

A flexible and integrated solution

Meeting the challenge of welding aluminium



ABB Flexible Automation



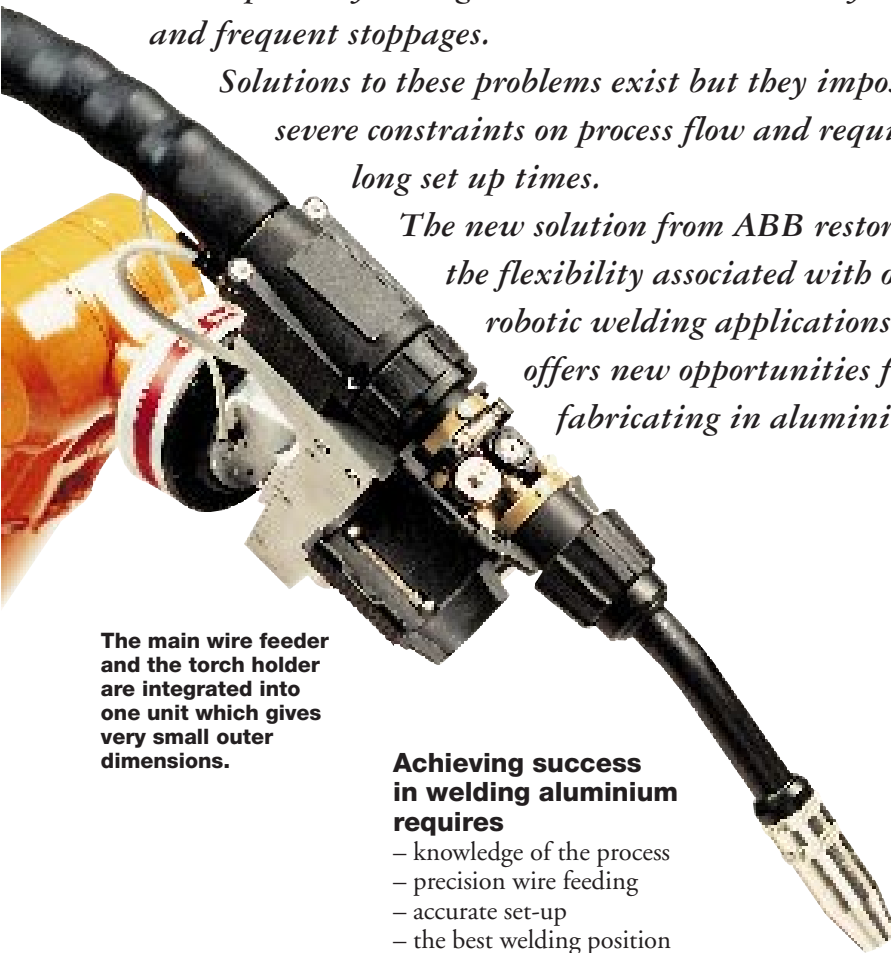
Meeting the challenge of welding aluminium

Aluminium alloys are being used ever more frequently in the automotive and related industries. Also, the continuous development of new alloys is widening the use of aluminium in other industries.

Yet the welding of aluminium is beset with special difficulties. To overcome these problems it is essential to have accurate set-up, to maintain close control of feeding the soft filler wires and to use the best welding positions. Failure to maintain precisely the right conditions leads to heavy sooting and frequent stoppages.

Solutions to these problems exist but they impose severe constraints on process flow and require long set up times.

The new solution from ABB restores the flexibility associated with other robotic welding applications and offers new opportunities for fabricating in aluminium.



The main wire feeder and the torch holder are integrated into one unit which gives very small outer dimensions.

Achieving success in welding aluminium requires

- knowledge of the process
- precision wire feeding
- accurate set-up
- the best welding position
- good fixturing
- good joint preparation

Knowledge of the process

ABB's wide experience of welding applications has been applied to the design and tuning of the integrated system. This experience can assist you to find the right solution to your problem – quickly.

Precision wire feeding

The new wire feeder system has feed rollers in the welding gun – close to the arc. The assist motor, which pays off the wire from the bobbin, together with the control system help to maintain a low tension in the wire – preventing distortion but permitting large movements of the robot arm.



