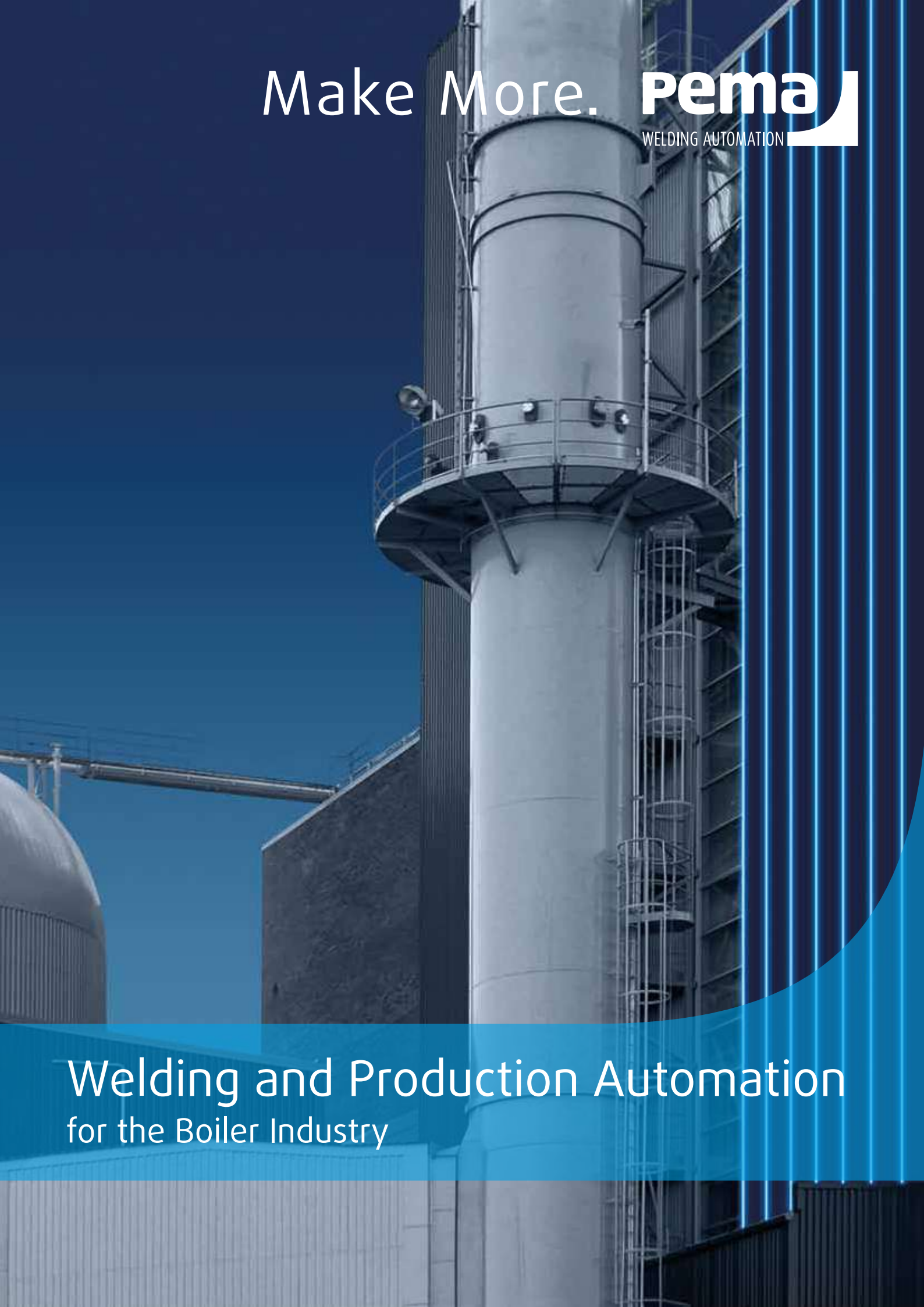
Make More.

