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1977 Yasnac RB
MOTOMAN-L10



1980 Yasnac RG
1983 MOTOMAN-L10W

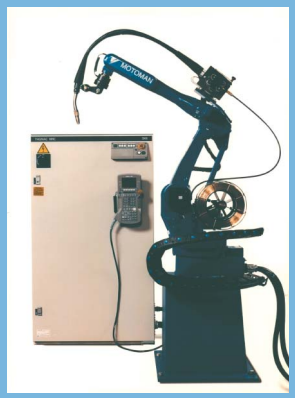


1983 Yasnac RX
1985 MOTOMAN-L106



1988 Yasnac ERC
MOTOMAN K10S

MOTOMAN robot history



1994 Yasnac MRC
MOTOMAN-SK16



1998 Motoman XRC
MOTOMAN-UP20



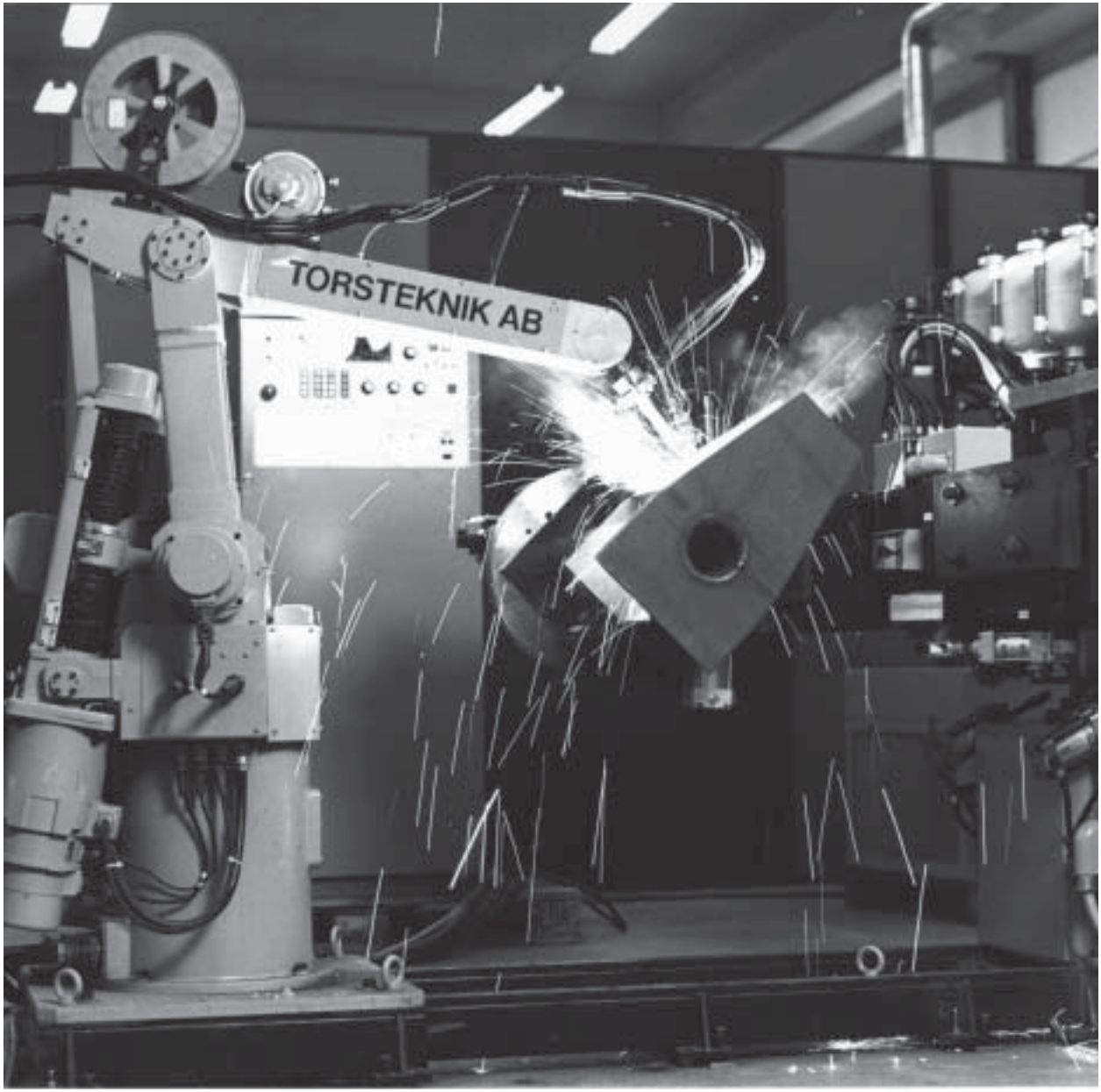
2004 Motoman NX100
MOTOMAN-EA1400N
MOTOMAN-ES165N