Correct welding positions

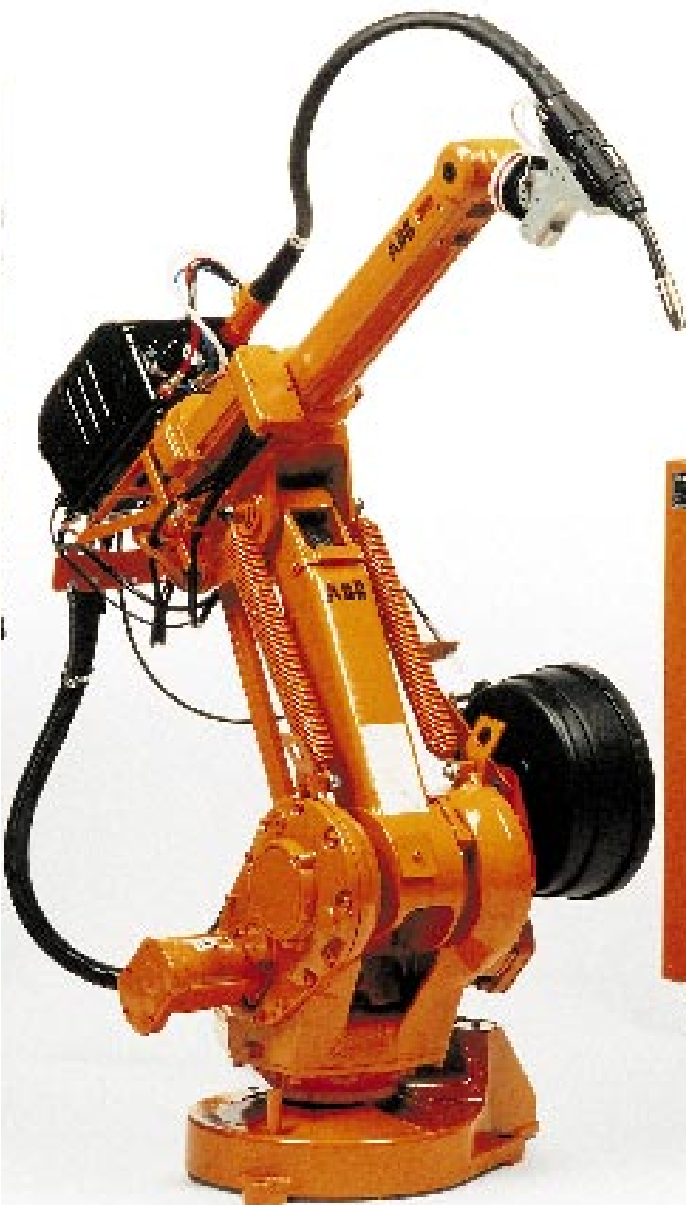
The six axes robot can weld from the best position and because the welding gun and the work-piece movements are so well co-ordinated the best position can be maintained throughout the weld; the best speed also. The slender arm of the 1400 and 2400L robots permits good welding positions even where access is limited.

Precise arc parameters

The monitoring and control aspects of the Arcitec power system ensure optimum arc conditions resulting in a very consistent weld bead. The schedule pulse function gives a MIG weld looking as good as a TIG weld!

Joint design

Good joint preparation and fixturing are key words for achieving full use of the aluminium welding.



All components in the ABB system are designed to work together to give the best possible solution – without compromises.

True integration for maximum flexibility

All the components in this system come from one company. They have been designed to work together to give the best solution – no compromises, no trade-offs. This, plus ABB's practical welding experience means that the solution offered to your problem is the optimum for the overall application.

A robot controller dedicated to arc welding

The S4C unit is proven as a top class robot controller for arc welding. This, together with the dedicated software Quickmove, and Truemove, assures top class performance for speed and accuracy of movement. The S4C brings the same performance to the welding positioner.

The unique system for precision feeding of soft wire

To achieve the required control of feed rate without damaging the aluminium wire, a new welding gun has been developed with drive rolls and control instruments in the gun – just inches from the arc. Bobbins up to 7 kg are mounted on the robot. Bobbins up to 40 kg are mounted in a separate cubicle which can have controlled humidity.