Pema
WELDING AUTOMATION



Welding and Production Automation

for the Boiler Industry

Providing both Flexible and Effi cient Equipment for Boiler Manufacturer Needs

In the production of critical components, there is absolutely no room to compromise on quality. Therefore, quality must be built into the production process. In PEMA production lines, solid and robust quality comes as standard. With several decades of experience behind us, PEMA understand that safety and quality are critical factors in the boiler industry.

Working for a long time in this highly advanced sector has made us the leading manufacturer of automated welding systems for boiler industry. Understanding the needs of our customers, reliable equipment, modern processes and the constant development of our products are key when it comes to securing business.

PEMA is recognized for its long-term cooperation and key-customer thinking. This concept includes full lifetime support services and retrofit projects. The fact that some of our very satisfied customers have included PEMA products in their production lines for over twenty years is a testament to this.

PEMA is able to provide lay-out and productivity studies right from the early stages of your investment plans.

Our wide product range covers all key processes in automated welding and material handling equipment:

PEMA Wide Product Range

- Water tube panel welding lines
- Special geometry panel welding gantries
- Economizer welding line
- Tube welding and bending lines for tube shops
- Robotized applications for complex constructions
- Column and boom solutions for cylindrical pressure parts
- Robotized applications for general steel constructions
- Material storage and prefabrication systems



"In the production of supercritical boilers, there is absolutely no room to compromise on quality."
Rajeev Sondur of TBWES



Better Capacity and Quality Go Hand in Hand

Tools for Capacity – Tools for Quality

We are able to provide you with tools to increase the capacity and quality of your end product and thus raise your level of competitiveness. All lines are modular and designed based on the customer's production capacity needs.

To ensure your production capacity from raw material to an inspected final product, you can rely on PEMA's fully integrated systems. The integrated system from a single supplier not only ensures capacity, but also provides guaranteed quality.

PEMA's integrated production line provides high quality with minimum repairs and production stops, which is the key to a successful project. Greater control at all stages of mass production means higher quality and fewer repairs, which means to higher profits for our customers.

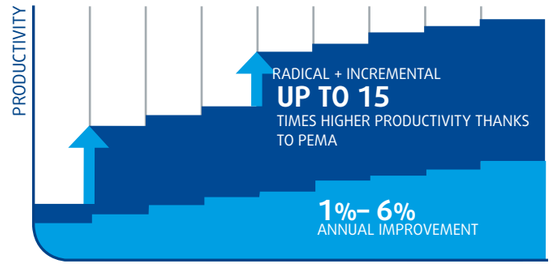
Panel Production – A Critical Process

The efficacy of PEMA machines has been developed and proven in continuous three-shift production.

The panel production line capacity is difficult to achieve using manual welders, and therefore we have focused on both high availability rate and reliability of complete systems.

Service agreements and original spare parts will further support your continuous production.

Rethinking Production Capabilities



Definition: Productivity = Output/Input [KPI: Profit %, €/kg, m/min etc.]

Challenges in Production:

CHALLENGE	ADVANCED MATERIALS REQUIRE MORE DEMANDING WELDS.	HIGH QUALITY REQUIREMENTS AND TRACEABILITY
SOLUTION	PEMA's stationary panel welding machine for best possible material guidance and control combined with LE modern welding technology and welding consumables. Possiblity to weld even the most demanding materials.	PEMA automated lines with quality assurance assisting software. Possibility to integrate quality inspection systems to the lines.



Solutions for the Whole Production Chain

PEMA has experience in all major processes of panel and tube production. The earlier you involve us in your project, the more you can benefit from your investment.

Technical requirements for final products are being set to increasingly high levels. Materials are more difficult to to work with and weldability is challenging.

PEMA has developed equipment and solutions for precise material preparation. This will ensure clean surfaces and good tolerance to raw materials.

The welding process using the flexible Lincoln PowerWave system brings several options for optimization of the welding process. This, combined with proper material handling and control during the welding process, will help you to meet ever-growing demands. We have experience of all major processes involved in panel and tube production. Bending systems can also be provided with the complete turnkey deliveries when needed.