2006 MOTOMAN-IA20
MOTOMAN-DA20

MOTOMAN
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1. The programming unit was used to move each robot axis and save its position. When running the program the robot would assume each position in the very same order that they were recorded.



2. RB control cabinet.

Yasnac RB and MOTOMAN-L10

MOTOMAN-L10
Introduced in 1977
Five axes
Maximum workload 10 kg (including gripper)
Weight 470 kg

Control system RB
Programming capacity 250 positions, could be extended to 600 and 350 instructions
16 input signals and 15 output signals
99 robot jobs in magnetic memory
63 welding parameters
Dimension 1600x650x700 mm
Weight 350 kg

The very first Motoman robot
Motoman L10 was the first robot which Yaskawa introduced on the market. Its control system was equipped with a separate programming pendant used to record the robot's position one by one. The control system had a magnetic memory which did not require a backup.

New positions, points, could be added or moved, but it was impossible to erase any of them in the recorded program. Four finished programs could be accessed from separate keys on the programming unit.

Using a few points to calculate a straight line or a circle (so called interpolation) was not possible. Consequently it was necessary to record quite a lot of points in order to complete a welding line.

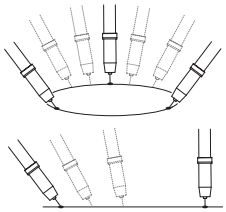
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3. Motoman L10WA with a sixth "A"-axis.



4. With circular interpolation only three points (two for linear) are needed for the control system to complete a welding line.



5. The RG controller cabinet.

Yasnac RG and MOTOMAN-L10W

MOTOMAN-L10W
Introduced in 1982
Five axes
Maximum workload 10 kg
Weight 280 kg

MOTOMAN-L10WA
Introduced in 1983
Six axes
Maximum workload 5 kg
Weight 280 kg

Control system RG
Introduced in 1980
Controls up to six axes
Programming capacity 1000 pos (600 instructions).
99 robot jobs in magnetic memory (external memory on tapes)
22 input signals and 21 output signals
127 welding parameters
Linear and circular interpolation possible
Dimensions 1600x650x700 mm
Weight 350 kg

