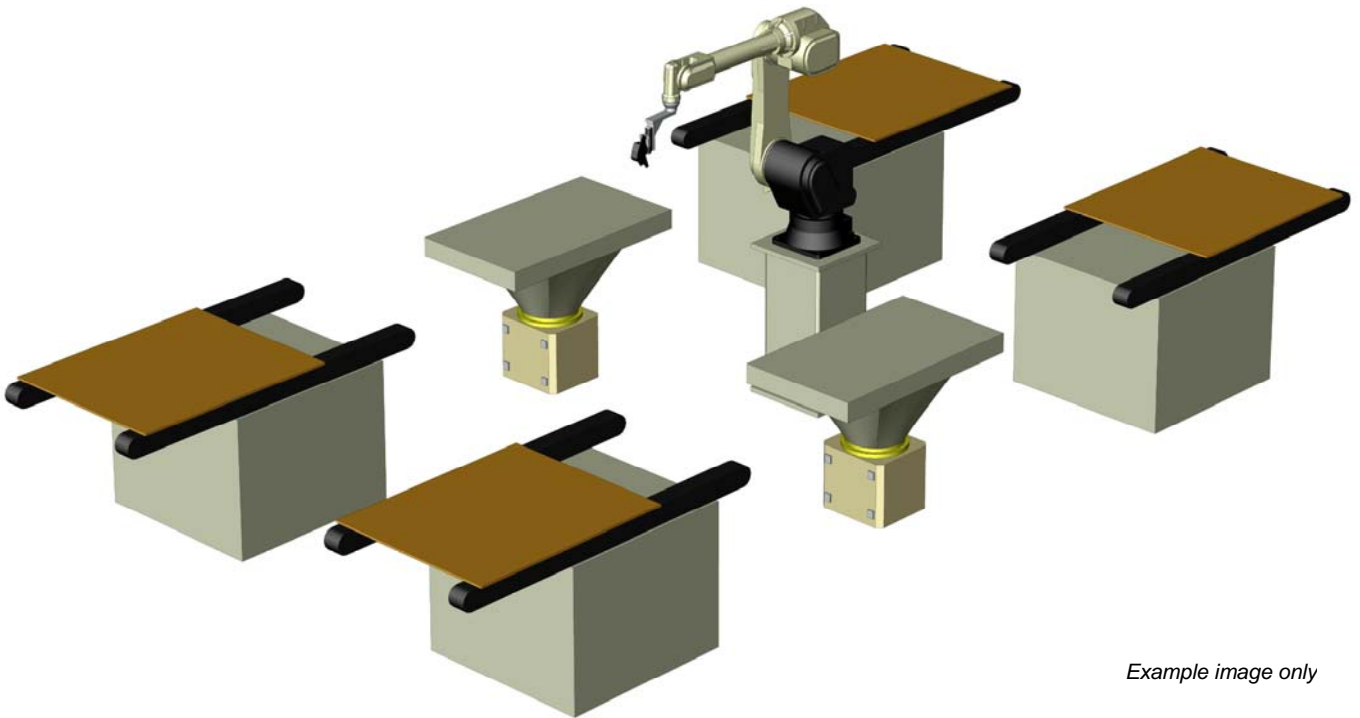




ARMOUR

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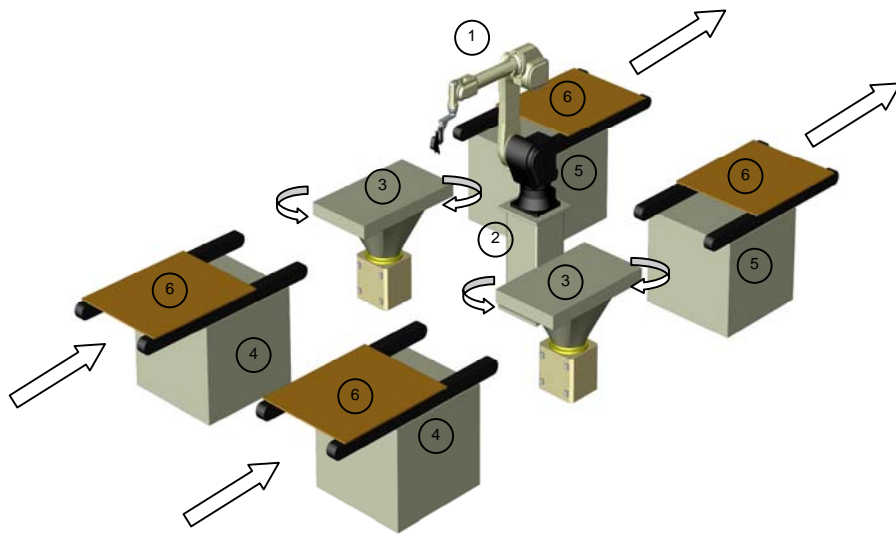
RS-02-06 ROBO-SPRAY



