

Complete Coating System Upgrade

When budgets are tight or the geometry of the system is difficult to re-create, a complete system upgrade is a great alternative to new equipment.

This upgrade re-uses the customers refurbished process chamber and framework. We fit our latest controls and measurement equipment to deliver an 'as new' system. Selecting an upgrade over a replacement system can return a saving of 25%.

Step 1

A project plan is agreed with the customer, the cleanroom work area is carefully sealed off and dismantling work commences. We realise that there is great value in some of the obsolete components being removed. We find that optical coating systems can be as much as 40 years old and still in daily use. This makes anything we remove an invaluable resource to support other elderly equipment. These components such as old gauge heads, electronic control modules will not be needed so are carefully disconnected and are left with the customer.

Wordentec engineers carefully de-commission and remove the system from the customers facility. The system and all its peripheral components are prepared for shipping. Our logistics partner collects the consignment and delivers it to the Wordentec Factory



A typical 40 year old BAK760 coating system

A system, packaged, awaiting collection

Step 2

The system is carefully unpacked and moved to a fully equipped service bay in our factory. The system is completely stripped into its component parts.

The chamber framework is checked for cracks, broken bolts and unwanted items that can be removed. Any repairs needed are completed and the repaired framework is sent away for blasting. The framework is checked once more, any tapped holes are cleaned and masked before the framework is sent for powder coating.

The process chamber is also blasted inside to remove any residual coating material. The outside is also blasted to remove the old paintwork. The water ways, tapped holes, flanges are checked for damage or blockages and replaced if necessary.

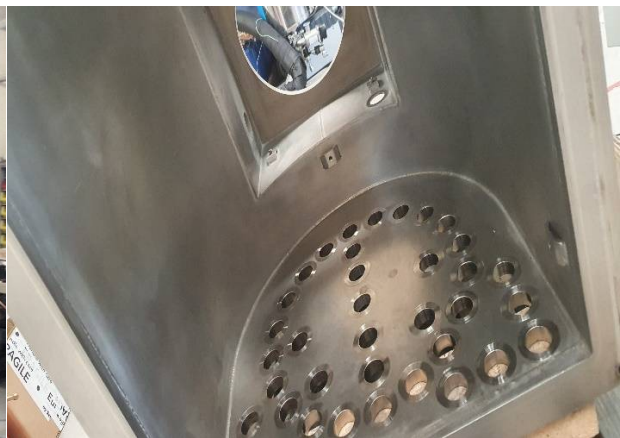
The chamber then masked, and the outside is powder coated. The vacuum feedthrough ports are then re-ground and all seal faces checked for damage and repaired where necessary.

The control rack is discarded however any modern power supplies, scan generators etc that are to be used in the upgrade are removed, cleaned and checked.

If needed, the pumps are serviced and tested, then painted to match the system colour scheme, normally light grey, RAL7035.



A Leybold 1504 chamber fully stripped



The restored base of a Leybold 560 chamber

Step 3

A new control rack is taken from our stock. This rack is the same control rack that we use for our new coating systems such as the WAVE800. This rack is configured to suit individual requirements however the basic layout is fixed. Any interconnecting panels needed to make the system and rack fit together neatly are made and fitted.

The control rack houses the system PC and screen, the high voltage power supplies, the electrical switchgear and in some cases where there is no room underneath the chamber, we also have space for heater transformers, filament and thermal source transformers. The rack, when bolted to the side of the system provides a clear pathway to the chamber base, allowing the high current cable route to be as short as possible.

The system configuration and electrical layout will have been agreed in advance and in parallel with the mechanical work happening to the chamber, the new electrical switchgear and control components are installed into the electrical distribution section of the control rack. The interconnecting wiring between the power supplies and system controls are connected and all outgoing supplies are connected to the sockets at the rear of the control rack.

When the control rack is rolled up to the side of the system it is bolted to the chamber frame, the earth busbar is bolted along the chamber base and the interconnecting wires are laid out and neatly connected to the chamber components.



Step 4

During the upgrade all seals are replaced. In all upgrade work we always use high quality, high temperature viton seals. If we are using an existing rotary substrate drive the bearings are changed and any worn parts are renewed. The drive motor is replaced with a modern inverter driven unit. Our preferred option is to fit the Wordentec X5 planetary drive system or our latest iteration of the traditional Balzers BD104. Valves, vacuum pipework and valve actuators are also replaced.

The coating sources are installed to the agreed layout. These can be the re-conditioned sources we removed from the system or they can be new evaporators. We can install any combination of electron beam guns, thermal sources and sputter sources, the only limiting factor is the available space. We replace the shutter drives and switches with new Wordentec rotary actuators with non-contact limit switches. We can accommodate ion and plasma sources for ion assisted deposition, front or rear surface heating can also be installed.

All vacuum feedthroughs are replaced as necessary, any blank feedthroughs are fitted with new blanking plugs, all nuts and washers are replaced with new. We fit all front surface heater connectors with high current, quick connect plugs made by Lemo. This allows the operator to quickly remove the heaters for chamber cleaning.

