

## WAVE Wordentec Advanced Vacuum Environment

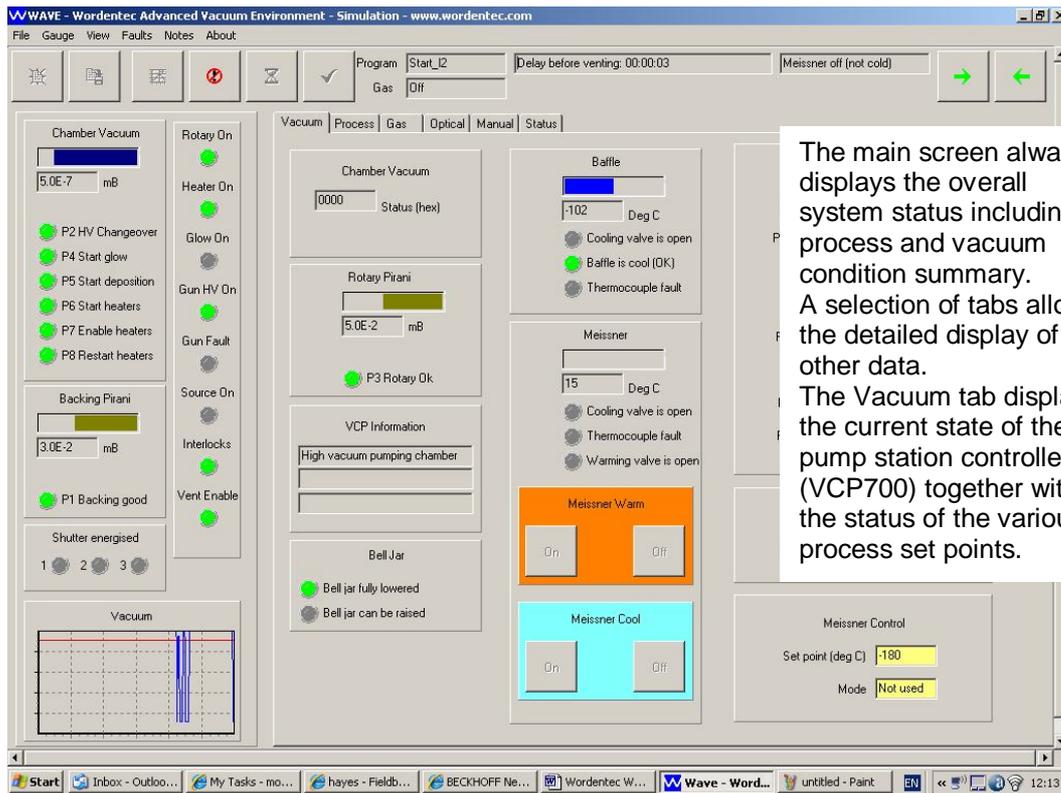
**WAVE is the central control system for our vacuum coating systems and upgrades. It comprises carefully selected industrial control products and key industry standard instruments configured to provide a flexible, operator friendly, machine operation and control environment.**