Example image only

The RS-02 Robo-Spray robotic spraying cell is designed for high volume flexible manufacturing. With careful integration of the supporting equipment the system achieves maximum utilization of the spraying robot. The Armour control system utilises highly user friendly interfaces for easy integration into the production environment.

All programming can be carried out off line, greatly minimising cell down time and speeding product development. Armour will custom build a robotic solution to meet your requirements, whatever your spraying application may be.



1. Robot
2. Robot Stand
3. Harmonised manipulator
4. Loading conveyor
5. Unloading conveyor
6. Product support

Products loaded onto the conveyors (4) are taken into the enclosure (not shown for clarity). The conveyors deposit the products onto the rotating manipulators (3) that are harmonised with the operation of the robot (1). When spraying is complete the unloading conveyors (5) lift the products from the manipulators and remove them from the enclosure. Products are located onto simple support structures. Part of the structure is illustrated above (6).

ROBO-SPRAY OPERATIONAL BENEFITS

Although Robo-Spray is capable of handling high volumes, it is the flexibility that is the key factor, as we have developed the system to handle a very diverse product mix with short runs (often only one part of each type).

The general principal of our standard commercial system is very similar to the set-up that can be seen in our factory (and on our CD ROM), but with many improvements. The benefits of our system over the others that we have examined are many, but the main design criterion is the flexibility. We are sure that we have developed the robotic spraying of GRP far beyond the systems of any of our competitors.

Development process:

The Armour Engineering Robo-Spray system has been very carefully developed over a period of several years, to ensure that it is the most suitable system available.

Using our own considerable experience of acrylic sanitary ware production, we studied the criteria required, and the robotic solutions that had been employed by other companies in order to be sure that every aspect was fully considered. When the investigation was complete and the results analysed, we were in a position to begin the mechanical engineering.

The prototype system was assembled in our bath factory in Sunderland and the basic principles tested and refined. Production was gradually transferred onto the robot and it was run in this environment for a period of 24 months to be certain of reliability and performance.

System parameters:

Total Flexibility:

The system is designed to offer complete flexibility for all product types without the need for long production runs. Once the programs have been created, the system can smoothly change from one product type to another, to another, to another and so on. A version of the standard Armour product support system is used for simplicity. This is very important as it ensures that the system does not restrict production in any way, and ensures ease of handling, simple consolidation and efficient curing. Programming is carried out off-line, so down time is minimised, and once the program is perfected it can then be saved permanently. Programs can be modified and re-saved, so one program can become the basis for many more, so saving time.

Superior Performance:

The system is designed to carry out the work of 1.5 men (depositing 6.5kg of material per minute), on three shifts, with minimal operator involvement and extremely low maintenance. Speed and accuracy are paramount.

Cost Savings - Materials:

The accuracy of Robo-Spray provides an immediate and obvious saving by significantly reducing over-spray. The ability to engineer the deposition thickness of the laminate enables specified tolerances to be achieved in a process that all too often relies upon over-engineering product thickness. Hence wastage savings accrue from both accurate deposition and observance of designed product thickness. The reduction will vary from organisation to organisation but will typically be in the range of 5%-10%.

Cost Savings – Labour:

As 1.5 men are replaced by Robo-Spray a direct saving can be easily identified. If use of the system is maximised by multiple shift operation, up to 4.5 men can be saved, giving a short payback period on the capital investment.

Improved Product Quality:

The repeatability of the process and the “engineering in” of laminate deposition removes the random nature of the manual spraying process. Rework costs are minimised and reject rates reduced. The system delivers stricter quality control performance providing your customers with the confidence and service levels they demand.