The chamber base is populated with the process gas installation. The mass flow controllers and isolation valves are plumbed in with stainless steel VCR fittings. The high voltage and heater feedthroughs are connected to their transformers, all of which are earthed to the inter-connecting earth busbar. The cabling is tucked away neatly in dedicated trunking. The compressed air pipes, water pipes and connections are labelled and made to the coating sources. This is a secure cabinet. It is locked and protected by our dual channel safety monitoring system.

Finally, new shielding is fitted and checked for ease of installation.



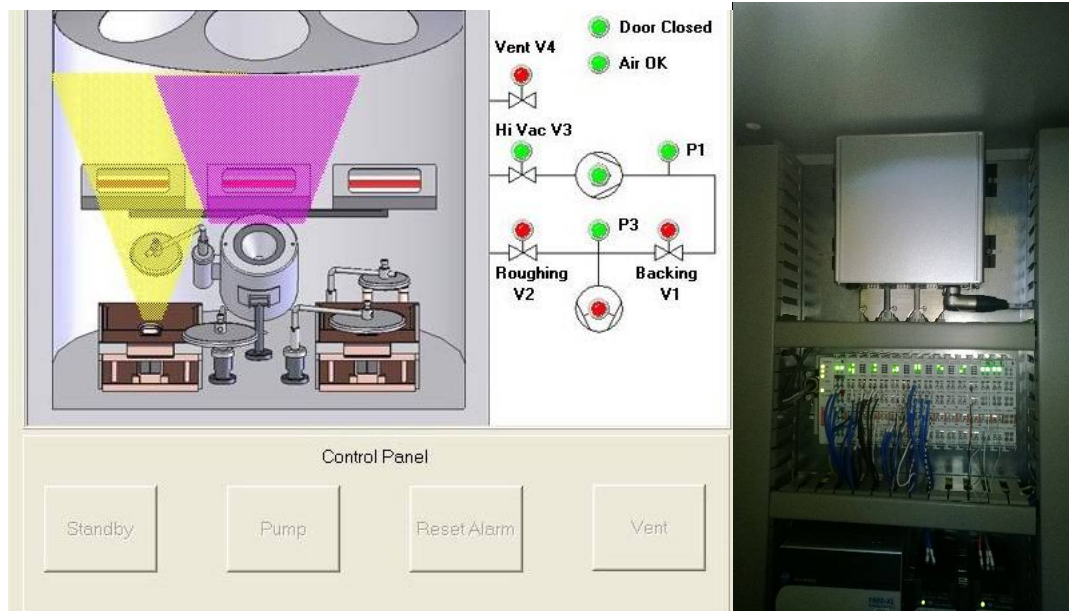
Step 5

Just like all new coating systems, our complete system upgrades feature the latest version of our legendary WAVE coating software. In September 2019 we launched the third generation of the feature packed software. The new version runs on the stable Microsoft Windows 10LTSC platform. This is a special version of Windows 10 that can run offline and doesn't receive autonomous updates. Using the latest Windows version allows us to securely use applications such as teamviewer for remote support and training. It also benefits from the secure inbuilt networking ability of Windows that will seamlessly integrate into most factory networks.

The Wave software has a fixed, core structure that we have developed over many years. It is stable and runs using little processing power. Our software team fine tune the software for each application to reflect the chamber layout and process requirement. At Wordentec we do not fill the electrical cabinet with expensive, redundant switchgear and controls that will never be used. The software and hardware are designed around the actual layout and we work with our customers to tune the software to best enable them to improve and manage their processes. Rest assured, if there is a need to re-task a system for a completely different process, as a Wordentec customer there is a cost-effective way to achieve this.

Our system features our VCP800 pump controller. This looks after the sequencing and monitoring of the pumping system. This is of particular importance if the system is fitted with a cryo pump. In the event of a networking update or for any reason there is a power failure to the pump system the controller can maintain the pump system without the need for the system PC. This drastically reduces the problems associated with downtime following a short power outage.

Our onboard water distributor panel is monitored in real time and the cooling water flow rates for each channel are monitored and reported by the VCP800 controller.



Step 6

The system now goes through rigorous testing to ensure all the component parts work as they should. There is always some fine tuning of shutter speed and positioning along with crucible alignment and substrate rotation speed.

We then work to ensure the system is set up correctly for its intended the range of processes. This begins with setting up the beam position and scan patterns, we check that the substrate heating system is accurate and does not overshoot its setpoint. We make sure all peripheral equipment is communicating the correct values to our controller and that the cooling water flow is distributed around the system correctly without leaks.

A series of individual layers are evaporated from each source in turn to check that there is a good rate and that the measured thicknesses we see are correct. Once we know that each source can correctly perform a long single layer we can program the system to run its multi-layer processes.

Normally, there is an agreed process that we run at our facility prior to sign off. We invite the customer to spend some time at our facility to complete this. The factory sign off is a fantastic opportunity for the system operators to get some time working with our controls before delivery. We offer to provide as much training as needed to ensure that the operators of the system have a seamless transition to using the Wave software.

Upon completion the system is carefully disconnected, re-packed and shipped on dedicated transport back to the customer. Our skilled installation team will follow to re-install the machine and repeat the sign off process. The Wordentec installation team, work with the system operators and maintenance technicians to provide training and any help needed in order to ensure that the project is a complete success.



For more information about Wordentec system upgrades please get in touch.

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