Robot system integration

Fully automated MIG/MAG and TIG welding
Efficiency is all a question of the system

GENERAL REMARKS

So many things to take account of!

The difficult thing about fully automated production is that unlike a human welder, the robot cannot “see” and intervene to correct e.g. the welding gap or the weldment preparation. This is where the challenge to the system provider lies – in taking account of all possible eventualities. The aim is to make the welding process so stable that top-quality results are achieved, even at the very lowest tolerance limits. The only recipe for success here is know-how, plain and simple, in terms of perfect interplay with the system.

Fronius has many years’ experience with robot welding. As Fronius’ success on the market has grown, so too has its product range. Bit by bit. Today, Fronius is a true “full-liner”.

Every single part is exactly tailored to all the others, harmonising optimally within an integrated network. This makes Fronius more than just a system supplier, but a partner that takes overall responsibility for ensuring that the entire process functions as it should. Having only one such partner to deal with makes cooperation very much easier.

One for all ...

Fronius robot welding systems can be deployed for just about any application you can think of. The specific know-how can be adapted both to widely diverse types of robot and to all types of material and application.

---

Being a system supplier, Fronius can offer all the components that count:

- Power source
- Wirefeeder
- Hosepack
- Welding torch
- Welding-torch equipment (holding clamps, cleaning items, collision box, weld shavers)
- Quality assurance systems
- Interfaces
- Consulting
- Optimisation
- System Know-how
If you go all the way, you’ve got to have what it takes

All systems under control

Whenever robots are at work, the result will be affected by many very different factors. Keeping all of these in harmony is the best way to ensure a smooth sequence and optimum results. You can only do this, however, if you understand all these parts and how they interact with one another. Three subsystems make up the whole: The power source and the welding process itself, the wirefeed system, and communications between the systems. Fronius stands for the integral whole.

WELDING

A model process

In automatic welding, the stability of synergic programs is a vitally important factor. The expert knowledge integrated inside the power source ensures that the process runs smoothly right from the beginning of welding and through to the very end. Both in pulsed-arc welding and in spray-transfer, dip-transfer or high-deposition arc welding, exemplary results are possible within a very short time, with no need for laborious experiments.

A particularly interesting feature is the spatter-free ignition. This was specially developed for aluminium, but does equally valuable service on all processes that weld CrNi or steel. Digital technology, in conjunction with the Robacta Drive, makes for 100 % reproducibility, and maximum contact-tube lifetime.

Another feature definitely worth mentioning is the “R-compensation” function. Here, the resistance (“R”) in the welding circuit is measured and both the process control and the indicated values are calibrated in the light of this R-value. In this way, results can be replicated without difficulty, even when hosepacks of different lengths are used.

An exciting new precedent in welding engineering.
**WIREFEED**

**Everything is calculable**

The wirefeed is tremendously important in robot welding. Making it possible to feed both hard and soft wires at a constant speed, yet without damaging them in the slightest, is the ultimate challenge. A challenge to which Fronius has risen with various features – for example with a special wirefeed system that uses toothed drive rollers to ensure precision wire guidance; with the forced-contacting arrangement for the wire, which ensures a defined current transfer; and with generously dimensioned drive rollers and 4-point wire support for optimum force-transmission.

A noteworthy detail that prolongs the lifespan of wearing parts is the automatic motor-current detection feature: The more wire is fed through the inner liner, the more it wears out and the greater the force that is required to feed the wire through it. In order to determine how high this motor current actually is, measurements are carried out constantly, telling the system a great deal about the condition of the inner liner. This allows preventive maintenance to be carried out in good time – before things grind to a halt. Another integrated quality safeguard is the high-performance torch cooling system. Even at high deposition rates and duty cycles, the gas nozzle stays optimally cooled; no spatter clings to the nozzle and less additional cleaning needs to be done on it.

You can choose from a wide range of wirefeed units, to suit every machine configuration. The VR 1500, for example, is a small and lightweight 4-roller drive that is superbly well suited for mounting on the 3rd axis of the robot.

