



Let's
Talk

PRODUCTIVITY



GLOBAL SOLUTIONS FOR LOCAL CUSTOMERS - EVERYWHERE

ESAB's presentation at a glance.

From 14-19th September 2009, Essen is the welding capital of the world where ESAB presents its latest welding and cutting technologies. Everything on our vast stand has been selected for its ability to demonstrate measurable productivity improvements - mostly through cost and time savings. Let us give you a brief overview:

Cutting page 2.

Productivity, cost-efficiency and ease of use are key words for ESAB's cutting equipment exhibits:

- The new SUPRAREX™ SXG - combined oxyfuel/plasma cutting system, equipped with two completely new cutting heads
- Bevel Excavator and QUATROJET™
- VBA Wrist.
- The AUTOREX™ fully encapsulated automatic plasma cutting centre.
- Remnant steel scanner
- The new COLUMBUS.NET™ CAD/CAM programming system and DATA LEAP™ product data management software.

Welding

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- ESAB's new welding head for spiral welded pipes page 3.
- The Aristo™ Mig range of digital power sources page 4/5.
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Let's talk productivity at Schweissen und Schneiden 2009

"Let's talk productivity" – this message could not be more important than it is right now, with an economic climate forcing fabricators to drive down costs in all areas of their production.

On an impressive 1,250 m² stand at Schweissen und Schneiden in Essen, Germany, ESAB will demonstrate how world-leading welding and cutting solutions can help you to "weather the storm". A general view is that quality companies will survive a recession. Quality of management, manufacture, production processes, products and quality of supply chain, including that of their suppliers, are the elements that ESAB has been focussing on to best serve customer needs.

Several factors set ESAB apart from other suppliers of welding and cutting equipment and consumables. As a world-leader, ESAB has the most comprehensive product range, enabling customers to select products without the need to compromise. ESAB is recognised by the global welding and cutting market as the most customer focussed supplier (as endorsed by Frost & Sullivan) and the most trusted partner to work with. Therefore ESAB

is unique in that we start with the customer and try to understand their needs, especially their need to survive in these difficult economic times.

What is Productivity?

When it comes to welding productivity, the first thing that jumps to mind is deposition rate or travel speed and in the case of cutting, speed and material thickness. In both cases, these factors play an important and quantifiable role. However, there are many more contributors to welding productivity, which truly make a difference.

In MIG/MAG welding – the mostly frequently used method, there are a great many developments which can provide productivity benefits. This can be through the use of the Marathon Pac™ bulk wire system, which saves on downtime and brings highly efficient storage, handling, installation and disposal, whilst having a positive effect on the quality of the welded product. Another example is the QSet™ function integrated in the U8₂ pendant for Aristo™ digital power sources. With QSet™ a few seconds of test welding is enough to enable the system to find the

optimal short arc welding parameters and save valuable production time. Imagine this in a mechanised installation.

Last, but not least, the consumable can be optimised to obtain higher travel speed or improved process stability. As is the case with new OK Tubrod 14.11 – 1.2mm metal-cored wire for thin-plate welding and the AristoRod™ copper-free MAG wire. Combined in a robotic environment with the sophisticated Aristo™ robot package and, controlled by Aristo™ U8₂ or Aristo™ W8₂ Integrated control unit, all the ESAB features like QSet™ and TrueArcVoltage™, off-line editing, networking, parameter handling, secure access levels and many more are available to optimise productivity.

In the field of SAW welding, the EcoCoil™ and BigBag™ are easy to handle systems for the bulk supply of wire and flux, which offer major reductions in downtime. Whereas a dedicated flux such as OK Flux 10.72 allows reduction of the joint included angle, saving on weld volume and arc time.

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To find your way on the ESAB stand, see back page



Let's talk cutting productivity at Essen

Productivity, cost-efficiency and ease of use are key words in ESAB's cutting equipment presentation at Schweissen und Schneiden. It's all about interesting new cutting concepts and smart supporting software – designed to increase productivity and simplify your cutting operations.

At Schweissen und Schneiden, you can see our new **SUPRAREX™ SXG** - a combined oxyfuel/plasma cutting system. For exhibition purposes, it is equipped with two completely new cutting heads – Bevel Excavator and QUATROJET™ – as well as the latest generation VBA Wrist.

Bevel Excavator is the new tool for cutting extreme bevels in mild steel at angles beyond 45°, a good example being the teeth of excavator shovels. The oxyfuel head can be rotated endlessly for circular cuts, and can cut material up to 200mm thick and 400mm long. Until now, producing parts like this has been extremely complicated and time consuming. The bevel parameters are introduced via a software module, which makes the aggregate very easy to programme. The contours for production are transferred from a CAD program, eg, ESAB COLUMBUS, to a specially developed bevel software. The software can run offline in the design office or directly on the VISION controller.



QUATROJET™ is a completely new type of oxyfuel cutting head. It features automatic flame monitoring, making it recognise any possible cutting break and automatically stop the gas supply. So, unlike traditional systems, the cutting machine does not require permanent monitoring by an operator, while fuel gas and oxygen cannot escape unhindered. It enhances the safety of both workforce and environment. It also features integrated height sensing.



VBA WRIST – 3D plasma bevel cutting

This innovative plasma bevel cutting head is used for precise and variable bevel and profile cutting of three-dimensional parts such as pipes, dished boiler ends, profile sections and plate. A plasma torch moves in five axes by program-controlled AC motors. In combination with ESAB VISION control, extremely small bevel tolerances can be achieved. Integration into the CNC machine system allows for uncomplicated control of bevel cutting. The cutting parameters are automatically set for various material thicknesses and bevel angles and thus significantly facilitate programming.

AUTOREX™ – the fully encapsulated automatic plasma cutting centre for heavy duty and precision cutting at a surprisingly low cost. Automatic cutting with plasma is fast, precise and, above all, often much more economical – and the cut quality approaches that of laser. The system cuts steel, stainless steel and aluminium up to 25mm thick. AUTOREX™ is based on the EAGLE plasma cutting system with revolutionary m³ plasma technology enabling high speed/low-cost cutting, quality cutting and marking and high current thick-plate cutting using the same torch.

The complete cutting technology, including machine portal and torch are hermetically sealed from the working environment, making special noise protection superfluous. Clean air is guaranteed by a powerful dust extractor and a fine dust filter system.

The standard integrated exchange table guarantees a continuous supply of material parallel to cutting.

AUTOREX™ is equipped with the VISION control unit and ESAB Columbus CAD/CAM programming software and is available for maximum plate sizes of 1500 x 3000 and 2000 x 4000mm.

Remnant steel scanner – re-use plates as free of charge material.

Remnant blanks are often scrapped, because it takes too much time to measure them by hand with adequate precision and use them for other cutting jobs. ESAB's new remnant steel scanner, allows automatic high precision measurement of the geometry after which new to cut components are nested automatically onto the remnant blank. The scanner is an inherent part of the machine, so there is no need to move the part after scanning. It is cut at exactly the same location as it is measured.

The latest on CAD/CAM and product data management software – test it yourself.

The latest generation of **Columbus.NET™** programming software enables quick, easy creation of even the most complex cutting programs. This ESAB innovation is based on the Microsoft.NET developer platform and thus has an ensured future. Companies that invest in .NET are safeguarding their investment against future technological changes. COLUMBUS.NET is a genuine 32-bit program and runs under the Windows XP and Vista operating systems.

The practical advantages of the new software include the option of fully automated program and nesting generation. According to adjusted values and criteria, Columbus.NET automatically selects the flame-cut parts, provides the nesting and technology data and selects the most suitable plates.

For weld edge preparation – an increasingly important function – the operator can choose between bevel types V, X, Y and K. With Columbus.NET, individual bevel types, with contours cut up to five times, can be produced. The graphic user interface is extremely helpful, especially where different cutting and marking tools are combined.

The operator can see at a glance how Columbus operates all tool combinations and automatically generates the required traverse paths between different tools. Operating errors are virtually ruled out thanks to an ingenious plausibility check.

Columbus.NET also displays the entire program structure in Columbus Explorer, arranged optionally on one or two screens.

DATA LEAP™ is a new generation of production data management systems. Production processes are monitored, controlled and optimised in real time, through a direct connection to automated production. DATA LEAP™ creates IT links between the production elements in the overall operating process, such as:

- Production data reporting
- Machine data reporting
- Quality management data

As a complete modular system, DATA LEAP™ performs the required functions of mediation and communication between the levels within the business. Flexible connections to ERP, PPS and nesting systems such as COLUMBUS™, make it possible to evaluate structured data in a database using Excel or XML documents.

Not on show, but please ask for full information about our innovative Global SUPRAREX offer.

With **Global SUPRAREX™**, oxyfuel/plasma cutting is brought within financial reach of more fabricators. By standardising the portal width of this normally custom-made system to 4.5m, 40% of the market demand is covered, enabling serial fabrication. This gives you the advantage of competitive pricing and short delivery times. The width of the cutting table stays adaptable within the 4.5m span.



Marathon Pac™ - total MIG/MAG efficiency

Savings along the entire MIG/MAG production chain.

Recent Frost & Sullivan research shows that manufacturers, especially in Asia and the developing markets, will continue to automate their welding processes driven by skills shortages, quality requirements, production and health and safety issues. Marathon Pac™ has been the trusted solution of choice in advanced European markets. It is designed to enable customers to get the maximum return on capital for their automated solutions.