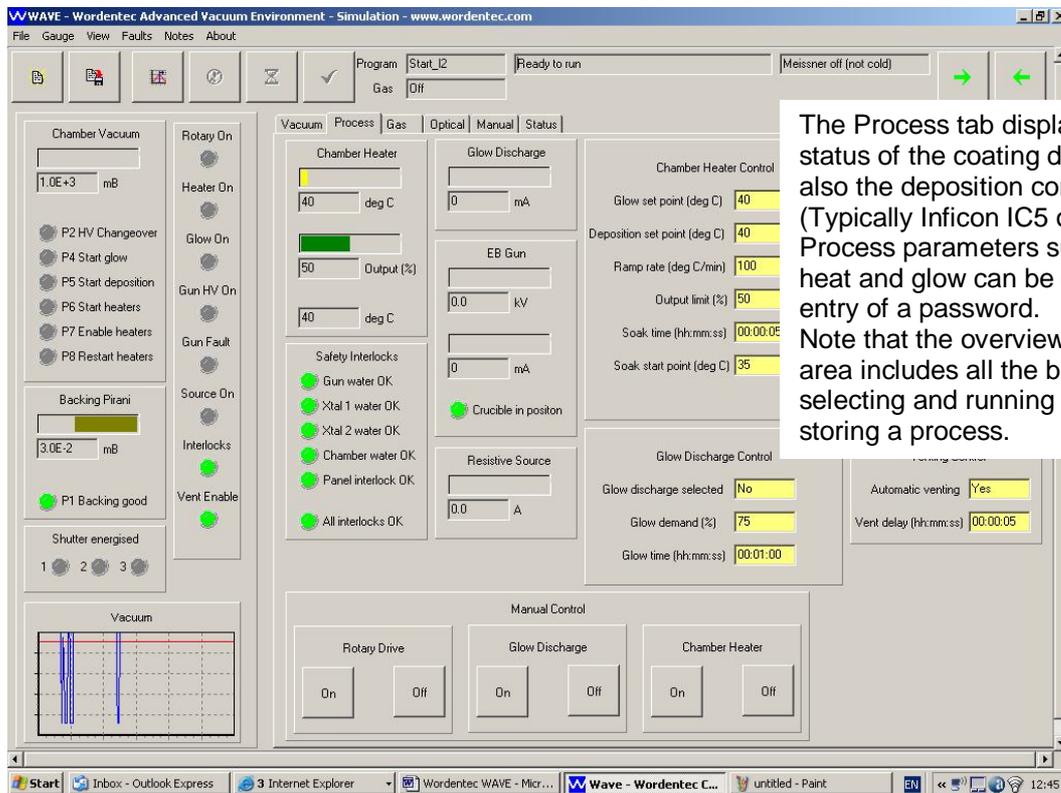
The software is designed to provide control of a thin film coating plant and provides a well organised user interface allowing convenient entry of programmable parameters during process configuration and straightforward process status indication during a coating run.

Machine control and data acquisition is handled by a robust industrial Field bus system (Beckhoff Lightbus) which is directly linked to the PC via noise immune fibre optic links. WAVE interacts with intelligent instrumentation via RS232 interfaces. The software supports watchdog protection to provide safe process abort in the event of PC crash. Pump station control is handled by a dedicated micro controller (VCP700). It supports active vacuum gauges and runs independently of the PC. All safety critical items are administered through dedicated approved safety devices in compliance with essential Health and Safety requirements of the Machinery Directive 98/37/EEC as amended.

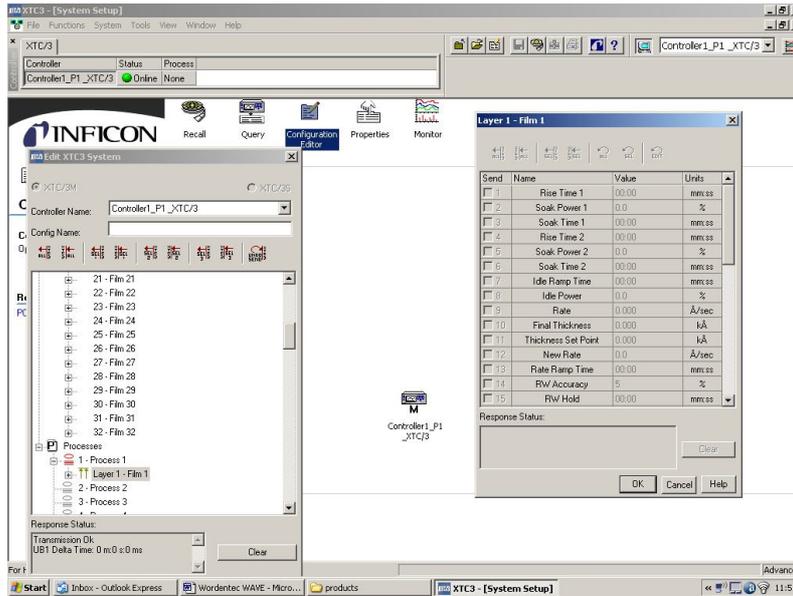




The main screen always displays the overall system status including a process and vacuum condition summary. A selection of tabs allow the detailed display of other data. The Vacuum tab displays the current state of the pump station controller (VCP700) together with the status of the various process set points.



The Process tab displays the status of the coating devices and also the deposition controller. (Typically Inficon IC5 or XTC3) Process parameters such as heat and glow can be edited with entry of a password. Note that the overview screen area includes all the buttons for selecting and running and storing a process.