Where soft wires need to be fed, the Robacta Drive master/slave drive system is recommended. In this configuration, the main wire drive (master) is located in the immediate vicinity of the seam. The most suitable unreeling devices here are the VR 1500, VR 7000 or VR 4040. The VR 4040 is a constant-force unreeling unit for 40 kg spools of aluminium wire. An end-of-wire watchdog tells you in good time when the spool is empty – and changing the spool is very easy, too. Moreover, the VR 4040's simple but ingenious details make it an exceptionally practical and efficient unreeling device.
COMMUNICATION

Mutual understanding is what it’s all about

Fronius offers many different solutions for communicating with any type of robot: Its wide range of offerings includes all commercially available interfaces for field buses, as well as standard I/O. The system is modular in structure and highly flexible. Thanks to the 100% digital power-source concept, it can be adapted to meet the most diverse user communications requirements. PC-based tools facilitate not only start-up and servicing, but also – and even more importantly – day-to-day operation, e.g. the JobExplorer for managing all data, with an easy-to-use back-up function, and WinRCU for configuring and controlling the power source from the PC. What’s more: Networking with other power sources via Ethernet; weld-data documentation using Fronius OPC Server; “Q-Vision easy”, and much more besides. In this way, every machine can be linked up to the robot in no time at all: “Plug & Weld” is the magic formula here.

A very special feature of the digital power sources, and one that should definitely be mentioned, is the touch-sensing function: When the wire is touched down on the workpiece, with the aid of the power source the robot can always “feel” exactly where on the weldment the seam begins. Without any extra modules. As standard, whichever interface you select.

Touch Sensing

Plug & Weld: Plug it in - and start welding!

1 Power source
2 Wirefeeder
3a Standard I/O - Interface
3b Fieldbus interface
4a Welding torch Push-Pull
4b Welding torch
5 Robot control
6 Wire supply
The solution as a whole is what counts

PROFITABILITY

All in all, simply the best.

The availability of the installation, and with it the profitability of the investment, is largely decided by the quality of the welding components. Fronius uses only high-grade materials and components, for instance top-quality contact tubes and hoses. What is more, Fronius sets great store by ingenious technical designs that protect the system as a whole. Like the efficient torch-cooling system, to take one example. On top of this comes the fact that inverter technology leads the field when it comes to minimal power consumption. All these are factors that greatly reduce the total costs in the long term, giving a corresponding boost to profitability. After all, it’s a matter of opinion which costs you enter into the equation as the basis for your decision. The more detailed your investment appraisal, the more clear-cut the result will be. And seen this way, there’s no better solution.

PRODUCTS

Welding systems

- **TS 4000/5000, TPS 4000/ 5000**
  The world’s first completely digitised, microprocessor-controlled GMA inverter power source. With unrivalled precision in the welding process, exact replicability of results, and incomparable welding properties. A few of the highlights: Various different ignition variants, "made-to-measure" arc, start-up program for aluminium, integrated power-source manager. All also available in a “remote” version, i.e. with no operating panel.

- **TPS 9000**
  The TPS 9000 is a newcomer to the existing range of digital machines. It is used when even more power is required for the welding process. The only thing you need for doing this is an extension kit.

- **Time Synergic**
  MAG high-performance welding with an extremely high deposition rate.

- **Time Twin**
  High-performance GMA welding process on a tandem basis. With two separately controllable power sources working with two insulated wire electrodes in one single gas nozzle and in a shared weld pool. For maximum efficiency.

- **TIG cold wire**
  TIG welding under DC/AC with filler-wire, for weldments that have to meet the most stringent requirements.
Wirefeed systems
- **VR 1500**
Small, lightweight, digitally controlled 4-roller drive, ideal for mounting on the 3rd axis of the robot.
- **VR 4000/7000**
The ideal wirefeeder in conjunction with a Robacta Drive or push/pull torch.
- **VR 4040**
Unreeling device for 40 kg spools of aluminium wire. End-of-wire watchdog, heating and internal lighting. A truly consummate product.

Quality assurance
- **Q-Master/Q-Vision**
Process-integrated quality monitoring for Time Synergic and Time Twin. For saving, editing, re-using, documenting and archiving your data.

Welding torches
- **Robacta, Robacta Drive**
Robot torches with a defined current transfer thanks to their forced contacting arrangement. On the Robacta Drive, the master drive is mounted directly on the front axis of the welding robot, to provide "in-situ" stabilisation of the wirefeed.

Operating panels
- **RCU 4000**
The remote control unit for operating all power-source functions remotely.
- **RCU 5000/**
The most innovative LCD remote control unit ever! Straightforward, logical user guidance thanks to its systematic menu structure and dialogue elements; orientated to the workday needs of various different user groups.

Interface
- **ROB 4000/5000**
Standard I/O; for communicating with all commercially available robots.
- **Field bus module**
Interface module developed in collaboration with Beckhoff, and enabling access to various different bus systems, e.g.: Interbus, Profibus, CanOpen, DeviceNet (optical wave guide or conventional wiring).