Typical cost savings for professional users

Table 1 gives an overview of typical cost savings when comparing Marathon Pac™ with 18kg wire spools. These are based on actual tests and reports from various branches of industry – in both low labour cost and high labour cost environments, and in a fully mechanised production environment.

Operating costs

It is essential that full welding station operating

costs are considered, not just the net hourly wages of the welder. These include:

- All indirect costs such as social charges, pension, sickness payments, holiday and overtime allowances, productivity and performance bonuses.
- Depreciation costs. These costs are significant with highly mechanised installations.
- Premises and auxiliary equipment such as overhead cranes, forklift trucks, etc.
- Operator revenues to cover overhead costs such as supervisors, forklift drivers, QC inspectors, management, HR, administration and sales.

Being conservative, ESAB estimates the operating costs for a low labour cost environment to be 10 Euro/h. In a high labour cost environment, various Western European customers use a rate of 50 Euro/h. For highly mechanised manufacturing, 250 Euro/h is typical for a

welding station with a couple of robots and manipulators. Some just-in-time suppliers in the automotive industry calculate with 2,000 Euro/h.

Downtime costs

Welding station downtime for spool exchange depends on factors such as the set-up (accessibility of the wire feeder, liner length, etc), management focus on lean manufacturing, and whether operators are paid by finished piece. It is also influenced by the distance to the location where spools are stored. Table 2, calculates typical savings on down-time for exchanging 18kg spools versus 250 kg Marathon Pac™s, in a problem-free welding situation. The savings on downtime in Euro/kg wire for the three operating levels are shown in the 3rd row of table 1, and an estimated 10 min. exchange for both spool or Marathon Pac™.

Downtime caused by feeding problems can be much longer than the time lost in spool changing. The helix of spooled wire is a particular cause of feeding and welding irregularities ("dog tailing"). Wire from Marathon Pac™ is straighter, by nature, due to a built-in pre-twist of the wire. The result is dependable feeding. Many users of Marathon Pac™ feed over large distances with minimal maintenance - and still report problem-free welding.

A factor, not covered by the calculation, is simple storage, handling, installation and disposal. Time lost in unpacking and transport to the welding station is a fraction of that needed to pick-up and unpack spools, aided by a complete range of accessories such as lifting yokes, trolleys and quick connectors. Folded flat after use – Marathon Pac™s consume a fraction of the space needed to store non-foldable drums.

Weld quality

Stable feeding and straight wire delivery from Marathon Pac™ leads to better joints, good penetration, less spatter and improved joint appearance with less post weld repair.

Quantifiable results are available from a well known European mass production automotive components company. Savings due to the reduction of welding defects, re-work, grinding, scrapped materials, etc, amounted to five times the cost savings on downtime only for the 50 Euro/h operating cost group, in table 1. This means that their recorded benefits exceed 2 Euro/kg wire - purely due to improved

weld quality. In table 1, we stay conservative with 1 Euro/kg for the high cost environment, a level confirmed by other studies in this field, and 2 Euro/kg for the highly mechanised environment. For the low cost environment, we have reduced the quality savings to only 20% of the high cost group, mainly because re-work costs are lower.

Equipment wear parts

Marathon Pac™ wire is straight which, in itself, leads to reduced wear in the feed system, eg, liners, guiding tubes and feed rolls. Another reason for reduced consumption of wear parts and feeder components is the absence of turning spool weight - as with 18kg spools.

ESAB has studied the wear and spare parts costs for industrial users. Typical consumption is around 2 tons of wire/year per welding machine. Typical wear parts cost 200-400 Euro per year/welding machine (labour costs for replacement excluded).

In table 1, we have again been conservative, taking 200 Euro per year as a representative figure for spare parts. For the low cost environment, the assumption is that spare and wear parts costs per kg of wire, is never less than 50% of the above, ie, 0.05 Euro/kg wire. For the high labour cost environment, the saving amounts to 0.10 Euro per kg wire.

In the highly mechanised environment, as downtime is so costly, manufacturers should allow a higher safety margin in terms of preventive maintenance. It is realistic to double the cost in comparison with the high labour cost environment.

Marathon Pac™ pays back.

Changing to Marathon Pac™ always gives pay back, regardless of the cost environment. The total savings in the low operating cost column of Table 1, are not necessarily "typical" – but minimum. From the higher cost columns, anyone buying MAG wire will understand that under "typical" conditions, savings will be at least the same, or exceed, the cost price of the wire. Marathon Pac™ is, therefore, more cost-effective than spools for any professional customer in any environment – and could effectively be free of charge. Endless Marathon Pac™ is the latest step in MIG/ MAG efficiency, with no stopping at all for wire exchange – a system with many advantages for true lean manufacturing in just-in-time production and multi-robot stations.

Table 1: Typical cost savings for professional users - 18 kg spools vs 250 kg Marathon Pac™

	Low labour cost environment	High labour cost environment	Highly mechanised environment
Operating cost EUR/hr	10	50	250
Cost saving - Eur/kg wire used			
Downtime	0.09	0.43	2.15
Weld quality	0.20	1.00	2.00
Equipment wear parts	0.05	0.10	0.20
Total EUR/kg wire	0.34	1.53	4.35
Total EUR for 250 kg MP	85	383	1088
Total EUR for 475 kg MP	162	727	2066

This overview is based on actual tests and reports obtained from Marathon Pac™ users from various industries

Table 2: Downtime cost savings - 18kg spools vs. 250 kg Marathon Pac™.

Spool Weight	18 kg	250 kg MP
Spool changes/ton of wire	55.6	4.0
Spool change time (min)	10	10
Total time per ton	9.3	0.7
Downtime saving (hr/ton of wire)	-	8.6

ESAB's new spiral pipe welding head

There is a constant, worldwide demand for increased productivity in spiral welded pipe fabrication. So-called two-step technology, with GMAW-tack welding and final SAW-welding stations, ensures production flow and increased quality. ESAB, involved in welding for more than 100 years and with over 60 years experience in submerged arc welding, constantly reassesses the demands of pipe welding customers. As a result, we have developed new highly productive spiral pipe welding equipment. At Essen, we present the internal SAW welding head with up to three wire feeders.

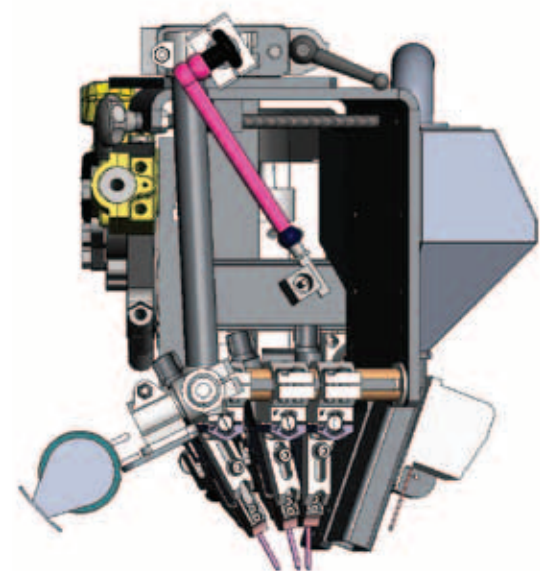
The internal spiral pipe welding head is the most important element in the welding of a spiral pipe. The welding head fits into a 20 inch pipe and is mounted on an internal boom. The limited space in a 20 inch pipe is challenging. Our designers were charged with the task of ensuring high speed welding, with less wear at contact points and quick and easy adaptation for different pipe diameters.

By customer preference, side wire feeders are used, mainly, in push-pull-mode. The wire feeders at the end of the boom de-coil wire from a 1000kg EcoCoil and the welding head wire feeders ensure the correct wire feed speed. The design of the welding wire system within the welding head, depends on the smallest and largest internal diameters of the pipe, the steel strip width and the left or right position of the forming station. The easy change of welding head angle – generally a three-wire arrangement – is ensured by the connected welding and control cables. The laser joint tracking head is in line with the joint at the front of the welding head and gives the steering signal to the motorised cross slide. The flux hopper is positioned just above the laser and the flux supply nozzle is between the front of welding head and laser. Optimum welding quality is achieved using our newly designed wire contact equipment. Spring loaded special alloyed copper contact jaws, with a contact length of 30mm, ensure constant current transfer to the wire. There is no voltage drop. This advanced design avoids

the problem of fast wearing contact tips. The welding angle of the isolated contact equipment for each wire can be changed quickly and easily, or fixed with rigid spacers between the wire contact equipment as required in the WPS. ESAB offers customers a choice of either solution.

The flux recovery nozzle is mounted on a swivel arm adjusted to the best recovery position. To observe the ID-welding process, a video camera is mounted in front of the internal welding head, in line with the axis of the pipe.

The design of ESAB's internal welding head fulfills not just best welding practice. With the reduction of service time for the exchange of wear parts, such as contact jaws, and with the reduction of mounting time in the case of pipe dimension changes, increased output in pipe tonnage gives fabricators a competitive edge.





