Eiterfeld, 8th May 2013

Better by experience

New b+m painting robot generation T1 X5

In spring 2013, b+m surface systems GmbH launched the fifth generation of the T1 series painting robots. More than 10 years of operational experience with the previous robot generations, mostly in 3-shift production process, have been directly incorporated into the development of the new T1 X5 series painting robots. The new X5 models are state-of-the-art 6-axis articulated arm robots featuring a very high level of development in technical performance, handling and maintainability. Also, the new control system already complies with the upcoming revision of the safety standard ISO 10218:2011. In addition to the already developed industries, b+m is also targeting new customers with the X5 robots, e.g. plant manufacturers which are looking for robots that best suit their requirements. b+m is trying to convince these customers of the new robots that are currently using competitor's products.

T1 X5 series painting robots are specifically developed and optimised for paint application processes. Other fields of application of common industrial robots such as material handling, assembly or welding have not been considered in the X5's development. This specialisation becomes clearly evident by the robots' design features:

- Targeted control of surface quality and coating thickness through precise adjustment of paint output and TCP speed
- EX-proof and suitable for electrostatic application systems (ESTA)
- Protected integration of dosing and application systems in the corpus
- High payloads and free installation space for dosing and application systems
- Installation of application systems close to the spray gun results in short supply lines and reduced material loss during colour changes
- Smooth, easy to clean external surfaces
- Lightweight material design (aluminium and GRP/CRP)
- Optional installation of application systems from other manufacturers

For the above mentioned reasons, b+m painting robots have since proven particularly efficient for applications in highly productive plastic painting plants. This market segment generally has very demanding requirements on mechanics and control systems. To achieve optimum painting results, higher axis speeds and acceleration are required than in other fields of paint application because of the variety of components and the fact that the product carriers are often filled in different ways. Ever since starting its own robot development, b+m has been consequently designing the T1 for this purpose, and thus the above mentioned advantages become particularly evident.

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The state-of-the-art machine control system of the T1 X5 has been chosen considering optimised usage of current possibilities of modern drive and control technology in terms of axis movement data and path accuracy. Based on the control data, the complete drive train and the corresponding control system have been designed and optimised with respect to the new requirements. By this development, path speed, path acceleration and path accuracy have been optimally adjusted on each other for paint application processes. The path algorithms therefore result in reduced gear load, albeit the gear mechanics of the main axes have been designed with sufficient load reserves. Altogether, this provides very high load limits for the complete drive train of the robots.

Future-oriented

The development of the new control system has also been used to already comply with the current draft revision of the safety standard ISO 10218:2011. The upcoming standard will require all robot manufacturers to provide for the safe monitoring of the maximum permissible speed of the TCP (tool center point) of 250 mm/s. The revision requires the monitored limitation of the “safely limited speed” during the so called “teaching” process. The control system therefore has to ensure that the permissible TCP speed will not be exceeded, even though different axes move at the same time and thus the individual axis speeds are added up in the TCP. The control system of the T1 X5 series painting robots complies with the new standard without any restrictions.

It can be assumed that future amendments to the standard will lead to even stricter requirements and further restrictions on kinematics. The control system and the complete design of the motors and gears have been configured with this in mind. Resulting from this precaution, b+m expects the advantage that, by updating the software, current T1 X5 series painting robots can be relocated and re-commissioned also after many years of operation.

Innovative technology

The T1 X5 are an all new series of painting robots that will particularly fulfil the customers’ requirements on efficiency, flexibility and reliability. In addition to the optimisation of the technical performance data, the development also focussed on easy handling and maintainability of the robots. The following describes the most important features:

- The switchboard is provided with a **control panel** that displays important signals at a glance. Actual operating states are displayed via traffic light colours green/yellow/red. The operating modes are set by a key switch. 18 LEDs are provided to display the operating states, and 8 of these LEDs are freely configurable by the customer.

- The **switchboard** of the robot features a special cooling design that does not require additional cooling units up to 38° C ambient temperature. Indirect cooling of the electronics compartment prevents dirt ingress in this area.
- The control device (teach pendant) has been designed as **mobile panel** and features a colour graphics display and touch control. Several special keys are provided for frequently used functions. The mobile panel is EX/II approved.
- Easy **installation and maintainability** has also been a focus in the development of the T1 X5 series painting robots. Single drives and drive components can be exchanged very quickly which results in reduced expenditures on repair and short downtimes for maintenance and repair works. Several components are maintenance-free over the complete working life of the robot.
- The **gears have been designed for high loads** and increase the reserve capacity in the main drives of axes 2 and 3 which results in reduced wear.
- The **robot base** has been designed under the aspect of the greatest possible travel range.
- The **travelling axes** of the T1 X5 robots feature weight-optimised design and high rigidity at the same time.
- The travelling axes feature **robust roller guides** in encapsulated design that prevents dirt and dust ingress.

An important development goal, especially for b+m's existing customers, was the compatibility between older b+m robot types and the new X5 models. All programmes of today's b+m robot types also work on the new X5 robots. With respect to replacement demands and plant extensions, this is an important point for existing customers as no or only marginal programming efforts will be required when upgrading to the new T1 X5 series painting robots.

Key software features of the new T1 X5 series painting robots are:

- **Upward compatibility** – Existing programmes, paint databases and parameter settings of old b+m robot types run on the new software.
- **Downward compatibility** – Programmes written for the T1 X5 also run on older b+m robots.
- **Addressing** of 99,999 different programmes and 500,000 colour datasets.
- New intelligent colour database system **"Easy Handling Colour System"** to administrate approx. 25 million datasets.
- **Remote service** for all drive and control units in the switchboard, incl. the mobile panel.
- Important **diagnostics functions** can be directly configured and displayed on the mobile panel.

It should be stressed here that all developing and manufacturing works for all b+m painting robots are carried out at b+m's headquarter in Eiterfeld, Germany. This is an important advantage for many European customers when it comes to technical questions due to short reaction and travelling times.

EasyEdit, b+m's powerful offline programming and simulation tool, is also available for the new T1 X5 robot generation.

Conclusion

After a decade of successful operational use of b+m painting robots, the fifth T1 generation is a comprehensive new development which complements mature and reliable b+m robot technology with many innovations. The well-known user-friendly operating concept of b+m robots has again been enhanced and is now being visually supported via a mobile panel featuring a colour graphics display. The robot control system is state-of-the-art, drive and control systems have been optimally adjusted on each other to meet all specific demands on painting technology. Additionally, the requirements of the upcoming revision of the safety standard have been integrated in the robot control.

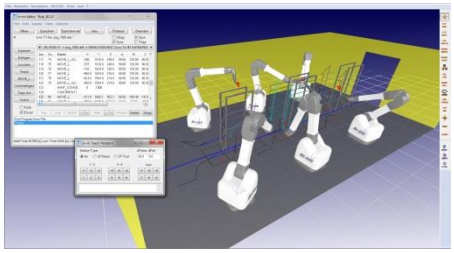
b+m has consequently realised the new development and sees the T1 X5 series painting robots in a very good position for future use in painting plants with high quality demands. Therefore, the new robot generation is perfectly suited to achieve maximum efficiency. With the new T1 X5 generation, b+m is also targeting manufacturers of painting plants that are independent in the selection of robots, and other new customers that have not yet used b+m robots. The new X5 models are available since spring 2013.

Pictures/captions:

The new b+m T1 X5 series painting robots already comply with the upcoming revision of the safety standard for industrial robots.

The switchboard is provided with a control panel that displays actual operating states via traffic light colours green, yellow and red.

The control device, called Mobile Panel, features a colour graphics display and touch control.



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