By involving us in the process and material planning at an early stage of your project, even before the investment decision has been made, you will reap greater benefits from your investment. Careful pre-planning will ensure that the capacity, quality and safety requirements match with your exact needs. The planning of possible future investments for additional units can be arranged easily and without unexpected costs at this stage.

The individual processes are matched in layout, which is made in close co-operation between PEMA's project team and your work team. The layout will help you to plan the material flow in your factory. It can also reveal potential bottlenecks in the factory workshop.

Boiler Automation Range

- Stationary panel welding machine
- Gantry-type panel welding machine
- Conveyor lines for maximum productivity
- Storage systems
- Fin-bar prefabrication systems
- Tube prefabrication systems
- Tube lines with integration to bending systems.

All Processes from One Supplier

- Customer factory layout design
- Production flow and capacity studies
- Welding tests
- Material prefabrication
- Blasting for material cleaning
- Cutting and measuring
- End beveling and buffing
- Automated material transportation systems
- Material storage for continuous production
- Panel welding with stationary machines
- Panel welding with gantry machines
- Tube welding machines
- Preheating processes
- Post-processes
- Joint inspection integrated to conveyor lines
- Tube bending systems
- Panel bending systems
- Material preparation for onsite installation



Tube shot blasting with steel grit is a prerequisite for high-quality SAW welding. It reduces welding defects and the need for manual repairs after panel welding.



The NC-controlled end beveling unit has specific tools designed for each groove type.



End buffing unit integrated to the end beveling line.



The seam grinding process takes place directly after the welding process. Seam grinding is required for panel welding.



The PEMA heavy-duty fin-bar calibrating machine is designed for constant production and best possible quality in panel welding.



The complete PEMA delivery will ensure productivity, quality and good geometrical tolerance of the finished panel.

Panel Production in Series

1. Able to produce over 3000m of weld in one shift
2. 2–6 SAW heads
3. Possibility to run complete line with three operators.

PEMA stationary panel welding lines are designed with solid quality for mass production.

Tube Prefabrication Line

- Tube shot blasting
- Tube end beveling
- Tube end buffing
- Tube welding machine with grinding
- Tube cutting and measuring
- Tube inspection
- Conveyor line and control system

Fin-Bar Prefabrication Line

- Fin-bar uncoiler
- Fin-bar blasting
- Fin-bar butt welding
- Fin-bar calibration
- In-feed system to panel welding line