As versatile and intelligent as you want it to be – always easy to operate

Aristo™ Mig 3001i, 4001i, 5000i Aristo™ Mig U4000i and U5000i

ESAB continues a tradition in digital welding technology that started in the 1980's with the introduction of the world's first power source with digital weld process control. Today, our Aristo™ Mig range represents the latest generation of intelligent, reliable and extremely user-friendly digital power sources. The modular production design and a range of panels with increasing application intelligence, allows the Aristo™ Mig power sources to be customised for the needs of individual fabricators.

Strong and reliable machines

All Aristo™ Mig power sources have design features that provide clear advantages for fabricators. The corrosion-proof chassis is easy to clean, and designed for long service life under tough working conditions. Although compact by design, Aristo™ Mig

power sources have air-cooling built-in to facilitate long and trouble-free service under the most demanding conditions. The air-cooling fan and water pump are "run-on-demand-systems", i.e. they are only activated during welding and shut off automatically. The ELP (ESAB Logic Pump) recognises whether a water cooled torch is present and activates the water cooling systems accordingly. This saves energy and reduces wear and maintenance costs as well as the noise level. Our Aristo™ Mig power sources are designed with air-cooling separated from electronics. The integrated dust and metal-particles filter is easily reached for cleaning.

The Aristo™ impresses with its breathtaking performance in terms of control and precision. The process repeatability, both within one unit and after component exchange, is a great benefit when weld quality matters.



The unique TrueArcVoltage™ system, in combination with a PSF™ welding torch, guarantees welding with the selected arc voltage, independent of the torch and return cable length. You get what you see. Aristo™ Mig power sources use CAN-Bus communication, optimising the flexibility of the equipment. CAN-Bus is a digital communication and control system that enables all "intelligent" components of the power source to communicate internally and externally with feeders, remote controls and the control panels.

The digital communication system is based on "pulse trains" which need only two leads each for communication and power supply. The system is reliable, insensitive to disturbances and additional functions/features can be added without any change of the infrastructure.

Modular design provides fabricators with the following options to 'build' their Aristo™ Mig power source:

Capacity

1. 300A
2. 400A
3. 500A

Type of power source

1. Air cooled

2. With water-cooling
3. With multi-voltage unit (500A)
4. With water-cooling and multi-voltage unit (500A)

Type of wire feeder

1. Aristo™ Feed 3004
2. Aristo™ Feed 4804
3. Aristo™ YardFeed 2000
4. Aristo™ RoboFeed 3004

Accessories such as torch, cable assembly, trolley, remote control, kit for multiple wire feeders and counterbalance device.

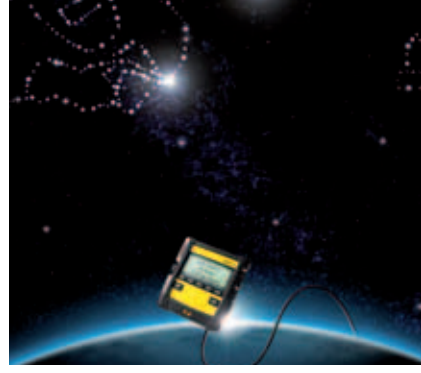
Aristo™ Mig – the control unit does it

The U6 panel, incorporated in the wire feeder, and the U8₂ and U8₂ Plus control pendants, contain most of the software that determines the level of functionality and intelligence of the power source to meet the welding requirements of individual fabricators.

The table shows the level of processes, machine functions and intelligences supported by the Aristo™ Mig 3001i, 4001i or 5000i power sources equipped with, respectively, U6, U8₂ and U8₂ Plus. The U8₂ control pendant provides full flexibility for both today's and future requirements. U8₂ Plus offers the highest level of intelligence available.

Processes, process functions and intelligence of AristoMig panel types

	Aristo™ U6	Aristo™ U8 ₂	Aristo™ U8 ₂ Plus
Processes			
MIG/MAG	X	X	X
Synergic MIG/MAG	X	X	X
Pulse MIG/MAG	X	X	X
Synergic pulse MIG/MAG	X	X	X
MMA	X	X	X
Arc gouging	X	X	X
TIG (DC)	X	X	X
Pulse TIG (DC)	X	X	X
SuperPulse™			X
QSet™	X	X	X
Process functions			
2/4 stroke	X	X	X
Crater filling	X	X	X
Creep start	X	X	X
Hot start	X	X	X
Adjustable burn-back time	X	X	X
Gas pre- and post flow	X	X	X
Digital V/A meters	X	X	X
Gas purge/wire inching	X	X	X
Auto save mode			X
Release pulse		X	X
Large display		X	X
Dials to adjust wire feed speed and voltage		X	X
Dial to scroll menu		X	X
Intelligence			
Languages display		X (17, including chinese & russian)	X (19, including chinese & russian)
Memory for 10 parameter sets	X		
Memory for 255 parameter sets		X	X
Basic package synergic lines (92)		X	
Complete package synergic lines (>230)			X
Create synergic lines			X
Support manual and mechanised applications		X	X
Limited editor set and measured values		X	X
LAN (via Aristo™ WB ₂)		X	X
File manager			X
Weld Point™		X	X
Production statistics			X



Aristo™ U8₂ - connect to the welding universe

E SAB has launched the Aristo™ U8₂ second-generation digital control pendant as a radical new way to enhance welding performance, extend communications and improve ease of use. Designed to complement our Aristo™ power sources and wire feeders, the new pendant is suitable for manual and mechanised MIG/MAG welding, and TIG and MMA.

User friendly

Aristo™ U8₂ creates a whole new universe of welding control opportunities offering maximum functionality with minimum complexity. Five function buttons, single menu and "Enter" button and three setting wheels cover every option. A large, bright, easy-view LED display and knurled setting wheel give you simple gloves-on, visor-down operation.

Multilingual

In the global welding community, ESAB technology is the benchmark for flexibility,

With an expanded memory and updated display, the Aristo™ U8₂ supports seventeen world languages, including Russian and Chinese (with original Cyrillic and Chinese characters). Manuals are available in all seventeen languages.

WeldPoint™

Our proprietary WeldPoint™ software brings the shop floor to the production office! Weld schedules, production statistics, quality log, error log, limit setting and measure limits can be transferred from the power source via Local Area Network (LAN) and converted onto HTML or text format by WeldPoint™.

SuperPulse™

SuperPulse™ is the recommendation for applications where control of heat input is essential. Combination of short arc/pulse, spray arc/pulse, pulse/pulse or short arc/short arc provides excellent control of the heat input for heat sensitive applications.

Fieldbus and LAN

Aristo™ u8₂ connected to Aristo™ W8₂ add-on modules, provides access to Local Area Network (LAN) and Fieldbus (DeviceNet, Profibus, CANopen and Ethernet) for communication with computers and external devices (robot controller, PLC, etc).

USB memory stick

Export and import of data. Transfer of data from one unit to another for welding similar components on other machines. Transfer of data to WeldPoint™ for analyses and/or quality assurance.

User defined synergic lines

New combinations of welding material and

shielding gas can be tested and recorded as a new synergic line. You can then immediately implement this in production by copying the data from one unit to another, using the USB memory stick or transferred to WeldPoint™.

Production statistics

This function keeps track of the total arc time (sec) consumed wire (gram) and the number of welds. Useful data when recalculating welding time and consumables.

QSet™

Set and forget. A few seconds test welding and the short arc stabilises as you watch. The QSet™ function automatically sets and stores the optimal welding parameters, maintaining consistent arc stability, regardless of wire feed speed.

Dials for quick setting

Quick setting of wire feed speed and voltage by the setting wheels on the right side of the panel and the cursor on the left side provide efficient setting and operation.

Limit editor

The limit editor provides two options - setting limits and measure limits. Setting limits protect the operator from exceeding the welding procedure setting data. Measure limits protect the power source from exceeding a number of defined values.

Multiple wire feeders

Up to four wire feeders can be connected to one power source and controlled by Aristo™ U8₂. A typical solution for applications requiring wire size, wire type and shielding gas changes.

Support MMA, TIG and MIG/MAG

Aristo™ U8₂ supports the processes MMA, carbon arc gouging, DC TIG, pulsed DC TIG, MIG/MAG short arc/spray arc, pulsed MIG and SuperPulse™.

The processes available to the operator depend on the identification (ID number) of the connected power source.

Standard power sources support MMA, carbon arc gouging, MIG/MAG short arc/spray arc, pulsed MIG and SuperPulse™.

Aristo™ Mig U4000i and U5000i are universal power sources supporting MMA, carbon arc gouging, DC TIG, pulsed DC TIG, MIG/MAG short arc/spray arc, pulsed MIG and SuperPulse™.



Say goodbye to poor displays and confusing manuals.

efficiency and consistent quality. Ingenious software, intuitive interfaces and logical controls have dramatically simplified welding processes. Even so, language is a critical factor in understanding and using the full potential of such advanced welding systems.

New HNG head marks 30 years ESAB in narrow gap welding

For the past three decades, several innovations have improved the narrow gap welding equipment and the process. The third-generation HNG multi narrow gap welding heads feature several innovations to bring a new level of functionality:

- Double sided tracking makes it possible to weld a wider joint and to weld more beads per layer in the automatic mode.
- Flux delivery between the two wires to ensure weld quality
- Modular torch design, making both the leading and trailing torch to be the same
- Air cooled torch
- Improved angle of the trailing wire for improved weld quality
- Improved PLC control system, fully integrated with external equipment and a weld data logging program.