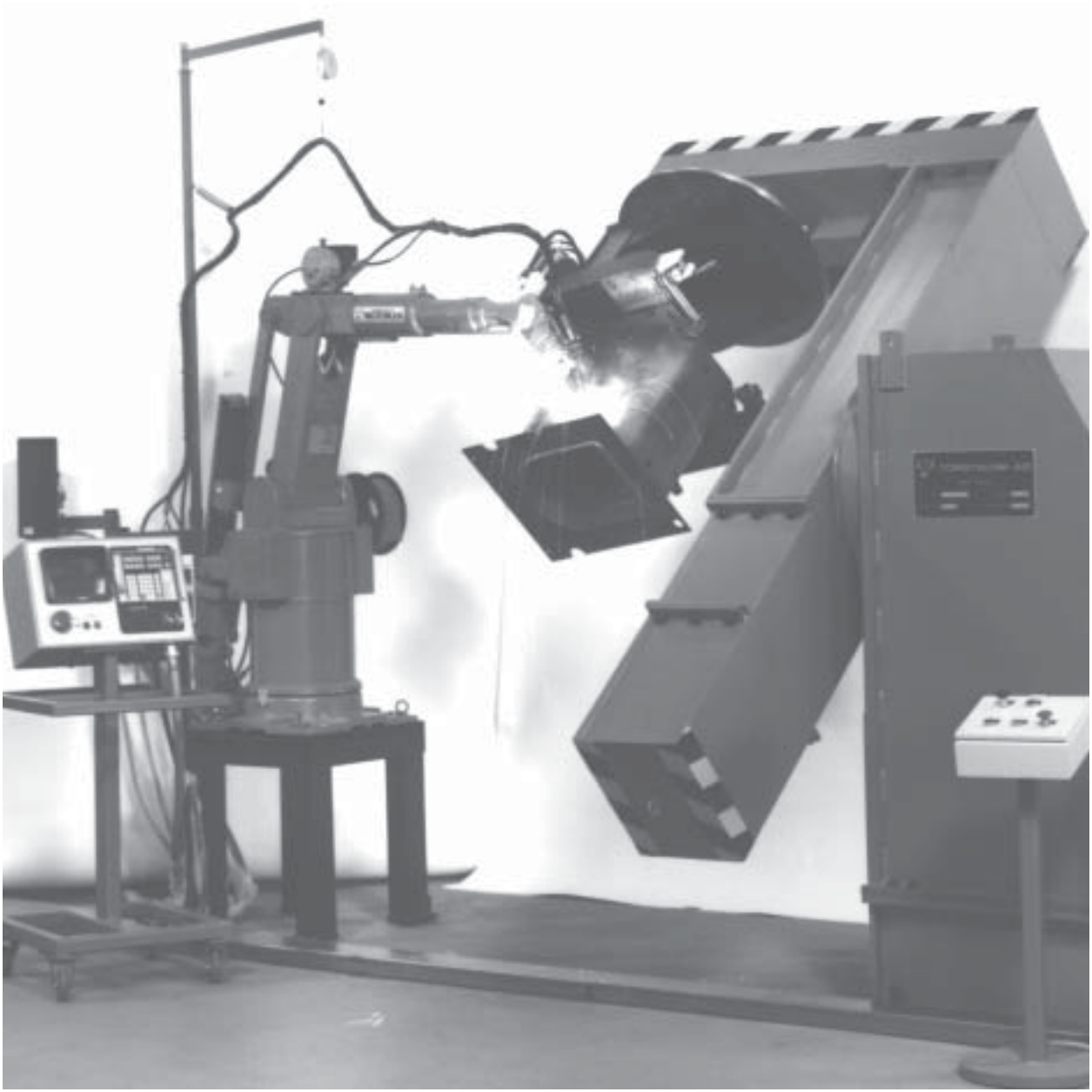
Many improvements to robot and controller

The work area in the new Motoman L10W was increased by 80% and the robot wrist is more narrow. The robot was made of a light aluminum alloy which helped reduce the size of its motors.

The model L10WA, with its extra wrist axis called A, was the world's first six axes robot. The control system RG could handle either this robot model, or the ordinary L10W and an external axis. However, the L10W-models were almost exclusively used with the next generation controller RX.

The later versions of RG control system enabled circular and linear interpolation, three dimensional shifting of a robot job and pendular motion. It was even possible to control it from an external computor, but that was not put to much practical use.

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6.The RX controller was the first system with a monitor and English text.



7.The RX controller and programming pendant.

Yasnac RX and MOTOMAN L-series

MOTOMAN-L106
Introduced in 1985
Six axes
Maximum workload 10 kg
Weight 350 kg

Control system RX
Introduced in 1983
Controls up to eight axes (the robot's six plus two external axes)
Programming capacity 2,200 pos and 1,200 instructions (could be extended to 5,000 pos)
249 robot jobs in memory
48 input signals, 24 output signals plus 2 analogue outlets
127 welding parameters
Dimensions 700x1100x580 mm
Weight 200 kg

