Increased control for pulsed-arc welding

Based on the high measuring and control speed of its TPS/i MIG/MAG power source platform, Fronius has developed a PMC (pulse multi control) pulsed welding package that provides the welder with access to a large range of synergic characteristics, which fully exploit the potential of the latest generation of Fronius devices. An improved pulse correction function, an updated SynchroPulse welding process and newly developed functions such as the penetration stabiliser and the arc length stabiliser, make the welding process even easier with better welding results.

The penetration stabiliser keeps fusion penetration at a constant level by adjusting the wire feed speed, even when there are stick out fluctuations, for example, in corners that are difficult to access or due to trajectory fluctuations in robotic welding. Thanks to its high computing power, large memory, extremely quick system bus, and because of the highly dynamic wire feed speed, the TPS/i is capable of controlling penetration quickly and precisely, without overshooting. This enables the arc length – and thus the fusion penetration – to be maintained at the same level over a large area. It also makes handling noticeably easier. The user can set and limit the value of the wire feed speed, which has been readjusted to the maximum extent, within a window of up to 10 m/s to guarantee that welding procedure specifications comply with the corresponding requirements when the stabiliser is active.

The arc length stabiliser, also a new function, is at least as helpful as the penetration stabiliser when it comes to manual and automated welding. This allows the user to influence the arc length directly via the welding voltage. The result is a short arc, meaning that controlled short circuits occur, ensuring droplet transfer that is reliable and resistant to interference. In this case, quick control keeps the duration of the short circuit to a minimum and reduces the voltage at the right time with the result that bonding flaws and spatter are prevented. The welder does not need to perform any manual readjustment in the case of external interference – as a result of shifts in torch position, changes in sheet thickness or uneven heat extraction, for example.

For users who prefer to work with the traditional regulation function to stabilise the arc length, or are required to do so by the welding procedure specifications, Fronius has also integrated these functions into its new PMC suite.

Pulse dynamic correction is another new feature incorporated into the package. With the TPS/i this dynamic correction can be used to speed up (or slow down) droplet detachment, while keeping the energy input per unit length at a constant level. PCS (pulse controlled spray arc) is also included in the scope of supply of the PMC process. This characteristic enables users to switch seamlessly between pulsed arc and spray arc, with the problematic intermediate arc being hidden.

Furthermore, Fronius has achieved significant developments in terms of the start-up and shutdown phases. The ignition energy now adapts to the respective temperature of the wire end, meaning that less power has to be applied for arc ignition when the wire end is still hot. With an installed PMC process, the wire is retracted at the end of the welding process. This has the additional result that the current is reduced and burn back prevented. Both measures improve the energy balance and protect the wearing parts.

The SFI (spatter free ignition) function also works with standard TPS/i wire feeders. It is, therefore, no longer necessary to acquire a more complex push-pull unit in order to use SFI. In combination with the newly developed SFI HotStart, the power can be increased for up to two seconds at the start of the welding process to avoid bonding flaws as a result of ‘cold’ ignition.

Finally, Fronius has fine-tuned the SynchroPulse function and introduced a duty cycle welding parameter. This allows the user to determine how long the high-current pulse phase should last per cycle for SynchroPulse welding. This means that the heat input can be controlled more accurately than previously possible, with the result that less experienced welders are also able to produce acceptable weld seams in all positions.

The penetration stabiliser ensures optimum edge detection, as shown by this sample welded using CrNi 308 1.0, 3.0 mm wire and 97.5% Ar/2.5% CO₂, shielding gas at a wire feed speed of 17 m/min, a welding speed of 1.3 m/min, with the arc length stabiliser set at 0.3 and the penetration stabiliser on maximum.

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The TPS/i’s integrated PMC process, with the penetration stabiliser activated achieves arc length control by readjusting the wire feed speed instead of the welding current. This ensures constant fusion penetration.