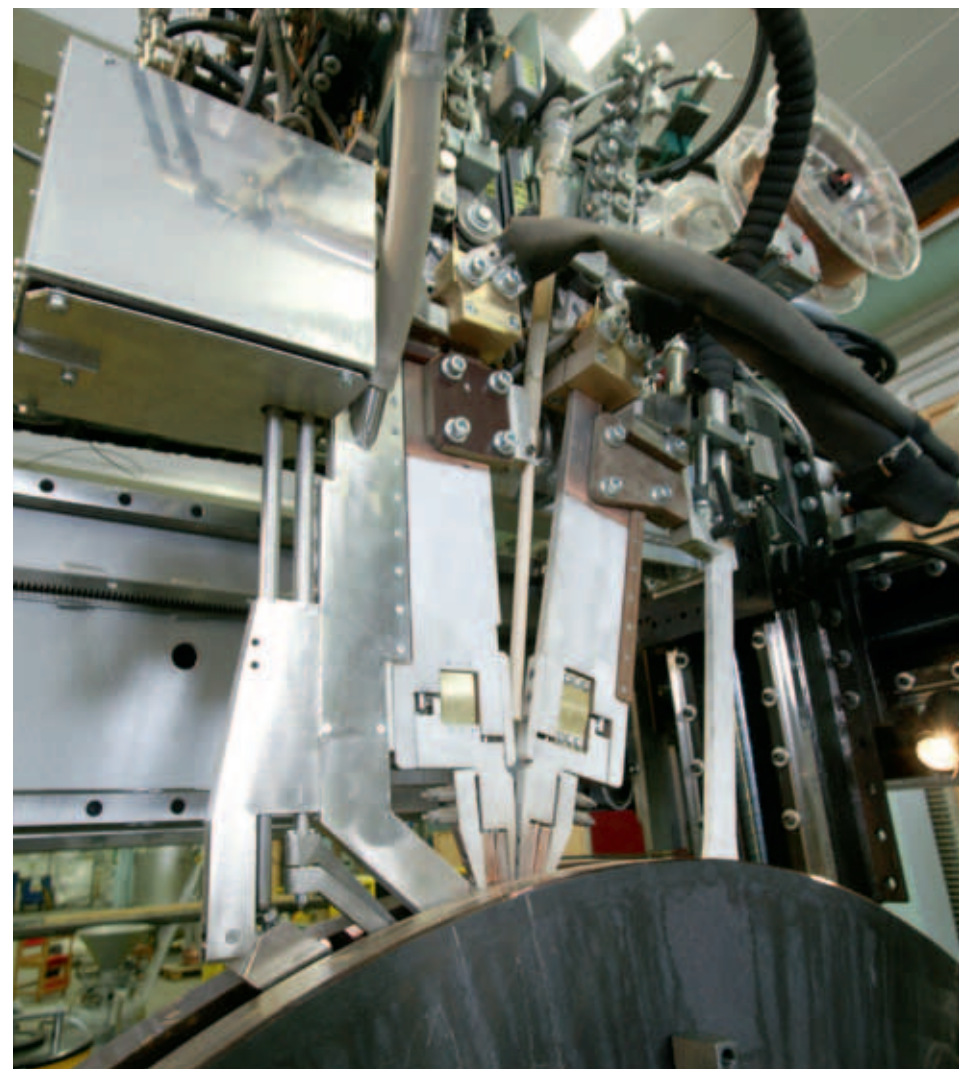
The lower part of the weld nozzle is moveable. With a pre-set nozzle angle, the welding wire alternates to weld from left to right. For circumferential applications, the changeover is automatic, achieved with an off-set to avoid build-up on the same spot.

Due to the position of the nozzle, the wire enters the side wall at an angle, giving excellent slag detachability and penetration to eliminate weld defects. By joint tracking on the welding side, the exact stick-out is achieved and the weld process guaranteed.

The narrow gap process for submerged arc welding is based on a two bead per layer weld procedure in a narrow joint. The standard joint is machined with an angle opening of 1 to 2 degrees, a width of 18-24mm and a maximum depth of 350mm.

Narrow gap welding offers two major benefits: it is an economical joint configuration with less weld volume to fill compared to other joint configurations; and the automation-friendly joint, with only two beads per layer, limits weld defects and gives a high quality weld.

Typical applications for SAW Narrow Gap are thick-walled objects for both longitudinal and circumferential welding where high quality is demanded in, for example; pressure vessels, rotor shafts, nuclear reactors and turbine shafts.





Continuation of page 1

A special lining in our new BigBag keeps the flux dry and allows it to be used without re-baking – another huge productivity advantage.

There is also the ESAB Telbo™, our new telescopic boom, which utilises far less factory space and offers increased manufacturing flexibility. It can take large welding heads for multi-wire processes that utilise DC- and AC-SAW. The Multi-wire SAW process is a productivity and profitability booster. For example, in wind tower manufacture, it's no coincidence that 80% of the worldwide installed wind towers are welded with ESAB consumables and equipment. Another key example is mechanised TIG equipment,

which increases both productivity and quality. It allows multiple-machine operation by a single operator and welds are absolutely reproducible.

So what is productivity all about? Productivity is a life style, in which every aspect of welded fabrication is constantly under review, with the aim of becoming faster and more efficient. ESAB would like to help you to reduce costs and gain more from your production. This is the ESAB philosophy and we would like to share it.

So, let's talk productivity in Essen.

Local access to world-class products, service and support - also through distributors

As one of the world's premier industrial brands, ESAB has established a network of highly trained distributors for welding and cutting equipment, consumables and accessories. These distributors also act as a source of advice, backed up by ESAB's own technical support engineers' experience of global applications and processes. Distributors play a vital role in enabling ESAB to offer global solutions for local customers – everywhere'.

ESAB has the most comprehensive range of high-quality welding electrodes, wires and fluxes to meet every need. Distributors stock the most popular products, while others are available for rapid delivery from ESAB's supply centres that are located strategically throughout Europe and served by advanced online order processing.

By using an ESAB distributor, customers also benefit from access to the very latest technological advances in welding and cutting processes and equipment. Demonstrations can be arranged at the distributor's premises or, if more convenient, at the customer's site.

When a customer purchases equipment, the relationship does not end there. Technical support is provided for the life of the equipment, and distributors can also take care of any maintenance requirements, with many additionally offering in-house repairs.

ESAB distributors are truly a one-stop-shop for welding and cutting products, service and support.

GLOBAL SOLUTIONS FOR LOCAL CUSTOMERS

The power of the ESAB product range

ESAB has the most complete and comprehensive product range in the welding and cutting industry. Whatever your welding or cutting requirement, ESAB will be able to supply it, be it a general purpose welding electrode or a full "Turnkey" welding or cutting installation. For ESAB customers this offers substantial benefits. A one-stop shop for high quality industrial products can bring significant time and cost savings. There is also the guarantee of consistent product quality from a supplier you can trust to support your needs long after the initial sale. Endorsed by the fact that ESAB recently won its largest ever, single order for a turnkey solution for a windtower manufacture in the US.

An environmentally responsible supplier

ESAB is one of the very few international companies to have acquired a global ISO

ISO 14001 is the international standard for environmental management systems (EMS), providing organisations with a framework for achieving their environmental and economic goals.

14001 certification, covering everything from

design, development and production to sales and service worldwide. Customers are assured that every ESAB product is produced to the same environmental standard with every step taken to minimize environmental impact. Customers striving to obtain ISO 14001 certification themselves, or aiming to continually improve their environmental performance, will be able to benefit from having ESAB as a dedicated partner.

Reducing environmental impact

The fundamental reason for implementing an environmental management system (EMS) worldwide is to have a structured approach towards minimizing the negative impact of our activities on the environment.

Responsibility extends far beyond the office doors and factory gates of ESAB, so it is important to understand the impact of our activities in a broader sense. By using a lifecycle approach, we can map the effects of a product from designer's desk to the end of its life and including disposal. Right from the early stages of development, aspects such as finding alternatives for hazardous components, or energy consumption during production and use, and packaging waste and recyclability are all taken into account. This results in products with a reduced environmental impact.

ESAB awarded for customer service excellence

The "2008 Global Welding Consumables Customer Service Excellence Award" has been presented to ESAB. "ESAB has developed an exceptional product range in response to customer specific needs," notes Frost & Sullivan Senior Research Analyst Archana Chauhan. "The company has one of the largest welding consumables product ranges; it has consumables for every welding application type, but also to cater to particular industry segments such as shipbuilding, automotives, pipelines, and pipe mills. They are manufactured under

a strict ISO 9001 quality assurance programme, in factories that are ISO14001 approved, worldwide.

"A global presence and widely dispersed manufacturing facilities have facilitated an extensive reach and more effective response to customer needs.

"The ESAB Group has manufacturing plants across the globe and sales offices and distributors in almost 80 countries, enabling ESAB to provide a truly global experience to its customers.

"ESAB invests heavily in R&D to enhance the quality and productivity of its consumables, while reducing their environmental impact and improving the working environment of its customers."

The Excellence Award is bestowed each year upon the company which has demonstrated global excellence in a given business function such as sales, marketing, customer service, product quality and supply chain management.

About Frost & Sullivan.

