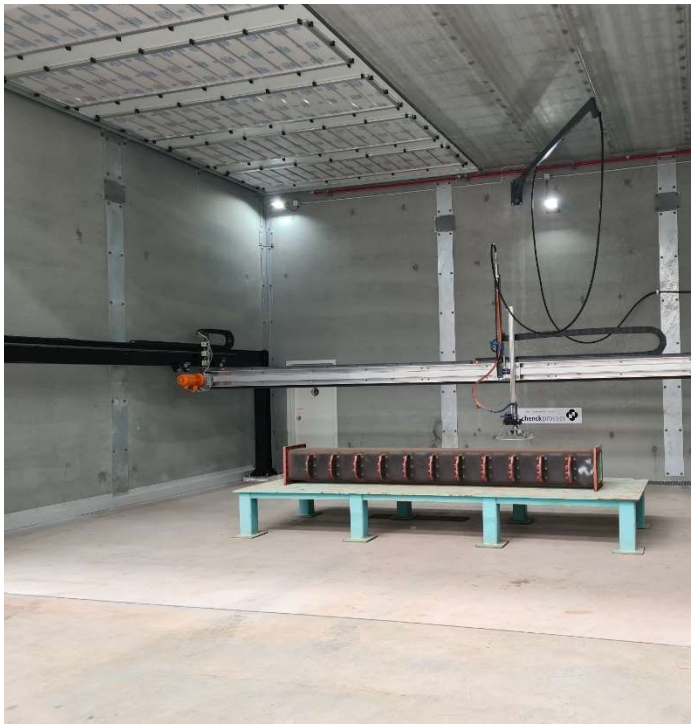
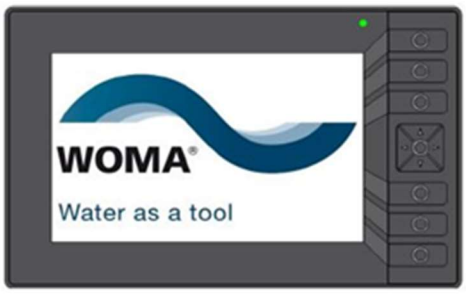


**Image Below:** Six (6) Metre acoustic doors complete with high impact (bullet proof) windows, safety interlocks and 'butterfly' mountings enabling comfortable single person open & close capability. The wide setting facilitates the placement and removal of large structures by Fork Truck therefore requiring no 'man-handling'.

**Image Below:** Purpose-built mobile control station enables 'Manual' and 'Automatic' Mode' control of operations from any of the window positions. If in automatic program mode, visual operation is not necessary as the robot completes pre-programmed 'parcels' of work with no human intervention.

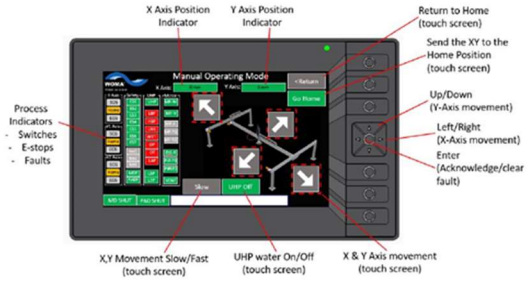
**Images Below:** Screenshots provide an insight to expected Operator interface and operation.



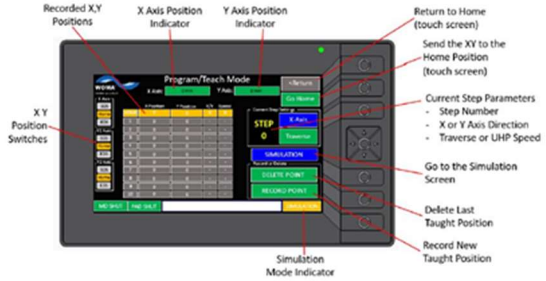


After a few seconds the unit will then change to the home screen:


**Manual Operating Mode:**




**Teach Mode**




**Vacuum Mode Screen**


The vacuum mode screen allows the vacuum pup to be switched on and off.

**WOMA ROBOTIC AUTOMATION:**

**WOMA Semi-Autonomous Ultra High Pressure & Vacuum Encapsulation Wash Bay**

The team at WOMA (Australia) is extremely proud of this entirely Australian designed, developed and implemented innovation which has delivered outstanding safety and productivity improvements for our client Schenk / Sandvik.

The development is of International benchmark standard in its sophistication, reliability and capability and we are confident it lays the foundations for the improvement of safety for Ultra High-pressure Operators, and Persons Conducting a Business Undertaking (PCBU's) across Australia within the Industrial Cleaning sector from Oil & Gas and Petro-Chemical to Mining & Resources, from Refining to Civil Construction and Manufacturing.

The following Video Links provide further insight in to its function;

- **Schenk Sandvik Robotic Blast Bay 1**
- **Schenk Sandvik Robotic Blast Bay 2**
- **Schenk Sandvik Robotic Blast Bay 3**