



CASE STUDY

Automatic Direct Wiring of Standard Components

Adept Technology, Inc.
www.adept.com

Automatic Direct wiring of Standard components (ADS)

For more and more companies the rationalization of manufacturing products is an important and extremely effective process. Based on clear parameters like the size of the company, its products , investment capability, and engineering resources, the BJB experts, a leading manufacturer of lighting and domestic appliance products, team up with robot manufacturer Adept Technology, Inc. to develop future-orientated technical solutions for manufacturing. The partnership resulted in the development of the extremely efficient BJB wiring system ADS.BASIC designed for the production of small and medium-sized lighting products. The modular system is efficient, flexible and easy to use and requires a space of only 28 m². The Adept Viper™ s1700 six-axis robots shorten cycle times and the comparatively low investment amortizes over just a few months.

The BJB wiring system ADS.BASIC., available since 2007, offers a maximum flexibility in luminaire finishing. It consists of a loading and unloading station as well as a wiring and test station. The two work trays are able to handle different luminaires. Only the installation and removal of the luminaire housing is done manually.

Once the luminaire housing – equipped with components – is fixed on the work tray, all further operations proceed automatically.

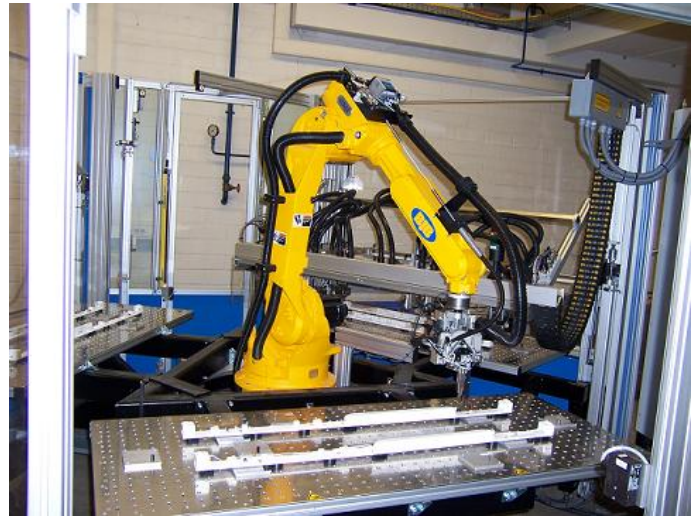


Image 1. The automatic wiring of the luminaire housings in the wiring system ADS.BASIC by BJB is effected by the six-axis robot Adept Viper™ s1700.

Wiring Station

The work tray is located in the waiting area and provides a luminaire housing equipped with components. It is forwarded through the indexing table into the working envelope of the six-axis Adept Viper s1700 robot. Simultaneously the already wired luminaire from the previous run is discharged.

The conducting wire is 'endlessly' carried from a cable silo, which contains up to 15 km wire, to the installing tool. After the work tray is positioned, the beginning of the wire is stripped by the high precision, multi-functional

installing tool, stripped from the integrated strip appliance and then positioned into the gripper.

The robot then proceeds to the first contact position and the stripped beginning of the conducting

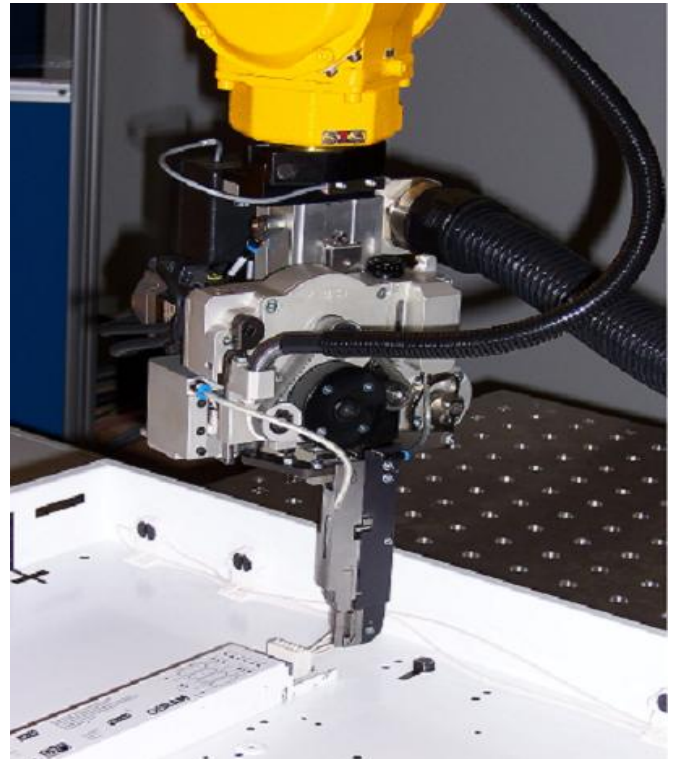


Image 2. The robot arm precisely brings up the installing tool (with integrated strip appliance) at 0.06 mm to the different contact positions.

wire is put into the first clamping point. The gripper opens and the robot follows the predefined course for each luminaire type with the first installing tool.

Throughout the procedure the conducting wire is presented to the robot matching the robots' speed. At the same time the installing tool crosses one or more cable clips, which keeps the wire in position. As soon as the robot has reached the second contact position, the wire is cut and automatically stripped at the installing tool from the integrated strip.

The feeding unit is pneumatically lifted and the end of the wire is put into the second clamp point. After the next wire has been automatically stripped, the feeding unit is lowered to the home position, the beginning of the next wire is pushed into the gripper and is picked there for the next wiring procedure. This procedure is repeated until all conducting wires are installed. The finished luminaire is conveyed by the work tray to the test station and testing for 100% accuracy according to EN 60598 is performed. The result of this luminaire testing is displayed to the operating personnel and stored on a database for later analysis.