Frost & Sullivan, the Growth Partnership Company, empower clients to create a growth-focused culture that generates, evaluates and implements effective growth strategies. Frost & Sullivan employs over 45 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from more than 30 offices on six continents.



Why the recession is the best reason to buy quality

By Nazmi Adams, Global Marketing Director, ESAB Holdings Ltd.

Nobody can predict the future, but a good working assumption is that manufacturing industry may take two years to return to the levels of output seen in 2007.

With lower levels of demand, business owners have to 'right size' their organisations to suit the current market. At the same time, businesses need to set a new level of productivity and a lower break-even cost point. After taking these steps, manufacturing operations will have little or no slack, so it is vital to keep production running smoothly. Stoppages and rework will eat into profits or wipe them out altogether.

Running an operation this lean requires that money is spent wisely. However, this does not mean 'buy the cheapest' because low-cost, low-quality products can be a false economy, resulting in further expenditure elsewhere that makes the initial savings pale into insignificance.

If manufacturing companies are trying to save money, they may try to cut costs by switching to low-priced welding consumables such as welding wire and electrodes. While we have already argued that businesses need to count every penny, it should be borne in mind that consumables typically account for 2-3 per cent of fabrication costs, whereas labour accounts for 10-20 per cent. Switching to cheaper consumables may save a small proportion of the 2-3 per cent, but there could be substantial hidden costs. Moreover, the 10-20 per cent accounted for by labour is a more obvious target for savings, by improving the productivity capabilities of the welders.

If you are not yet convinced, consider the potential consequences of switching to cheap consumables.

First, it has to be remembered that the consumable can have a significant impact on

the weld quality. And even if quality only suffers on the minority of fabrications, which can be rectified through rework, the costs associated with the additional work will far outweigh the savings in consumable costs.

While it is fair to say that a highly skilled welder can produce good results with almost any equipment and consumables, it is also true that better quality consumables are often more forgiving, enabling welders with less skill to produce good quality welds. Few companies have the luxury of employing only the most highly skilled welders, so this point should be borne in mind when purchasing consumables.

Low-cost welding wires can also cause problems with build-up and wear in wire feeders and welding nozzles. Once again, this can result in deteriorating quality and un-planned downtime for cleaning and main-tenance - all of which impacts on profitability.

Just as important as the physical characteristics of the welding consumable is the supplier. During these difficult times there will be many suppliers making offers that seem to good to be true and indeed, they may well be. Choose a supplier that is prepared to work with you as a partner in order to get through the tough times. ESAB, for example, will look at a manufacturer's entire welding process to identify opportunities to enhance productivity and reduce production costs - but without sacrificing quality or introducing hidden costs elsewhere. Furthermore, ESAB is committed to maintaining its technological leadership through continued research and development, as well as working with customers to create tailored consumables and optimised welding processes if that is what is required. We see many manufacturers trying to make

desperate short term gains by bypassing their distributors. However, ESAB is committed to its global network of distributors and will work alongside distributors to help solve customers' business problems. We recognise that our entire value chain offers significant benefits to our customers.

So far we have focused primarily on welding consumables, but similar arguments hold true for welding equipment. Low-cost equipment is likely to produce lower-quality welds - especially in the hands of lower-skilled welders - and manufacturers need to be aware of the reduced productivity that would result from the need for more rework and post-weld cleaning. As we have seen above, delivering lower quality can lead to the customer negotiating a lower price or walking away.

Cheap welding equipment is also more likely to fail. Aside from the downtime associated with a breakdown, the repairs will eat into a company's profits. As with consumables, the additional cost of higher quality welding equipment is small compared with the potential impact that poor quality equipment can have on profitability.

With two years of stormy trading conditions looking likely, ESAB has already taken steps to prepare its business for the difficult times ahead. This fact, coupled with the company's experience of surviving past recessions, means that ESAB is well placed to cope with the current challenging market conditions and is confident that it will emerge from the recession in a much stronger position. But most importantly, ESAB is working with customers and distributors so that all parties can weather the storm together. Quality companies tend to deal with quality companies and ESAB is building a quality organisation to be better placed to serve the needs of its customer base.



ESAB- motivated, intelligent and passionate people dedicated to customer service.



Svetsaren, The ESAB welding and cutting journal, is our technical customer magazine. It is published once or twice a year in the English language. Svetsaren was first published in 1936 and today it has more than 13,000 subscribers from all over the world. Ask your local sales organisation for a free subscription.



Complete solutions for the fabrication of wind towers

E SAB has been involved in the wind tower industry from the early days, and has steadily responded to increasing requirements to the point where, today, 80% of all wind towers in service, worldwide, have been manufactured using our technology. All over the world, we partner with manufacturers of towers, foundation piles and transition pieces, for land-based, offshore or arctic service. Our services range from retrofitting of existing production facilities to turnkey equipment for greenfield installations.

At Schweissen und Schneiden we will show you a complete station for welding circumferential joints in wind tower sections – designed to deliver all-round productivity. This is valuable not only for the wind tower industry, but for fabrication of any large circular object with circumferential and longitudinal welds. The installation at Schweissen und Schneiden features:

- The revolutionary, space saving ESAB telescopic column and boom - Telbo™
- The 1000kg EcoCoil™ bulk wire spools
- The new moisture protected 1000kg BigBag for welding flux
- The world renowned OK Flux 10.72 wind tower submerged arc flux

Telbo™ - ESAB's unique telescopic column and boom - requires significantly less rear clearance because of the unique 3-section telescope-like retraction of the boom. All three sections are synchronised to ensure even, stable motion throughout the entire reach-out. Offering flexibility for plant design, Telbo™ can save valuable workshop space and can considerably reduce investment costs for buildings, heating, lighting, etc.

Two standard sizes are available: Telbo™ 6500 with a travel range of 6.5m and 8m max reach-out; or Telbo™ 9500 with 9.5m travel range and an outstanding 12m reach-out. The latter has a boom end loading capacity of 500 kg! Using Telbo™, production will be more flexible, even when mixed sized workpieces are to be welded. Consequently, dwell times are dramatically cut.

When it comes to stability, there is an obvious advantage in being able to use a tandem

welding head with front mounted 100kg wire reels, still ensuring consistent quality of welds!

The operator, with easy access to the fully integrated PLC control system, can safely control the welding operations at the work platform. It includes a modem for all -function external communication - including the weld process - and for fast, accurate on-line support from ESAB.

Joint tracking can be accurately controlled using a supervision welding head camera, reproducing the joint on a monitor at the platform.

EcoCoil™ bulk wire spools

In many welding set-ups, conventional 30kg spools can be replaced with EcoCoil™ bulk wire spools - reducing the number of spool changes by a factor of 33. Moreover, packaging material is reduced to a minimum whilst still giving full protection from moisture and dust during transport. All materials are fully recyclable. Since it is a one-way-package, there is no need for return logistics.

The costs for the required decoiling stand/ turntable are soon compensated by time savings on spool changes, after which the big savings begin. Advantages over heavy spools are achieved because the wire is not spooled tightly around the cardboard core. In the start and stop phases, the spool can slowly accelerate and stop whilst the wire is fed to the welding head at constant speed, thereby reducing welding defects.

New to the market is our environmentally friendly 350kg **Octagonal BigDrum™** for 2.5mm to 5 mm wire diameters. This is for customers who require frequent wire changes, prefer to have a lower weight per package, or need to have the full wire package protected against dirt or moisture during pay-off. The ESAB Octagonal BigDrum™ is based on the Marathon Pac™ outer shell - but with an inner tube. The packaging is made of cardboard and thus disposed of as recyclable paper. The Octagonal BigDrum™ needs to be placed on a rotating table during decoiling which, of course, can be obtained from your full-solution-provider or ESAB.

The new moisture protected BigBags have a

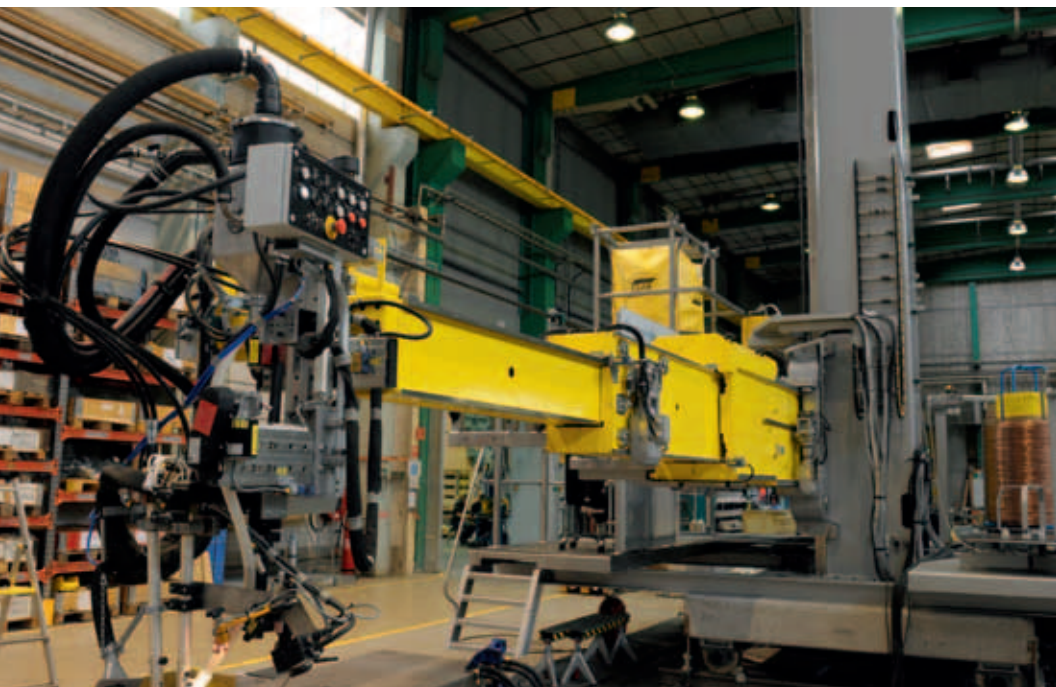


BigBag discharge spout showing aluminium lining.

very well defined discharge spout which can be closed during the flux flow.