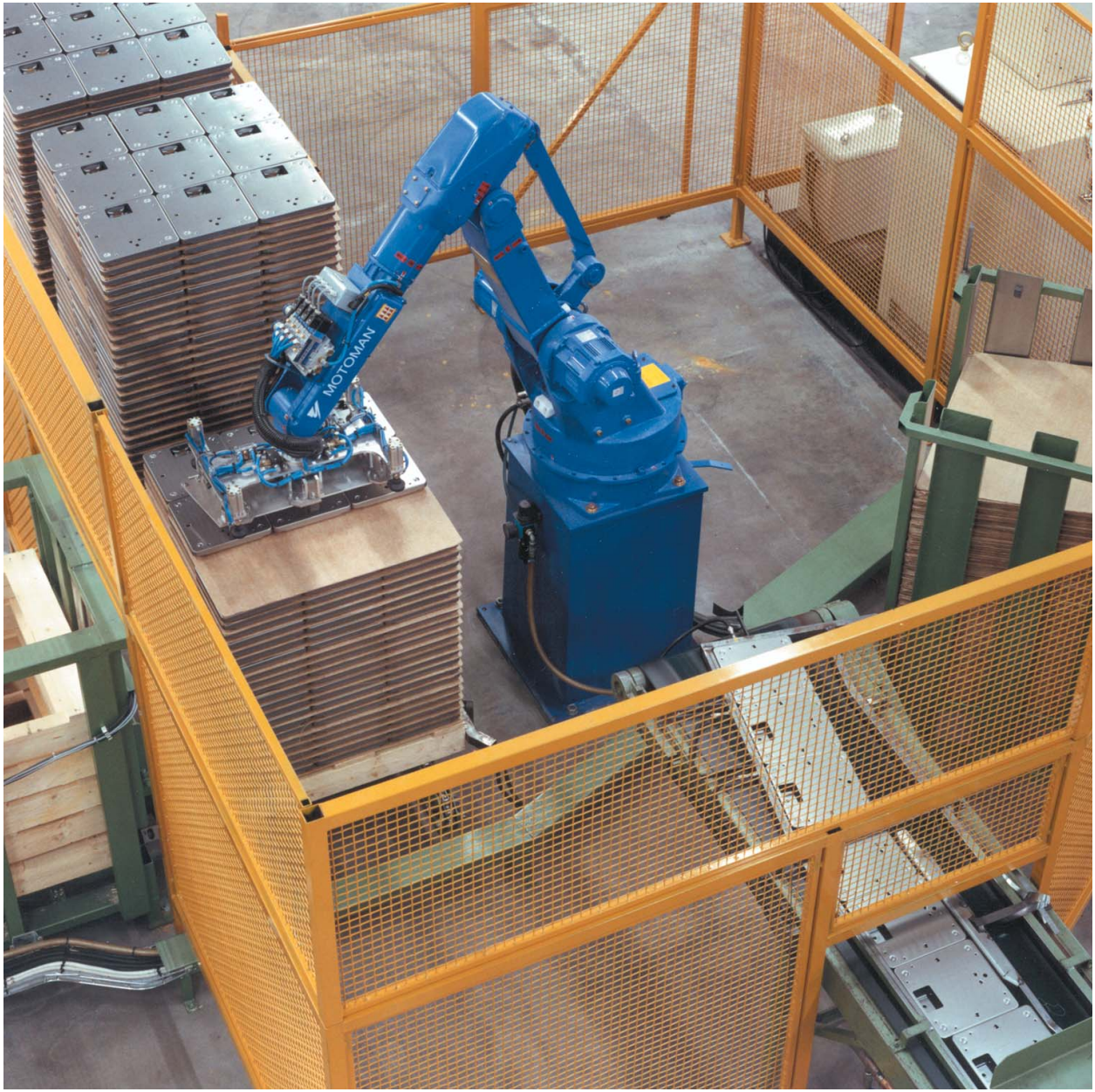
Other models in the series
L15, L30, L60 and L120

Introducing a whole robot series
This meant several robot models that could be operated with the same type of control system. The L-series included robots able to handle workload up to 120 kg. There was direct drive on the three wrist axes RBT.

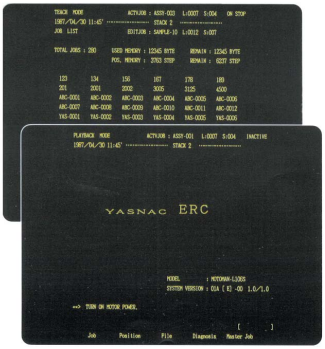
The later versions of the RX controller were equipped with "modern" functions like COM-ARC (seam tracking), multi layer, 3D-shift, parallell shift etc. In order to synchronise robot welding with a rotating manipulator the TRT function was developed.

Operator safety features included automatic low speed during programming and a teach-lock mechanism which prohibits operation through other equipment than the programming unit.

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8. Screen display with the new robot programming language INFORM.