Productive Investment Return:

Competitively priced despite the high technical specification, the revenue and expenditure savings generated by the system provide compelling economic arguments in its favour.

Environmental Benefits:

Styrene gas emissions are reduced as a consequence of the spray fan being maintained at a constant and optimal point from the product. Styrene is therefore maintained within the spray fan to a far greater extent than with manual spraying, and in addition extraction facilities can be sited much closer to the actual product. Overall atmospheric emissions are reduced and styrene levels within the working area are significantly lower.

Training:

Armour provides full training for the Robo-Spray system at our factory in England. The clients' operators will be shown how to create, modify and store product programs, best practice, and maintenance. The standard training package is expected to be sufficient in most cases, but supplementary training is available on request.

Production Reporting:

Every operation that is carried out by the Robo-Spray system is recorded in the production log by time and date. The name/number of the operator, the start time, the break periods, the types and number of products sprayed, the weight of raw materials applied to each product and the time taken to spray each product are all recorded and can be printed or downloaded whenever required.

Production Scheduling:

The control system allows for a complete working shift of products to be entered in advance (in any order) and the robot will spray each of them in turn. A bar code reader can be incorporated if required, or the list of products can be transmitted directly from the office.

Monitoring Of Raw Materials:

The system is supplied with an integrated pair of weigh scales that monitor the consumption of the resin and glass fibre, as the robot sprays. This enables overall usage and mix ratio's to be monitored and maintained within process criteria.

General Operation:

At the start of the day's production the full list of products to be sprayed on that working shift can be compiled (or entered individually throughout the day). The first product is placed upon the number 1 conveyor and the operator presses the start button. The conveyor carries the product to the rotating table that is harmonised to turn in conjunction with the action of the robot. The conveyor places the product on the table and the robot begins its spray cycle. The next product on the list (which can be any type) can now be placed upon the second conveyor and it will be taken to the second rotating product table. When the point in the program is reached at which any additional components are required (Baseboards/wooden sections etc.) the robot switches to the second product and begins to spray that part in accordance with the program. The first product is brought back off the rotating table by the conveyor, providing the operator safe access outside of the working area of the robot, to add any further componentry. On completion, the product is then taken back onto the rotating table.

When the second products' components are required, the robot will switch back to the first product and complete the spraying program. Meanwhile the second product is carried out of the working area by the conveyor for the same component addition operation.

Should no additional components be required then the program will run to conclusion before the work on the second product begins. When the first product is completed the conveyor takes it off the table, out the other side of the working area and deposits it onto a gravity roller conveyor so that it can reach the consolidation area.

The Robo-Spray cell is engineered to ensure that product movement and secondary mid cycle component operations have minimal effect on the spray time cycle, ensuring maximum utilisation of the actual spraying robot.

Conclusion:

We firmly believe that the Armour 'Robo-Spray' system is the most efficient available and represents a logical progression in the modernisation of the GRP industry. The benefits are manifold and can be readily quantified to demonstrate the improvements in any given production environment.

MACHINE SPECIFICATION

ELEMENT	SPECIFICATION
Machine Capabilities	Maximum product size: 2000 x 2000 x 600mm Deposition rate: 6kg per minute
Robot	Robot type: Panasonic Panarobo VR-006L Capacity: 6.5kg/min Repeatability: ±0.15mm or less Maximum speed: 2m/sec
Ancillary Construction	Main frames: Rolled steel sections – BS EN 10025 material Paint finish: Textured powder coating
Spraying Head	Spray Gun: Magnum-Venus internal mix chopper gun
Product Rotator	Panasonic harmonised manipulator
Product Holding	Standard product support system with location dowels
Control System	Armour PLC/PC based system with touch screen operator interface
Material Monitoring	Armour system with dual load cells and material alarms.
Extraction	Specified and supplied separately.
Enclosure	Modular unit with interlocked sliding door. Product entry/exit protected by light guards
Electricity	3 Phase supply + Neutral + Earth: 380/415V @ 50Hz Maximum power consumption: 10 kW
<i>example specification only - specification may be subject to change without notice</i>	

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