In order that customers can use fluxes without prior redrying, ESAB has equipped the BigBags with an aluminium liner, reliably protecting the flux from moisture, even in tough climates such as around the equator. The complete BigBag is fully recyclable.

OK Flux 10.72 is an agglomerated, basic flux, designed for the production of wind towers. It combines the high demands for multi-layer thick section welding, using high deposition rates with respectable toughness values down to -50°C when combined with a standard non-alloyed SAW wire. It is used for single and multi-wire procedures such as tandem, twin-arc, and tandem-twin welding and works equally well on DC and AC current. The excellent slag removal in narrow V-joints allows the included angle of the joint to be reduced. OK Flux 10.72 can be applied for unlimited plate thicknesses.





The ultimate welding robot with superior welding technology

ABB and ESAB have joined forces to create the ultimate arc welding robot – designed for 'plug and play' within half a day. Combining the best of each partner's expertise in welding and automation, the new, comprehensive package includes ABB's versatile, high performance IRB1600, IRB1600ID or IRB2400L robots, ESAB's Aristo™ W8₂ Integrated robot package and you, the client's, preferred choice of torches. The robots are available directly from ABB factories, and are ideal for the welding of carbon steel, stainless steel and aluminium. The Aristo™ W8₂ robot package is also ideal for the retrofit of existing robots, giving them a new welding life.

The robots feature our Aristo™ W8₂ robot package – a complete set of welding equipment and consumables, based on our latest digital power source technology.

The package consists of:

- The Aristo™ Mig 3000i and 5000i inverters.
- The Aristo™ W8₂ Integrated interface .
- The Robofeed 3004w ELP encapsulated wire feeder.

- Cable packages.
- The Marathon Pac™ bulk drum with robot quality welding wire.

Aristo™ Mig 5000i and 3001i inverters - designed specifically for robotic MIG/MAG welding in metal fabrication industries – represent ESAB's latest generation of digital power sources, offering up to 500A/39V at 60% duty cycle

The Aristo™ W8₂ Integrated interface. is built-into the ABB's IRC5 robot control unit, which has a major advantage in the sense that both the robot and the power source can be operated from a single pendant. The power sources are easy to use with the user-friendly W8₂ control facilities which feature the full library of ESAB and ABB synergic lines developed for thin-plate welding. Intelligent ESAB process functions such as Qset™, SuperPulse™ and Weldpoint™ are included.

The Robofeed 3004w ELP encapsulated, robot mounted wire feeder is 4-wheel driven.

It has all important functions for robotic welding such as manual forward and reverse inching, shielding and cleaning gas purge, gas sensor, air test and anti-collision detection, motor current control which are accessible through the IRC5 control unit. ESAB's TrueArc-Voltage™ system is built-in for continuous measurement of the arc length. Windows in the casing allow visual inspection of the feeding mechanism without having to open the feeder. The wire feeder is easy to connect/disconnect by using quick connectors.

The Robofeed 3004w ELP features the ELP (ESAB Logic Pump) switch that ensures water-cooling is only provided when a water-cooled torch is connected.

Cable packages connecting the Aristo Mig power sources to the Robofeed 3004w ELP wire feeder are available in 7.5m and 10m lengths for the ABB IRB 1600, IRB 1600 ID and IRB 2400L welding robots. Other lengths are available on request.

Marathon Pac™

Our Marathon Pac™ family offers a choice of three drum sizes for a variety of wire types – including robotic quality wires such as OK AristoRod™, Matt Stainless types and 1.2mm OK Tubrod 14.11, all of which can be incorporated in the Aristo™ W8₂ robot package.



OK Tubrod 14.11-1.2mm - fast as lightning

OK Tubrod 14.11 is a new 1.2mm diameter metal-cored wire for non- and low-alloyed steel which has been specially developed for the high speed welding of thin plates (1-4mm). Treated with ESAB's revolutionary cored wire surface technology, it sets new standards for reducing welding costs, especially in mechanised and robotic stations. The difference in welding performance in the thin-plate area, compared to solid wire, is striking. In many applications, travel speeds between 150 and 250cm/min can be achieved, regardless of whether it is thin fillet welds (a=2-2.5mm) or overlap joints. Here, OK Tubrod 14.11 tends to produce welds without undercut and with nice wash to the plate edges.

OK Tubrod 14.11 Ø1.2mm operates in the spray arc mode at currents as low as 160A, providing the widest possible envelope for low-spatter welding with a fine droplet transfer. This is a major advantage compared to 1.0mm and 1.2mm solid wires, which can only be used in the short arc or globular arc mode when welding thin plate.

With high welding speed and an extraordinarily low arc voltage, heat input into the welded part is very low, making it a viable alternative to modern, so called, 'cold arc' welding processes in welding non- and low-alloyed steel. These advantages also provide benefits in welding zinc-coated plate, where OK Tubrod 14.11 Ø1.2mm stands comparison with very low porosity and spatter.

Short welds with many starts and stops can also be achieved at a low spatter level with OK Tubrod 14.11 Ø1.2mm. A stable arc is established a split second after ignition.

OK Tubrod 14.11 Ø1.2mm is very forgiving with respect to poor fit-up, bridging gaps even at very high travel speeds - resulting in less post weld repair work and less rejects in serial fabrication.

Parameter setting with OK Tubrod 14.11 Ø1.2mm is simple. In the thin-plate area, the arc voltage is between 22V and 24V – whether one welds at the lowest wire feed speed of 7m/min or at the highest of 14m/min.

The best bead appearance and spatter level are obtained in EN ISO 14175: M20 with 92% Ar and 8% CO₂, but also the standard 82%Ar/18% CO₂ (EN ISO 14175: M21) mixed gas also gives good results. Weld penetration is not noticeably influenced by the amount of CO₂ in the shielding gas. However, the higher amount of silica islands with a higher amount of CO₂ has to be taken into account.

The application of OK Tubrod 14.11 brings potential cost savings to any application involving mechanised or robotic welding of sheet metal up to 4mm thickness where the welding station forms a bottleneck in production. Station cycle times can be substantially reduced, due to the significantly higher welding speed. This results in a 20-40% increase in productivity and a corresponding decrease in welding cost. Applications can be found, generally, in the fabrication of thin-walled components for the automotive and transport industries, and in the furniture industry.

Continued success for OK AristoRod™

The 'Aristo™' name is synonymous with ESAB's highest quality traditions. That is why you can be certain that OK AristoRod™ copper-free wire with ASC surface technology will deliver clearly measurable performance and efficiency enhancements across your welding operations. All over the world, fabricators have recognised this and in most markets OK AristoRod™ has become the leading product in its category.

OK AristoRod™ takes your MAG welding operations and systems to new levels of performance and all-round efficiency in both robotic and mechanised welding. ESAB's development of Advanced Surface Characteristics (ASC) has enabled the creation of a whole new family of wires with outstanding properties. Taken together these deliver the potential for increased productivity in automated MAG welding facilities.

With OK AristoRod™ you gain consistent, trouble-free feeding, with no clogging of the liners and guns, as well as low contact tip wear. The new generation of bare wires has excellent start properties too, with good arc stability at very high welding currents and producing extremely low spatter.

Combined, these properties translate directly into reduced maintenance downtime, excellent weld finish with minimal post weld cleaning, and increased deposition rates.

OK AristoRod™ wires can be safely stored for extended periods too. That's because the ASC surface technology creates a barrier that is highly resistant to corrosion. These new generation MAG wires are specifically designed to reduce your overall welding costs. What you'll gain is high quality, dependable production welding, time and time again.

OK AristoRod™ is available either on adapter-free basket spools or contained in Marathon Pac™ 250 and 475kg octagonal bulk drums. There's even an 'Endless' Marathon Pac™ version for continuous, non-stop delivery of wire to the welding head.

OK AristoRod™ - the benefits

- Very stable arc at very high welding currents.
- Extremely low levels of spatter.
- Excellent start properties.
- Consistent trouble-free feeding, even at high wire speeds and lengthy feed distances.
- Reduced contact tip wear.
- Improved protection against corrosion of the wire.
- Low fume emission level.





Rail repair needn't be complicated

ESAB's Tramtrac™ II and Railtrac BV/BVR 1000 are lightweight, easy-to-use systems designed for accurate, efficient repairs to tramway and railway rails. Easy to mount, easy to programme and easy to remove! A one-man job.