Narrow Wiring Sword

Narrow luminaires, for example luminaires of T5 design, often require an exceptionally slim wiring sword, in order to reach components that are otherwise difficult to access. An additional wiring sword for vertical wiring is also available. The pushing of the conductor wire, synchronously to the robot speed, is achieved with a drive motor in connection with a non-slip wire feeding. The servo motor is controlled via a DeviceNet amplifier by the Adept SmartController™ CX robot controller.

BJB GmbH & Co. KG was founded in 1867. It began its production of burners for oil lamps in 1870. In 1911 the company began the fabrication of tungsten lamp camps and in 1924 the manufacturing of bulb holders. In 1946 the company extended its product range with fluorescent lampholders and in 1975 with switches and terminal blocks. The first lampholder for compact fluorescent lamps was manufactured in 1981. Two years later components for domestic appliances came along. In 1995 the Automatic Direct wiring of Standard components (ADS) was started and in 2003 the new wiring system ADS.BASIC was established. Today the company has 670 employees at its headquarters in Arnsberg and 190 employees abroad. As a partner of the lighting and domestic appliances industry and the 'Connection to Light', BJB achieved in 2007 worldwide a consolidated turnover of 117.1 million Euros as well as an export accounting for almost 80 %. The market leader for oven lamps owns subsidiaries in the United Kingdom, USA, Spain, Italy, Taiwan, Japan and Hong Kong as well as factories in Spain (tool manufacture), USA (final assembly of oven lamps) and China, where porcelain or ceramic holders are produced.

Robots with V+ real-time-Multitasking Operating System

The new product extension of the Adept Viper series by the six-axis robot Viper s1700 now handles applications with a payload of up to 20 kg and a reach of 1717 mm. The new robot weighs 280 kg and is ideal for material handling, packaging, machine tending and conveyor tracking with vision guidance. It is controlled by the high-performance robot and vision controller Adept SmartController CX, which also works together with all other Adept robots.

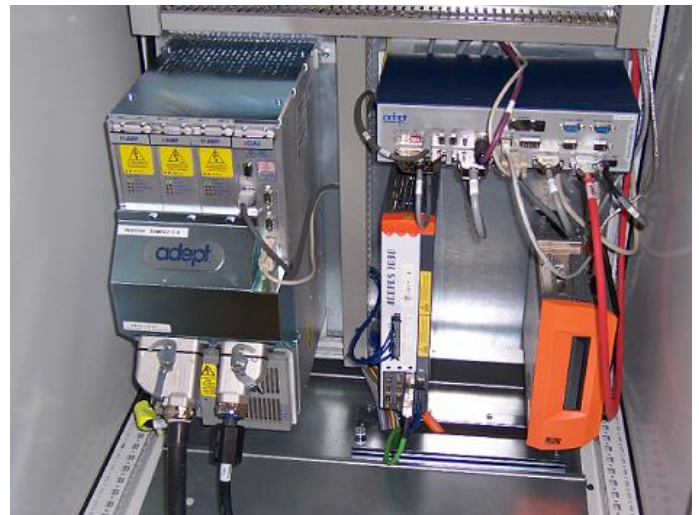


Image 3. The high-performance robot controller, Adept SmartController CX (right) works together with all Adept robots and can be integrated in fieldbus systems like DeviceNet or Profibus DP without any problems. On the left side you see the new amplifier unit PA4.

The integration into fieldbus systems like DeviceNet or Profibus DP is possible without any problems. The maximum effective speed is 8400 mm/s and the repeatability is $\pm 0,060$ mm. The controller offers 12 digital inputs and 8 digital outputs. The programming software, Adept

DeskTop™ allows the programming of the robot system via each PC at no additional cost. The attached absolute encoder makes for an easy calibration so that the reference run is not necessary. The servo update rate of 8 kHz allows for an excellent path following. High-efficiency motors deliver high performance with more torque per amp, while the solid design ensures high reliability and long durability. The vision guidance AdeptSight is optionally available. If requested, multiple robot solutions can be operated by one common control unit.

High-Performance Robot Control

The high-performance Adept SmartController CX controller was specially designed for robot and vision guidance applications. It controls the Viper and Cobra robot series, the Python linear modules as well as the SmartServo Kits and even 3rd party Kinematic Modules mechanisms. Its distributed processing architecture improves performance by freeing up 30% of the processor's resources. The control unit can operate up to 24 independent axis and thus also can address complex solutions with multi robots based on a common control unit. Additionally it supports applications with conveyor tracking. The SmartController CX features several high-speed

communication interfaces, including Fast Ethernet, SmartServo and a kit of serial interfaces for future expansions. The SmartServo is based on an IEEE 1394 interface, also called Firewire, which is the backbone of the latest controls generation. The SmartController CX platform offers unmatched scalability and is programmed with the efficient programming language V+.



Image 4. Horst George BJB's head of the software development department, right, and Adept Sales Manager Hans Lenos are checking the approaching positions of the robot arm.

Positive Experiences

The head of the software development department at BJB, Horst George, and the Division Manager for automation, Olaf Baumeister particularly treasure - beside the absolute reliability and the very long durability – the utmost flexible, all-embracing programming language V+, namely offering the user a maximum of flexibility and freedom, to program his complex applications. BJB commends the many, effortlessly realizable special functions, the easy operation and programming, the delivery reliability, Adept's application engineering support and the worldwide presence of the robot manufacturer.

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Information:

Six-axis Robot Adept Viper s1700

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BJB Wiring System ADS.BASIC

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