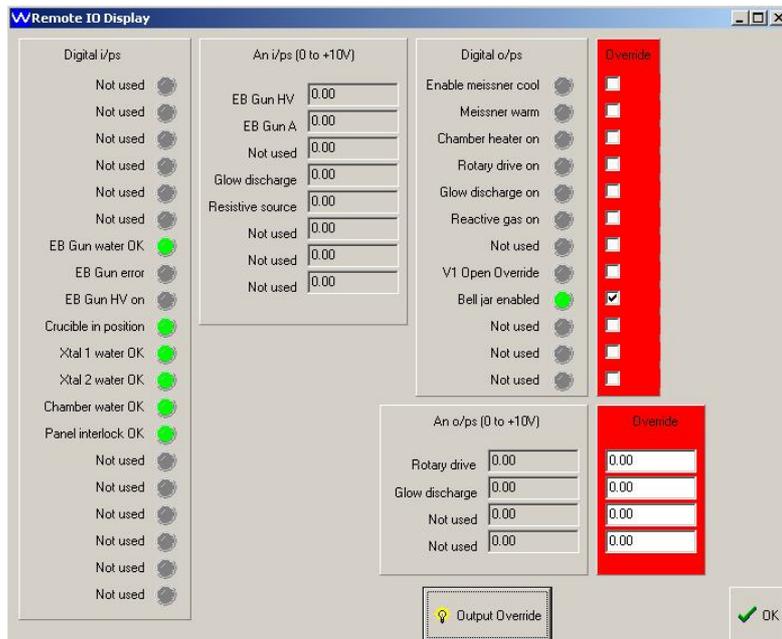


Material data (films) and processes (combinations of films) can be created, stored and edited

The industrial PC (Pentium4 2.8) with 40gb HDD provides plenty of local storage for processes and run data. A networking capability also enables the possibility of remote storage and access.

The control system will store and archive run data in the form of a database. It will be possible to review the stored data using standard tools (eg ms EXCEL)

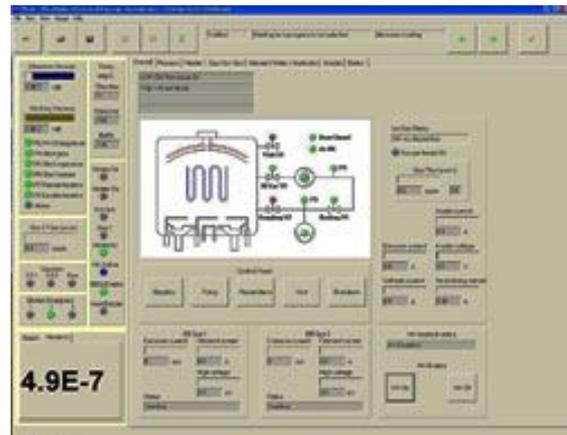
A system run sheet will be generated for each run. This form will be created and stored from operator input and from collected run data.



WAVE enables password protected levels of operation. This protects critical process settings as well as maintenance procedures from inadvertent action. Service mode enables full access to all i/o from the control screen.

WAVE fully integrates the control, monitoring and automation of :

- Active vacuum gauges
- Gas inlet mfc's
- Shutters
- Rotation
- Vacuum pumps
- Valves
- Heaters
- Evaporation sources
- Sputter sources
- Plasma / ion source
- End point
- Cooling water



A key feature of WAVE is that all the hardware and software platforms employed are standard industrial products with application specific customisation. This makes future expansion and support a low risk activity.

The software is written using the industry standard Borland C++ compiler Version 6 professional and is designed to run under Windows XP professional - service pack 2.

The Beckhoff Lightbus system is a fast and fail-safe serial fieldbus system that was conceived for the needs of automation technology. Low-cost and easy-to-process standard fibre optic conductor technology is used for transmission. The crucial advantages of the fibre optic conductor are interference immunity to electromagnetic influences, complete electrical isolation of connected modules from one another and a high data transfer rate.

During a process run the software logs process data. The data logged includes all vacuum gauge readings, the gun parameters, the cryo pump parameters, the state of each shutter, the IC5 layer number, deposition rate etc, the optical monitor reading and the chamber heater temperature etc. The data log consists of a comma-separated variable file which is can be imported into a standard application such as ms Excel.



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