Tramtrac™ II

Tramtrac™ II, with an Origo™ Mig 320 or Origo™ Mig 410 constant voltage welding power source and a suitable power generator, is the perfect equipment combination to repair worn embedded tramlines in curves in city tramway systems.

The Tramtrac™ II is a lightweight tractor that uses the tram rail it is welding, for guidance.

Simplicity of use is one of its major advantages. It can easily be applied to the rail by one operator. All welding process travel speed and start/stop manoeuvres are controlled from an easy-to-use control box.

The welding head is attached to a slide system which includes a semi circular slide for torch angle and horizontal and vertical slides. The wire feed unit is placed on top of the spool cover and is easily accessible when changing wire spools.

Tramtrac™ II uses OK Tubrodur 15.65 and OK Tubrodur 14.71, self shielded wires, specially designed to weld grooved rail without pre-heating.

Your investment in Tramtrac™ II equipment will result in a short pay back time, thus proving to be extremely cost efficient for repairing grooved tram rail. It eliminates the need for heavy cumbersome submerged arc welding stations and huge power sources that need two component welding consumables and a large crew to operate.

Railtrac BV/BVR 1000

Railtrac BV and BVR 1000 are designed especially for the repair welding of carbon manganese and 14% manganese rail steel, on site or in the workshop.

Major applications are the repair of welding crossings, wheel burns and rail ends. You will find that Railtrac BV/BVR 1000 systems are very cost efficient compared to replacing worn crossings and rails.

The compact Railtrac BV 1000 gives you the choice of 4 basic pre-defined programmes. The programmes have dedicated welding



Tramtrac™ II

patterns for repairing carbon manganese crossings, 14% manganese crossings, wheel burns, rail ends and other plain rail defects. Railtrac BV 1000 is easy to use and no programming skills are needed. The Railtrac system comprises:

- A 2-metre lightweight aluminium track
- Main Controller
- Weaving Carriage
- Small remote controller

The Railtrac is connected to an Aristo™ Mig semi-automatic welding machine with wire feeder which supplies the 42V AC power needed. Once the required information has been set in the main controller, all functions are controlled from the remote.

Lightweight, versatile and easy to use, Railtrac will give you accurate and efficient welding repairs. One operator can easily handle the application of the unit to the rail or crossing.

Advanced process control for A2-A6 welding tractors could be the key to successful welding

ESAB's contribution to successful mechanised welding includes the new A2-A6 PEK CAN Process Controller adapted for use with our LAF 631 / 1001 / 1251 / 1601 CAN and TAF 801/1251 CAN automatic power sources.

The A2-A6 PEK CAN Process Controller, with its clear text menu, is easy to use. Users can choose between 16 different languages. The large display keeps users informed about the main parameters - current, voltage and travel speed. 255 complete welding programs can be stored in the memory. The controller can be used for both SAW and GMAW.

Our new A2-A6 welding tractors all feature the A2-A6 PEK CAN process controller. For wire feed motors with encoders, the CAN bus system ensures constant travel and wire feeding speeds.



The A2T Tripletrac with A2-A6 PEK CAN process controller is designed for internal circumferential welding. The three-wheeled tractor steers with the front wheel via a steering wheel. This, combined with the fact that the steering wheel also controls the horizontal slide, ensures easy control of the wire position.

The A2T Multitrac with A2-A6 PEK CAN Process Controller is designed to optimise welding operations and to increase productivity and quality. The compact tractor is four-wheel driven, and features a clutch for quick movement to new positions. The A2T Multitrac for submerged arc welding is available in two versions, for single or twin wire. Wire up to 4mm diameter can be used. A version is also available for gas metal arc welding.

A6T Mastertrac with A2-A6 PEK CAN process controller is designed for heavier welding projects than the A2T tractors. The tractor is four-wheel driven, has compact design and a clutch for quick movement of the tractor to new positions. The A6T Mastertrac is available in three different designs, single, twin or tandem.

The A2 PEI Welding Controller can be used with all of our A2 Automats and A2 motors. Three knobs on the front panel set travel speed, voltage and wire speed. The actual parameters are shown on the digital displays. It can be connected to most analog DC power supplies.

The analog PEI controller can be used with a minimum of training. The A2 Multitrac with PEI controller can be used with the new LAF 631 / 1001 / 1251 / 1601 CAN power sources. In Submerged Arc Welding, 4mm wire can be used in the single wire version, or 2.5 mm in the twin version.

Orbital TIG welding with ESAB

The highest levels of weld reproducibility and quality

The compact, lightweight, Aristo™ MechTig C2002i power source features an integrated Windows-based man-machine interface which, together with the PRH enclosed welding head, makes it ideal for the pharmaceutical and food and beverage industries; shiny welds which require no cleaning. The equipment is robust and user-friendly, allowing one operator to run two welding heads simultaneously for increased productivity. An 'auto generation of parameters' function minimises the equipment start-up period. Basic parameters - material, tube diameter and thickness - are entered by the operator and the control unit automatically calculates a weld programme. This programme, or one refined by the operator, can be stored in the control unit and/or on a USB memory stick for repeated use. The auto generation function is valid for tubes with wall thickness up to 3mm. Alternatively, welding parameters can be manually set using a graphical or spreadsheet interface.

For larger pipes with thicker walls, for instance in the off-shore and power generation industries, the more powerful Aristo™ MechTig 4000i power source with its Aristo™ MechControl 4 control unit is the best choice - using PRC and PRD 160 weld heads. The fully programmable

power source maintains precise control of the welding process. Synchronised pulsing minimises the risk of hot cracks, and automatic arc voltage control (AVC) guarantees a constant arc length. Weaving of the electrode holder can give a much quicker filling of the joint and the weave dwell times can be individually programmed to avoid lack of fusion onto the side walls. A small remote control is used to change parameters during welding.

The stationary A 25 modular component system can be used when the weld object can be rotated. The modular components can be put together to suit application requirements, from the basic system with manual slides for positioning of the torch to the more advanced version with weaving and AVC slides.

The Aristo™ MechTig 3000i power source, Aristo™ MechControl 2 control unit and POC weld head, are suitable for tube to tube sheet welding.





Rosio™ - Robotic friction stir welding of complex components

By using high-payload industrial robots, a new field of 3-D applications for friction stir welding can be created. After a successful evaluation period, ESAB FSW Rosio™ is now available for various welding applications.

Power game in FSW

The main advantage gained by using an industrial robot for FSW is the 3-dimensional workspace. But along with the axis configuration needed to achieve this workspace, compliant behaviour is unavoidable. As the robot comes into contact with a rigid object, the structure compresses and leaves erroneous encoder readings. As those readings are fed back to the control system to be used in the continuous planning, the applied motion will not correspond to that intended. And, as the force experienced during FSW may be at the outer limits of the system's performance, such behaviour will cause instability and most likely cause the operation to fail.

A common solution to such a problem is force control. By disregarding positional readings in the active direction of the tool and, instead, reading the contact force and regulating it according to a desired value, contact stability is ensured. It is obviously a difficult task, requiring not only experience in robot system dynamics, but also the process. It has, none-the-less, been recognised as a suitable solution not only for FSW, but also in many other in-contact operations in which robots are used.

The ESAB robot prototype

ESAB has chosen to utilise a standard industrial robot for friction stir welding, whilst acknowledging the known challenges of force capacity, instability, etc. In order to keep the process entry level threshold low, it was decided that a standard, widely available industrial robot is used as a building block for Rosio™.

In order to minimise the effects caused by the process, focus areas for development have been in the implementation of adaptive control by mechanically reconfiguring the robot

so that the maximum downforce of 500kg can be fully utilised.

The actual welding head consists of a tool adapter, a spindle and a motor. It is dimensioned to apply a maximum torque of 40Nm and a rotation speed of 3000rpm. This is sufficient for friction stir welding AA6000-series aluminium alloys in thicknesses up to 5mm.

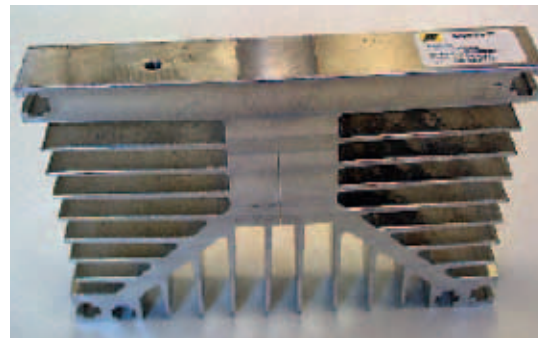
When integrating the welding head with the robot, two main areas need to be considered. Firstly, the operating area of the robot should not be affected by the addition of the friction stir welding head. Secondly, with a constant distance between the FSW tool and the robot's wrist, stability is increased and the position of the tool centre point is better controlled. Minimum mechanical re-configuration of the robot is needed. However, for FSW the 6th axis is more or less redundant, so the space occupied by that axis is used for housing the welding equipment. This increases stability by locating the FSW tool closer to the wrist.

As previously mentioned, there is always a need for an advanced control system when performing FSW with a robot. This is due to the fact that robots are typically not designed for in-contact operations, and very rarely – if ever – for the contact forces experienced during FSW. With elastic deformation always existing in the system under load, process control is very demanding.

