

Flexible manufacturing with short cycle times

Mitsubishi Electric presents a new solution for flexible location robots in industrial automation

Mitsubishi Electric is at Automatica Exhibition, Hall B2, Stand 310

Ratingen, 8th June 2010. The combination of advanced sensor technology and real-time control has opened-up new areas of application in industrial robotics, which go far beyond simple assembly and handling tasks. A newly-developed process, based on robot technology from Mitsubishi Electric, now allows the economical in-production use of flexible location robots which, even during the movement of the robot arm, react to changes in their environment and adapt their trajectory to suit.

Both the self positioning of the robot, and the pinpointing of other moving objects within the work cell function without an image processing system. In addition the sensor guided real-time control does not require any elaborate programming. Mitsubishi Electric are showing the robot solution developed by Robotics Technology Leaders and also other technical innovations in its product range for the first time at the Automatica 2010 trade fair in Munich.

A key element of this highly flexible handling technology for industrial automation is the VRFloor (Virtual Reality Floor) positioning system developed by Robotics Technology Leaders, which is also used in the robot assisted television cameras found in the new News studio of Zweiten Deutschen Fernsehen (ZDF.) The system includes passive

markers with a constant identity, sensors for registering the marking points and a control computer for analysing the sensor information. The various types of markers are fitted around three millimetres below the floor surface. An air cushion ensures the mobility of the robot, which can be moved within the work cell, but also transferred to other production stations. The sensors are fixed on the base of the robot and to other moving objects in the working area such as a work piece carrier. With this set-up it is no longer necessary to precisely align and position work pieces fed into the work cell. The positioning system works without contact and without wear.

"To be able to make robots and manufacturing stations so flexible, a real-time controller is indispensable", says Dr Stefan Riesner, Managing Director of Robotics Technology Leaders GmbH in Munich. This company, founded in 2005, and employing 10 people, is a member of the Mitsubishi Electric automation network and a specialist in robotic applications in the fields of broadcasting automation and highly flexible manufacturing systems - especially small batch sizes right down to economical individual manufacturing.

The fast interchange of data between sensor and controller puts the robot in a position to react directly to changes in the work area and to determine its trajectory during movement on the basis of current sensor values. A computer calculates the movement information from the signals and transfers the position data in quick succession to the robot controller, typically within one to 10 milliseconds. For a 15 centimetre curved motion of the robot arm which takes place in a period of three seconds, for example, 1500 positions must be transferred to the robot controller with a cycle time for the robot of two milliseconds.

Mitsubishi Electric equipped its industrial robots early on with an interface for real-time control. This allows RT Leaders to select a wide range

of robots for customised solutions. The product range includes five and six axis articulated-arm robots with a load capacity of one to twelve kilograms and a reach of up to 1385 mm and also SCARA robots with a load capacity of six to 18 kilograms and a reach of up to 850 mm. The youngest member of the family, a six axis articulated-arm robot type RV - 2SDB, with a two kilogram load capacity and a 504 mm reach, which is particularly manoeuvrable because of its construction, also offers the possibility of real-time control. The robot arm has a slewing range of plus/minus 240 degrees and can thus turn to both sides beyond its radius of action of 360 degrees. At a speed of up to 4400 mm per second the robot, which is braked on all axes, can achieve a repeat accuracy of two hundredths of a millimetre. This compact robot, which is celebrating its European premiere at the Automatica exhibition, can achieve these figures even in flexible location use.

"A fundamental advantage of our robot solution is the combination of flexibility, accuracy and speed - which at the moment is unchallenged throughout the world", says Stefan Riesner. The reliable self-positioning of the mobile robot dispenses with the need for the often highly time-consuming and expensive programming, which frequently makes it unprofitable to use stationary industrial robots, particularly for small batch sizes, high numbers of variants and quick product changes.

Commissioning and operating the system requires no programming knowledge. The operator configures the planned working processes for the robot once only, using the teach-in process. From this the control software calculates all the required values for the programme sequence in operation and using sensor data automatically corrects deviations from the original position of the robot and the objects.

Using this process it is possible to drastically reduce the programming input previously required and to replace it with a high degree of self-control.

The mobility of the robot requires an adaptable safety system. This consists of a three-dimensional model of the work cell. Using this model it is possible to check in real time whether the robot is moving on a collision-free trajectory. This not only senses threatened collisions with other robots in good time but also reliably prevents impacts with any other objects in the environment. The robot solution from RT Leaders thus fulfils all the requirements for efficient and highly flexible industrial manufacturing.

Mitsubishi Electric will show visitors to the Automatica Exhibition the performance capabilities of this technology on its stand in Hall B2. There, a robot moving on an air cushion will unerringly pick-up a die thrown by a second robot and then pass it to a fixed location partner. The random position of the die will be determined without a camera to an accuracy of less than 25 hundredths of a millimetre.

About Mitsubishi Electric

With over 80 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, Mitsubishi Electric Corporation (TSE: 6503 / ISIN JP3902400005) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. The company recorded consolidated group sales of 25,5 billion Euro in the fiscal year ended March 31, 2009.

Mitsubishi Electric Europe B.V. is a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan, and represents over a 30 year history of sales, service and support of automation products within the European market place.

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www.mitsubishi-automation.com

www.creating-productivity.com

<http://global.mitsubishielectric.com>

Press contact:

Mitsubishi Electric Europe B.V.
Factory Automation European Business Group
Monika Torkel
Marketing Communications Coordinator
Gothaer Str. 8
40880 Ratingen, Germany
www.mitsubishi-automation.com
Tel.: +49 (0)2102 486-2150
Fax: +49 (0)2102 486-7170
Monika.Torkel@meg.mee.com

PR agency:

DMA Europa Ltd.
Mr. Roland Renshaw
2nd Floor, Snuff Mill Warehouse
Park Lane, Bewdley.
Worcestershire. DY12 2EL, UK
Tel.: +44 (0)1299 405454
Fax: +44 (0)1299 403092
roland@dmaeuropa.com
www.dmaeuropa.com

User Contact:

Robotics Technology Leaders GmbH
Dr. Stefan Riesner – CEO
Am Loferfeld 58
81249 Munich, Germany
www.rtleaders.com
Tel.: +49 - (0) 89/1890465-0
Fax: +49 - (0) 89/1890465-11
info@rtleaders.com