9. The ERC control cabinet with the operator's panel on top.

Yasnac ERC and MOTOMAN K-series

MOTOMAN-K10S
Introduced in 1988
Six axes
Maximum workload 10 kg
Weight 300 kg

Control system ERC
Controls up to 12 axes
Programming capacity 2,200 pos and 1,200 instructions, could be extended to 10,000 pos and 5,000 instructions.
55 input signals and 35 output signals (could be extended to 96/44)
Dimensions 700x1140x580 mm

Other robots in the series
K3S, K6SB, K30WSB, K60S and K100S

Advanced functions
The K-series of robots had a direct drive on all six axes. This meant that the power was transferred to the axes directly and not through long chain transmissions or link-arms.

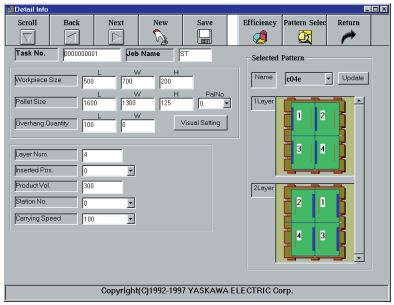
The ERC control system was able to control more axes than any other controller at the time. It had a lot of improved features like electronic seam tracking (ComarcII) and Multi Layer functions which meant that external sensors and seam tracking devices were no longer necessary. Other smart features were user coordinates, a step by step position control (forwards and backward,) fine adjustment of speed etc.

The programming pendant weighted only 0.9 kg and was equipped with a small display (12 characters) and a three positions deadmans handle.

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10. With the MRC control system followed a series of PC-software for file transfer, job editing and simulation tools.



11. The MRC control system could control two robots in synchronisation with each other.

Yasnac MRC and MOTOMAN SK-series

MOTOMAN-SK16
Introduced in 1994
Six axes
Maximum workload 16 kg
Weight 280 kg

Control system MRC
Controls up to 21 axes
Synchronised control of two robots (patented)
Programming capacity 2,200 pos (could be extended to 60,000 pos)
48 input and 48 output signals (could be extended to 144/144)
Dimensions 900x1600x650 mm
Weight 190 kg

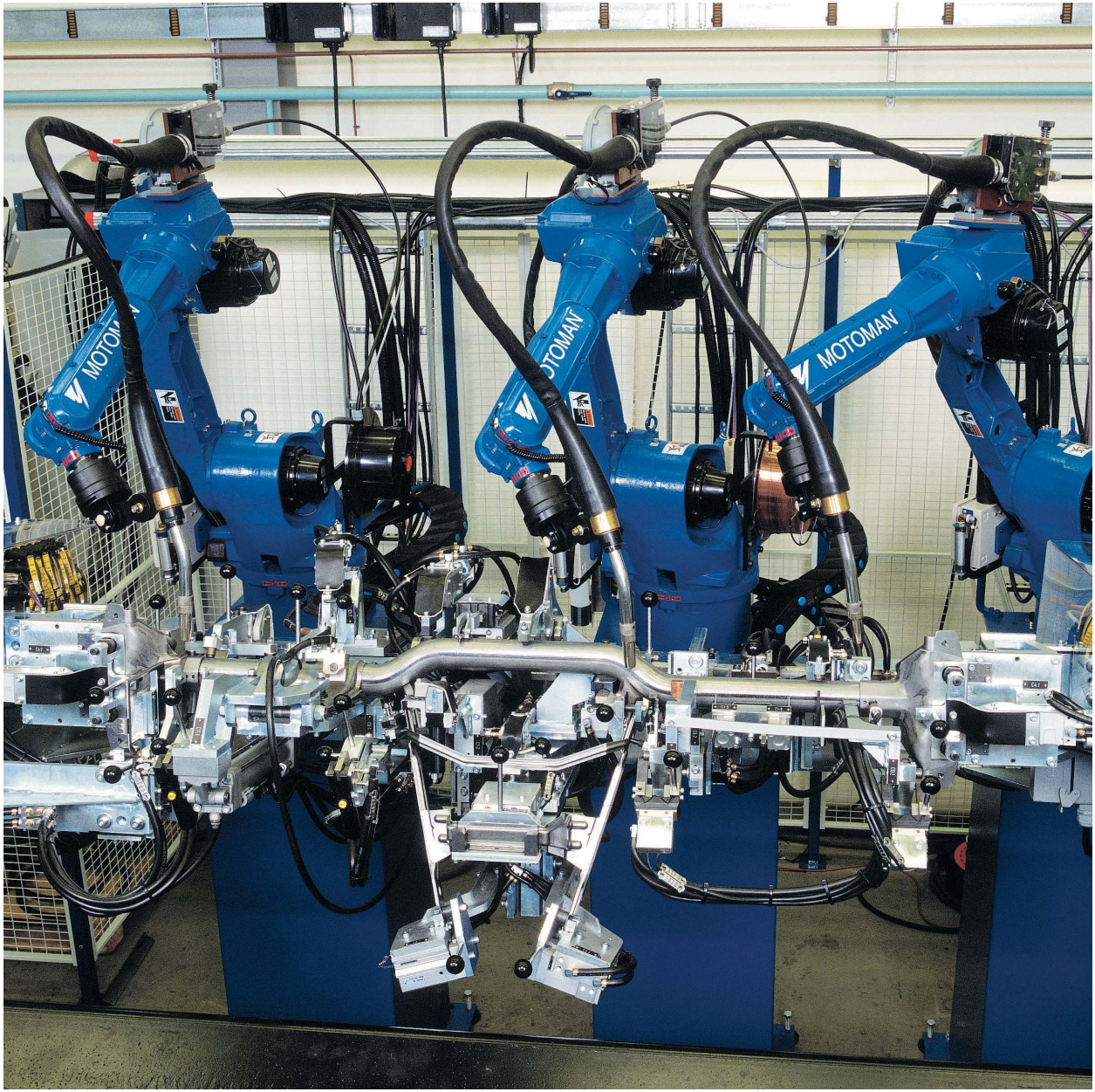
Other robots in the series
SK6 C, SK16-6, SK45-30, SK120, SK300 and SK-16

