



SAT Process Boosts Productivity 40% for Welding Mobile Machinery Cabs

- ESAB Value Added Engineering (VAE) team removes production bottlenecks.
- ESAB solution reduces welding time, lowers total production costs by 23%.

Situation

The cab welding line of a major manufacturer of mobile machinery experienced a bottleneck in the three robotic MIG/MAG welding stations used for final welding operations. Due to capacity limits and increased production volume, the company had been forced to add a second production shift.

Complication

The ESAB VAE team identified several problem areas:

- Excess production halts/downtime to clear burnbacks (wire fused to the contact tip).
- Excess post-weld cleaning (up to 48 minutes per cab) to remove spatter and repair welds.
- Weld preparation time and the need for two welding passes to create the required weld bead profile.

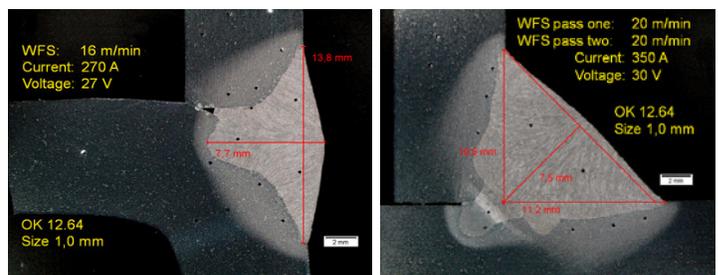
Solution

Implement ESAB's Swift Arc Transfer (SAT™) welding process and switch from a competitive wire to ESAB OK Autrod 12.64 in a 250 kg Marathon Pac™ for better feeding performance. SAT is suitable for welding plate from 2 to 15 mm and works in the flat or horizontal positions and for fillet, lap and butt joints. Because of its high travel speeds, SAT also lowers heat input.

Results

The ESAB solution enabled the manufacturer to increase production by 40% and eliminate the need for 12 – 15 second shift operators hired mostly on a contract basis. It also reduced burnbacks and spatter, lowering consumables costs and unproductive downtime. Overall, the ESAB VAE team helped the manufacturer lower production costs by 22.6% while generating a savings of \$375,000 in six months.

SAT Bead Profile



BENEFIT #1

High Welding Productivity

SAT uses small diameter (0.9 – 1.2 mm) solid wires at very fast wire feed speeds (up to 30 m/min) to increase current density, boosting deposition rates by more than 2 kg/hr compared to conventional spray transfer in this application.

Because of its penetration and bead profile, SAT achieved the required weld throat depth with a single pass, eliminating the need for a second pass on several joints. The combined process and revised WPS benefits enabled the manufacturer to produce 1,715 more cabs per year while lowering cost per unit by 22.6%.

Mobile Machinery Cab	Previous Solution	SAT/OK Autrod 12.64	ESAB SAT Benefit
Wire diameter	1.0 mm	1.0 mm	N/A
Wire feed speed	14.0 m/min	20.0 m/min	43% faster wire feed
Deposition rate	4.92 kg/hr	7.03 kg/hr	43% greater deposition rate
Joint cross seam area	38.9 mm ²	34.1 mm ²	12.3% smaller joint
Number of weld passes	2	1 or 2	Up to 50% fewer passes
Weld metal required	0.3213 kg/m	0.268 kg/m	16.5% less weld metal
Cycle time per product	74 min	53 min	28.4% less welding time
Products per year/station	4,300	6,015	39.9% more products
Cost per unit	\$40.72	\$31.50	22.6% lower cost

BENEFIT #2

Less Downtime

The SAT process using OK Autrod 12.64 in the Marathon Pac, coupled with the ESAB VAE team's process expertise, all but eliminated the mobile equipment manufacturer's problems related to excess post-weld cleaning and burnbacks. The company gained a potential additional capacity of 367 cabs per year, eliminated about \$6,100 of downtime and lowered contact tip costs by \$5,569.

SAT yields a very stable arc and consistent metal transfer. While it appears to generate more sparks, the spatter is very fine and operators can easily brush it off (the previous set-up produced larger spatter balls that often fused to the plate and required grinding).

OK Autrod 12.64 is a copper-coated, Mn-Si-alloyed G4Si1/ER70S-6 solid wire for welding non-alloyed steels. It has a slightly higher manganese and silicon content than G3Si1 wires to increase weld metal strength, promote low sensitivity to surface impurities and contribute to smooth, sound welds.

The Marathon Pac provides smooth and consistent wire payout with minimal cast and helix. The wire maintains consistent electrical contact with the contact tip, solving problems related to burnback, arc instability, wire stubbing and spatter. In addition, straight wire delivery keeps the weld bead centered in the joint and provides consistent sidewall fusion. Marathon Pac contributed significantly to the ability to make just one welding pass instead of two.



BENEFIT #3

Use Existing Equipment

SAT is a variation of the spray transfer process and works with inverter-based power sources that have a fast response time. Because of the high wire feed speeds, it works best with a premium robotic wire feed system, torch and long-lasting CuCrZr contact tips (again, all standard components).

ESAB typically implements the SAT process using the U8₂ or W8₂ control, which has pre-programmed synergic lines for SAT. However, as was the case with the mobile equipment manufacturer, setting up a system usually requires the experience of ESAB's VAE team to establish the correct variables for the application; these include welding parameters, wire type, shielding gas (typically 92% argon/8% CO₂), electrode stickout and programming torch direction and angle.



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