

Pulse welding with Fronius TransSteel Pulse

African Fusion talks to Edric van der Walt of Fronius South Africa about the addition of the pulse function to the TransSteel series. Not only does the pulsed arc allow faster welding speeds on thicker materials, but rework is reduced – by up to 70%– since the pulsed arc causes less welding spatter.

The TransSteel range of Fronius power sources was introduced to meet the need for rugged and reliable welding equipment for structural-steel fabricators. To produce quality welds, reliability is essential and, on any construction site, tough tools are needed for ongoing reliability.

Robust and reliable TransSteel welding machines have long been characterised by their intelligent design and exceptional ease-of-use. Digitally controlled and primed with expert knowledge, TransSteel welding systems are continuously being optimised to deliver better and better arc stability and weld quality, with guaranteed system performance.

While TransSteel machines have multiprocessor capabilities, the most used processes for structural steel welding are semi-automatic wire-based gas-metal arc welding (GMAW) and flux-cored arc welding (FCAW). For these, a vast range of possible steels, alloys and material grades, thick-

nesses, and welding positions is involved in structural steel welding and, for each, different welding parameters must be applied. In addition, lightweight structures are frequently made from aluminium, while stainless steel must often be used where corrosion resistance is required. Both require totally different welding parameters and arc characteristics.

For ease of use, therefore, Fronius' new TransSteel power sources are pre-programmed with 168 different parameter sets, including settings for:

- Mild and low alloy steels, which can be welded with solid or metal-cored wires; or rutile, basic or self-shielded flux-core wires.
- Stainless steels and CrNi alloys.
- Aluminium and AlMg and AlSi aluminium alloys.
- Welding wires with diameters from 0.8 to 1.6 mm.
- Gas shielding using any one of eight



Pulse welding helps the welder to produce neat seam rippling or to minimise distortion, such as during tacking.

different gas mixtures. In addition, integrated Fronius know-how for the GMAW/FCAW processes is embedded into these machines. Steel Transfer Technology, for example, is a knowledge package that has been specially put together for the steel market. The idea is that it perfectly tailors the welding characteristics to suit the precise needs of the welding arc for that application. This technology delivers precision ignition with perfect burn-off behaviour, depending on the fill requirements of the job: Option include:

- **Steel** is the universal set of characteristics for quick and easy 'normal' welding of steel.
- **Steel root** is the characteristic specifically developed for root pass welding. It is characterised by particularly strong gap-bridging ability, in other words, the ability to fill wide gaps.
- **Steel dynamic** is a characteristic with a forceful and concentrated arc, resulting in high welding speeds and deep penetration.

Pulse mode added

When GMAW welding, the mode of metal transfer between the filler wire and the weld pool changes depending on the welding current level, the material being transferred and the wire thickness. These different metal transfer modes include dip-transfer or short arc transfer mode, typically for low current welding of thinner plate; open arc or spray transfer for high current levels on thicker plate; and intermediate or globular transfer for welding in the overhead or vertical up positions, for example.

In addition, by using pulsed welding current, it is also possible to achieve open arc metal transfer at a precise rate of one droplet per pulse. So, by incorporating pulse mode into the new range of Fronius TransSteel welding machines it becomes possible to avoid completely the intermediate current levels associated with globular



With the intuitive operating concept, the welder can start up the TransSteel immediately and without any prior knowledge of the device.

metal transfer, which is difficult to control and prone to spatter. This is a particular problem when welding out of position.

The resulting reduction in spatter and defect repair by adopting pulse mode in the intermediate current range, leads to up to 70% reductions in rework. Also, compared to the standard intermediate arc, the pulsed arc allows welding speeds of up to 30% higher to be achieved, particularly for aluminium and stainless applications.

Most notably for TransSteel power sources, the welder is not required to have any previous knowledge of transfer modes or which parameters to select before welding. The intuitive operating concept of the system allows the welder to select the best set of parameters for each welding job by making three simple choices: the material, the wire diameter and the shielding gas.

The current and the voltage settings can then be adjusted to suit the needs of the job, and the key arc welding characteristics and metal transfer modes will automatically be selected to give best possible results. If required, however, all the welding parameters can be set on the front panel.

To satisfy individual welder preferences, a set of adjustments has also been made available for making small corrections to arc characteristics. These include arc length correction, arc force dynamic and pulse correction.

Arc length correction enables the welder to choose a shorter arc with reduced welding voltage; a neutral arc with an average arc voltage; or a longer arc with above average welding voltage. The arc-force dynamic is used to influence the short-circuiting dynamic at the instant of droplet transfer during short-arc welding. Options include a hard and stable arc at the one end, a soft low spatter arc at the other and a neutral short-circuit dynamic inbetween.

To correct the pulse energy during pulsed metal transfer welding, there is also an adjustment for influencing the droplet detachment force between lower, neutral and higher, which also influences the arc stiffness.

Other key TransSteel innovations include:

- **Automatic documentation:** A simple option for collecting and documenting real welding data is incorporated via a USB thumb drive, which can be connected to the rear of the power source to store all important data – including time and device-related data, along with the welding parameters used such as current, voltage and wire speed.
 - **Spot/tack mode:** Spot mode enables welders to place welding spots at regular intervals. With complete flexibility over the pause time between the intervals, this spot function is ideal for tacking joints prior to welding.
 - **Stitch mode:** Stitch welding not only produces a rippled seam appearance, but the low level of heat input also reduces material distortion when working with light gauge sheet.
 - **SynchroPulse** is an option recommended for welding aluminium alloys when a rippled seam appearance is preferred. This effect is achieved by modifying the welding power between two operating points at a frequency of up to 5.0 Hz. The changing current levels between high and low current also assist when welding in the vertical up position.
 - **Pulse Controlled Spray** is a mode designed for minimal spatter and deep penetration.
 - **The hose pack connector** is integrated directly onto the motor plate in the wire feeder. This enables the welding wire to be guided all the way from the feeder to the contact tip of the welding torch, resulting in highly stable wire feeding and less wear on the consumable parts.
- Fronius has added the pulse function to three models. The TransSteel 3000 compact Pulse, which is also a multiprocess device that masters MMAW, GTAW and GMAW/FCAW welding processes to the same high degree. This compact unit is ideal for a wide range of welding tasks, on a construction site, in the workshop, or for repair work.

For regular welding tasks or in small series production, the pulse function on the TransSteel 4000 Pulse and TransSteel 5000 Pulse brings more options and speed benefits. In contrast to the Compact version, these higher-power units have separate wire feeders.

Fronius' TransSteel welding machines are the embodiment of a wealth of technological know-how collected since Fronius



The TransSteel 3000 compact Pulse is a multiprocess device that masters MIG/MAG, TIG, and electrode welding to the same high degree.



TransSteel 4000 and 5000 Pulse have a separate wire feeder and are therefore particularly suitable for intensive welding applications.

began producing its first welding transformers in the 1950s. This know-how is all now incorporated and available in the new Fronius TransSteel 3000 Compact, the TransSteel Pulse 4000 and the Fronius TransSteel Pulse 5000 welding power sources.

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Fronius is adding the pulse function to the existing TransSteel series, making welding even easier.