

ESAB's submerged arc solution for efficient trailer beam fabrication

by Shaun Studholme and Derek Harvey – ESAB UK Ltd.

Metal Design and Fabrication, MDF, a trailer beam fabricator located in Antrim, Northern Ireland has obtained a major increase in manufacturing output by installing a custom made ESAB twin wire submerged arc welding system using OK Tubrod 14.00S metal cored wire with OK 10.71 agglomerated flux.

MDF

MDF is a successful fabricator of trailer beams supplying frames to the major truck manufacturers in the UK as well as several countries on the European mainland and are expanding rapidly.

To enable them to meet the increasing demand for their products, they decided to invest in a new submerged arc welding system for the fabrication of their mainstream beams (figure 1), replacing their old double headed single wire SAW installation using solid wire.

ESAB were awarded the contract after having presented a solution that provided increased welding productivity as well as flexibility for the various designs of beams that MDF produce. Along with the installation of the new system, MDF reorganised their workshop layout to optimise the efficient supply of beam compo-



nents to the welding station. Having used the new welding unit for over a year, MDF claim that it is 3 to 4 times more productive than before, depending on the type of trailer beam.

Double headed twin-arc SAW installation

The manipulator type MBVA 550 is mounted on a compact track, which requires a minimum amount of floor space. It is sited so that the unit can travel along the length of two side-by-side welding fixtures, welding one assembly while the second unit jig is being unloaded and re-loaded. The column is fitted with 180 degree rotation to allow for positioning the boom over the fixtures. The carriage carries a special OPC flux recovery unit, and a TPC 75 pressure tank for delivering flux to the two A6 welding heads, which deliver twin wires via bent D20 contact tubes. The arrangement allows for welding web widths from 70mm to 800mm. A VEC motor giving a tacho feedback into a PEG 1 control unit provides accurate carriage travel along the track that is long enough to cover the fixture and parking areas.

The welding heads are positioned and guided along the length of the beam by GMD guidance units, which control the vertical slides, and complete horizontal carriage allowing for motorised movement along the full length of the boom.

Welding voltage and current are pre-set and continually monitored by two PEG 1 control units, giving constant stable conditions.

For safety and optimum use of space, the welding and control cables are housed in a cable chain that is fitted within the rail assembly. The cables run the full



Figure 1. MDF's custom made ESAB twin wire submerged arc welding system. At the request of MDF, part of the photograph has been blurred.

OK Tubrod 14.00S (with OK Flux 10.71)
OK Flux 10.71

AWS A5.17-89: F7A2-EC1
EN 765: S A AB 1 67 AC H5

Table 1. Wire and flux classifications.

length of the track, between the carriage and floor sited LAE welding power sources.

Apart from the welding parameters, all controls are fitted on a remote control unit, which can be hand-held by the operator while positioning and welding the beams.

Welding consumables

Included in ESAB's proposal was the use of the cored wire/flux combination OK Tubrod 14.00S-Ø2.4mm/OK Flux 10.71, equipping MDF's SAW installation with this proven consumable package for high speed fillet welding.

OK Tubrod 14.00S is a metal cored wire providing a deposition rate that is up to 20% higher than a solid wire of the same diameter, depending on the welding application. It has been designed for use with OK Flux 10.71, an agglomerated, aluminate-basic flux that is slightly Si and Mn alloying. Table 1 gives the wire and flux classifications.

The combination is used when high integrity welded joints are required in mild and medium tensile steels, providing an excellent bead appearance in single and multi-layer butt and fillet welds with good impact toughness down to -20°C . It is suited for both single wire and twin wire applications. The slag detachability is good, also in narrow joints.

The MDF application consists of the simultaneous welding of two fillet welds with twin arc heads in the PB position (see photo). The flat strip varies in thickness from 4–8mm, whereas the vertical plates have a thickness between 8–20mm.

One advantage reported by MDF is that the wire/flux combination gives a round, but relatively flat bead penetration. Even when welding 8mm sheet, no burn-through problems occur, as encountered regularly with the old station using solid wire.

A second benefit is that the various beams, regardless the material thickness, can be welded at the same parameter setting of 580A/29V and 130cm/min. travel speed. This avoids the time consuming resetting of parameters which adversely effects the production efficiency.

A third advantage reported is the better slag detachability, saving time in the manual removal of slag.

Further, MDF are very satisfied with the appearance of the welds especially the blending of the toes. The latter is crucial for trucks, since the dynamic load they are subjected to can lead to the formation of fatigue cracks when welds do not smoothly blend with the plate material.

Coupled with the greatly increased productivity these benefits have helped to ensure that MDF remains at the leading edge of trailer beam manufacture.



Figure 2. SAW with OK Tubrod 14.00S/OK Flux 10.71. Note that the slag is self releasing.



Figure 3. The self-released slag is easily removed.



Figure 4. Bead appearance. The standing fillet weld is flat with a smooth blending of the toes.

About the authors

Shaun Studholme, Product Manager, Cored Wires in ESAB Group (UK) Ltd. He is responsible for cored wire marketing and is based at Waltham Cross, UK.

Derek Harvey joined ESAB in 1983 as a Service Engineer, and became a member of the arc-equipment technical department, based at Waltham Cross some years later. In 1993 he was appointed Sales Manager for Welding automation Equipment and has responsibility for the sale of automatic SAW, MIG/MAG, and mechanised TIG equipment.