Improved performance
With the introduction of the robots in the SK-series the maximum workload was increased by 300%. The system could control more axes as the previous one, and it could also synchronise the motions of two robots.

The MRC introduced some new functions well suited for machine handling and necessary when synchronising two robots: e.g. Multi tasking, servo float and S-move.

MRC also made it possible to edit robot jobs from an ordinary PC, so called offline programming. Allthough it had been possible to read robot jobs as text files before, it was only now possible to return changes made in the PC or even send completely new programs to the controller.

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12. Offline programming tools can help reduce cycle times and calculate the production cost.



13. The programming pendant received an award in 1998 for its user friendly design (Ministry of International Trade and Industry in Japan.)

Motoman XRC and MOTOMAN UP-series

MOTOMAN-UP20
Introduced in 1998
Six axes
Maximum workload 20 kg
Weight 280 kg

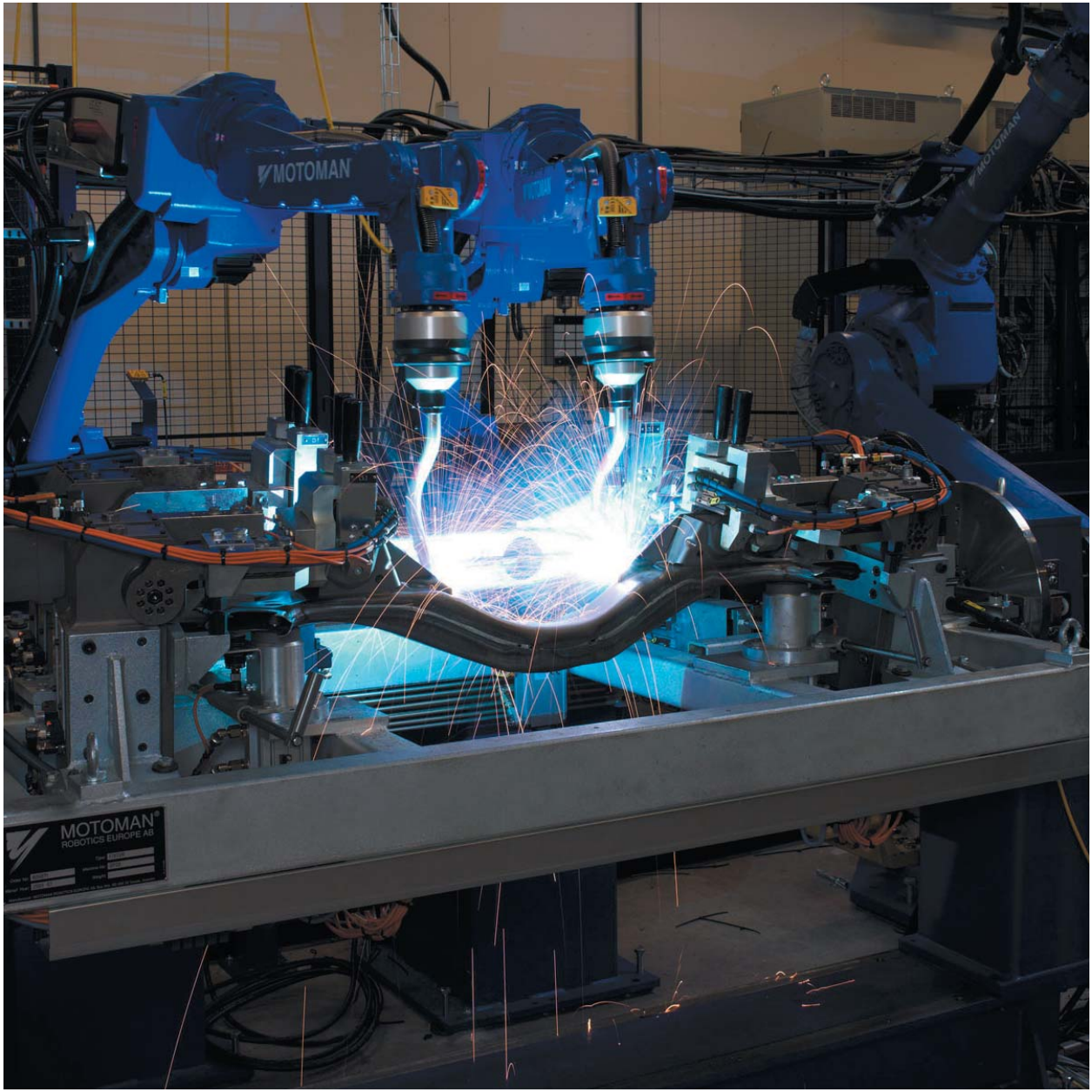
Control system XRC
Controls up to 27 axes
Synchronised control of three (four) robots
Programming capacity 5,000 pos and 3,000 instructions, can be extended to 60,000 pos and 20,000 instructions
40 input and 40 output signals (can be extended to 256/256)
Dimensions 800x900x650 mm
Weight 190 kg

Other robots in the series
UP6C, UP20-6, UP20M, UP50, UP130, UP165, UP165-100, UP200 and UP350

Increased usability
The XRC control system has a Windows oriented interface with directories and folders. Several types of PC-software for job editing, file transfer or offline programming and simulation are available.