Ancillary Equipment

The system can be supplied fully equipped to function as a welding cell or as part of a production line. Examples of ancillary equipment are cleaning and calibration devices for the welding torch, work piece positioners and safety systems.



Circular welding of a tube. Thanks to the wire feed system the weld is consistent even without positioning the workpiece.



Using schedule pulsing makes a MIG weld look like a TIG weld.



An example of welding a motorcycle frame where inline weaving has been used to give a good looking weld appearance.

Technical data

ROBOT SYSTEM		
Performance	IRB 1400AWI	IRB 2400AWI/ IRB 240LAWI
Handling capacity	5 kg	10 kg / 7 kg
Positional repeatability	±0.08 m	±0.1 mm / ±0.1 mm
Axis movements		
Working range		
Axis 1, C Rotation	340°	380° / 360°
Axis 2, B Arm	140°	210° / 200°
Axis 3, A Arm	135°	120° / 125°
Axis 4, D Wrist	300°	400° / 370°
Axis 5, E Bend	230°	240° / 240°
Axis 6, D Turn	600°	600°
Max. speed		
Axis 1, C Rotation	120°/s	115°/s / 135°/s
Axis 2, B Arm	120°/s	115°/s / 135°/s
Axis 3, A Arm	120°/s	115°/s / 135°/s
Axis 4, D Wrist	280°/s	280°/s / 310°/s
Axis 5, E Bend	280°/s	300°/s / 310°/s
Axis 6, P Turn	280°/s	300°/s / 310°/s

All data excluding welding equipment

Physical	IRB 1400AWI	IRB 2400AWI/ IRB 240LAWI
Dimensions		
Robot base, mm	620x450	755x600 / 720x550
Cabinet, H x W x D	1700 x 800 x 530 mm	
Weight		
Robot unit	245 kg	370 kg / 400 kg
Cabinet		
400 V	350 kg	350 kg
Other voltage	380 kg	380 kg

All data with welding equipment

Safety equipment	IRB 1400AWI	IRB 2400AWI/ IRB 240LAWI
Integrated components fulfilling both national and international safety regulations.		

WELDING EQUIPMENT

Physical	
Power source mounting	In separate cabinet below robot controller
Environment	
Cooling of power source	Forced air cooling
Degree of protection, cabinet	IP 21
Ambient temperature	5-40°C
Relative humidity	Max. 95%
Noise level power source	Less than 70 dB (A)
Emission	EMO shielded
Electrical connection	
Supply voltage	200-600 V ±10 %, 50/60 Hz
Power consumption at welding	Max. 16 kW
Power consumption at idling	0.2 kW
Power factor	0.88

Power source	
Permissible load at 60 % duty cycle	400 A / 34 V
Permissible load at 100 % duty cycle	315 A / 30 V
Open circuit voltage	65 V
Communication with robot controller	CAN-bus

Process	
Type	Gas Metal Arc Welding
Process methods	MIG/MAG and Pulsed Arc
Weld data setting	Synergic/Manual
Number of pre-programmed gas and wire combinations	90 pcs
Memory size for welding parameters	75 schedules
Example of some process functions:	Material heating and cooling Crater filling Slope at crater filling Final pinch off pulse Restart Restrike Tuning of parameters during welding

Monitoring	
Operator interface	Programming unit
Type of communication	Plain language
Measured values	Welding speed (velocity) Welding voltage Welding current
Diagnostics	Total 38 types for the power source, selective with explanations
Communication with robot controller	CAN-bus

Wire feed system	
Operation principle	Push-Push
Main feeder	DC motor with tacho supervision
Push feeder	AC motor with constant torque characteristic
Number of feed rollers	2 pcs in each feeder unit
Communication with control system	CAN-Bus
Speed range	2,3 – 18 m/min
Wire diameter aluminium (AlSi, AlMg)	0.8/1.0/1.2/1.6 mm (standard 1.2 mm)
Standard length of wire liner between the robot and the separate feeder unit for 40 kg bobbins.	6 m

Examples of peripherals	
Work piece positioners	The IRBP-series A, B, C, D, K, L and R types
Tool cleaning and calibration device	Torch Service Centre, TSC
Joint detection	SMARTAC

Data and dimensions may be changed without notice.



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