In FSW, operations can be divided into both planar and complex welds. Planar weld seams are performed by traditional machines, or any other 2-dimensional welding technique. Complex weld seams are applied on objects having curved surfaces. The major difference between the two, in terms of path planning, is that the motion of a planar weld may be planned according to a pre-defined fixed coordinate system. The system internally calculates how to orientate the tool in order to apply a tilt angle defined by the user - like a welding parameter - just by being given the positional coordinates from, for example, teach-programming. The robot system also features the ability to apply a proper tilt or travel angle with relative ease. By implementing welding instructions for the robot's programming language, including the algorithms to apply the tilt angles for a set of common operation, the operator may program the robot as with any standard robot operation.

Applications

One of the early users of robotic FSW is the automotive industry, where relatively soft aluminium alloys - AA5000 and AA6000-series - are used in thicknesses under 3mm. In these applications, forces under 5000N and tool rotating speeds below 3000rpm are typical. Successful butt- and overlap-joints on AA6063, AA6082 and AA5754 have been performed in order to verify the performance of Rosio™ - first in 2D or planar applications and, later, in a real 3D environment. For the 3D tests, programs were generated automatically from the CAD-drawings for concave-convex-concave objects as off-line programming.



Rosio™ technical data.

Force capacity	13 kN
Spindle torque capacity	44 Nm.
Spindle rotational capacity	3000 rpm.
Reach	2.55m from the origin
Control features	hybrid force/position control mode
Tool interface	Weld on interface with 25mm diameter
Process monitoring	Force (x, y, z); Torque (ix, iy, iz); Position (x, y, z); Tool orientation (q1, q2, q3, q4); Spindle rotation (rpm)
Mains	3ph. - 400V, 50Hz
Weight	Robot ~ 2500kg, control cabinet ~ 250kg
Connections	2 Ethernet connections (1 service), RS232 terminal

The new Demobus – ESAB on the move

The new ESAB Demobus makes its public debut at Essen. In true world premiere style, our new on-the-road showroom, with its modern spacious interior, will highlight recent developments in equipment, automation, filler materials and accessories.

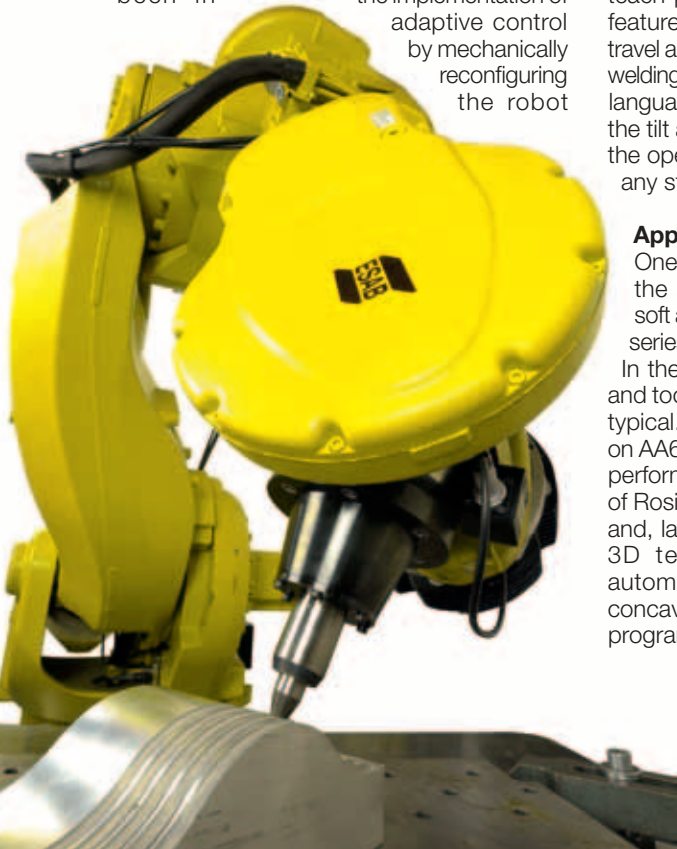
Our Demobus has been a highly valued sales tool for ESAB distributors for many years, enabling them to present to their customers an overview of ESAB's welding solutions. The Demobus has toured throughout Europe, re-appearing annually in many countries.

At Essen, visitors can take a tour through 'the world of ESAB', and see for themselves how education programmes, customer days and trade fairs can be enriched and – above all – how sales can be increased. Under the theme "we have it all", our equipment

and consumables will be presented in live demonstrations, in displays, and in videos viewed on one of the many screens aboard the Demobus.

We will show how we were at the birth of digital welding and illustrate by live demonstrations using portable Caddy MIG/MAG inverters how several decades of development have taken us to the top in digital welding technology. ESAB comes to you rather than expecting you to come to ESAB!

For distributors, we will also demonstrate how your sales area can be transformed with our point-of-sales displays and shop fittings – including a complete range of personal protection equipment, which features our renewed programme of welding helmets.



What's where on the ESAB stand

ESAB Hall 1, Stand 309

Demonstrations
Rosio™ 3D friction stir welding

Demonstrations
AristoRod™
copper-free
MAG wire

Demonstrations
Total MIG/MAG efficiency from
Marathon Pac™ octagonal bulk
drum system

Demobus
Distributor
Centre
Welding
accessories

Reception

New MIG Inverters

Demonstrations
Narrow gap welding

Demonstrations
Automated Cutting
Solutions with
Programming
3D and High Speed
Plasma Cutting

Welding
heads for
pipemills

Demonstrations
Complete solution for wind
tower fabrication. Includes
Telbo™ BigBag EcoCoil™

Hybrid Laser
Retrofit
Pipemill welding

Tramtrac,
Railtrac,
Mechanised
TIG

Demonstrations
Aristo™ W8₂ robot package/
OK Tubrod 14.11 for high
speed, thin-plate welding

Knowledge centre
Aristo digital
multi-process power
sources, including
U8₂ control unit

A2/A6 welding tractors

New MIG Inverters

The Knowledge Centre – intelligence at your fingertips

We would like to introduce you, directly, to some of the clever 'hidden' aspects of our products. How is it that we can measure welding parameters so precisely and always display the true value? And how does artificial intelligence simplify your MIG/MAG short arc welding?

The demand for welding parameter supervision and documentation becomes ever-stronger. Have a look at WeldLog™. The software displays and logs the welding parameters.

We have a full programme of welding and handling equipment as well as consumables for wind tower production. We have an impressive computer presentation that will give you a detailed picture of ESAB's complete solution for wind tower production. If you are interested in how everything works together, we can show you integration opportunities and offline PLC programming.

Laser Hybrid is mostly used for thin materials. ESAB has now developed a process and a welding head that makes this method available for thicker materials.

What are the cost drivers for a welding production? Learn more about it at our Knowledge Centre. ESAB does not want to sell you products only, but a complete process that does more than just remove a bottleneck.

What exactly is an inverter, and do electronic parts wear? If you always wanted to know what's inside different types of welding machine, how they function and what makes ESAB welding equipment unique – our Knowledge Centre staff will answer your questions, explain many of the hidden aspects of the equipment, and provide you with background information.

Reduction of Harmonics is a legal requirement. ESAB deals with those requirements in a very responsible way – for our customers' benefit and safety.

Learn about QSet™ as artificial Intelligence in a welding machine and why True AC Rating™ is beneficial for repeatability and quality with AC-TIG welding. An outstanding feature that provides true data in MIG/MAG welding is True Arc Voltage™. It reduces a possible deviation from the absolute value to a negligible level and allows exchange of components without recalibration.

Watch our new Aristo™ U8₂ and Aristo™ W8₂ high-end controls run on a PC, as well as our WeldPoint™ PC control software. Remote editing of data on particular machines in the network, as well as advanced parameter filing and system backup, are of particular interest where downtimes should be as short as possible and repeatability is a must. Come and share our view on technology and environment in the Knowledge Centre.

New inverters from ESAB More power, less weight and energy saving

Designed to function in the most adverse welding environments, our new range of MIG/MAG welding inverters have superb power to weight ratios. Higher than normal duty cycles make these systems more than capable of meeting the intensive arc time requirements of the heavy and medium duty fabrication industries. They are the ideal companions for fabricators operating within the shipyard, offshore, energy and transport segments.

The use of modern materials provides a lightweight, high performance power source with minimal environmental impact. ESAB's design focus on maximising efficiency lowers both energy consumption and installation costs.

Versatility is provided by a choice of three power source outputs ranging from 300A to 500A. The wire feed unit that encloses the wire spool can be fitted with a choice of easy to understand control panels offering differing levels of functionality and enabling a precise match to the desired application.

Flexible and efficient, lightweight yet powerful, these new systems are packed with features to simplify the welders task and assure weld quality.

A library of synergic lines for the most common materials, and our patented QSet™ adaptive arc system for automatic generation of optimal short arc parameters simplifies the arc setting process while minimising spatter and aiding

consistent results. The unique True ArcVoltage™ system guarantees welding with the selected arc voltage, independent of the torch and connection cable length.

The ability to select the MMA welding process, further adds to the versatility of this compact and mobile welding system.

Durability and repeatability, in the face of the most demanding applications, were also major design considerations for these new systems.

The new four wheel wire drive mechanism down to the integration of QSet™, all contribute to a system which is easy to use and yields consistent results.



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