Some interesting new features introduced with XRC are Form Cutting (used in laser-, plasma or water cutting), shock sensor functions and the ability to have acceleration/retardation in any point.

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14. The NX100 programming pendant has a touch screen display and is based on Windows CE operative system.



15. A quantum leap in robot technology: single- and dual armed robot models with all the supply cables hidden in the robot arm itself.

NX100 and application dedicated robots

MOTOMAN-EA1400N
Introduced in 2004
Six axes
Maximum workload 3 kg
Weight 130 kg

MOTOMAN-ES165N
Introduced in 2004
Six axes
Maximum workload 165 kg
Weight 1100 kg

Control system NX100
Controls up to 36 axes
Synchronised control of four robots
Programming capacity 60.000 pos and 10.000 instructions
40 input and 40 output signals (can be extended to 1024/1024)
Dimensions 800x1000x650 mm
Weight 170 kg

Other robot series
EA-series (arc welding)
EPL-series (palletizing)
ES-series (spot welding, general application)
HP (general application)
PX-series (painting)

Application dedicated robots
Each robot series is specially designed for its specific application, such as arc welding, palletizing or painting. In many of these models the supply cables are fitted into the upper robot arm, rather than hanging on the outside, which significally increases the robot's freedom of movement. In 2006 the brand new robot models: human sized single armed MOTOMAN-IA20 and dual armed MOTOMAN-DA20 are taking this concept one step further with all of the supply cables hidden in the robot arm.

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