Panel Welding Line

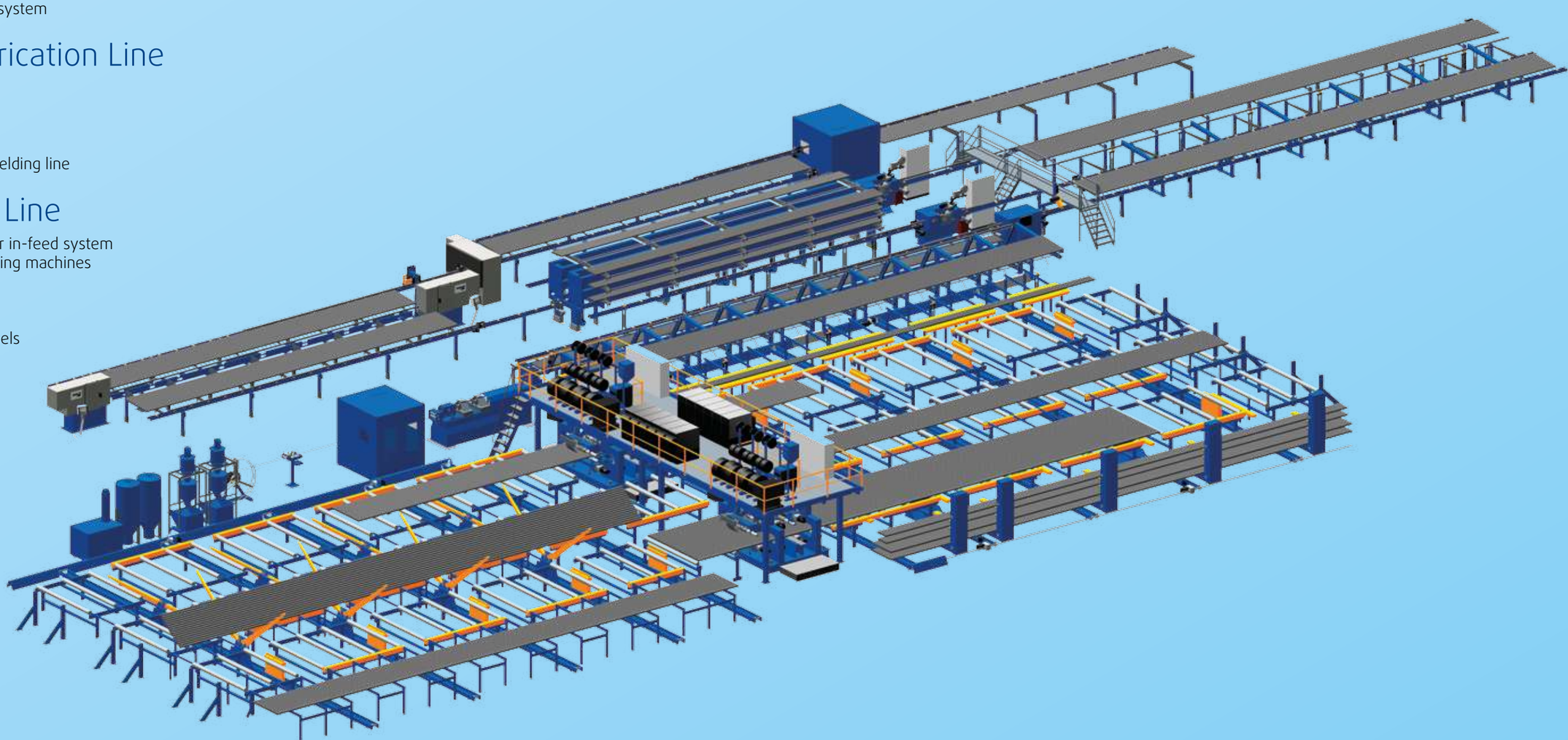
- Integrated tube and fin-bar in-feed system
- Two stationary panel welding machines
- Roller conveyors
- Flip-over system
- Cross transport conveyors
- Buffer storage for sub-panels
- Inspection table

Panel Production Lines – Two Main Types

Mass production lines with two welding machines and full material prefabrication systems. Small or medium-sized lines with quick changeover times for fast reaction times in service business.

In mass production machines there are typically six Lincoln PowerWave power sources for SAW welding.

SAW is a user-friendly process with no spatter, fumes or arc reflection and PEMA WeldControl system with various options for production and quality data collection.



High Output Panel Production in Mass Production

The PEMA panel welding line with two stationary panel welding machines is designed for mass production of water tube panels. The flexible and modular design of the line means it can be built according to customer requirements. A line with a double stationary welding machine system produces up to over 3000 meters of weld in one shift.

The panel welding line with two welding machines and integrated tube and fin-bar prefabrication systems is a complete package for high-productivity requirements. The line can be utilized with all necessary components for water tube wall panel production from raw material handling to ready-welded panels. Standard panel widths are 2000, 2500 and 2700 mm. Other widths are also available on request. The length of the panel is set according to the customer needs.

If production reliability is particularly important for you, the double machine line can be also equipped with an additional conveyor track. This makes it possible to use both welding machines on a standalone basis if necessary. It also provides alternatives and flexibility when welding sub-panels together.

PEMA panel welding line with two stationary welding machines.



PEMA mass production line with additional conveyor track.

Flexible Panel Production
in Small and Medium-size Production

1. Fast production start-up even by one operator
2. Flexible production with various tube and fin sizes
3. Typically 2–4 SAW heads

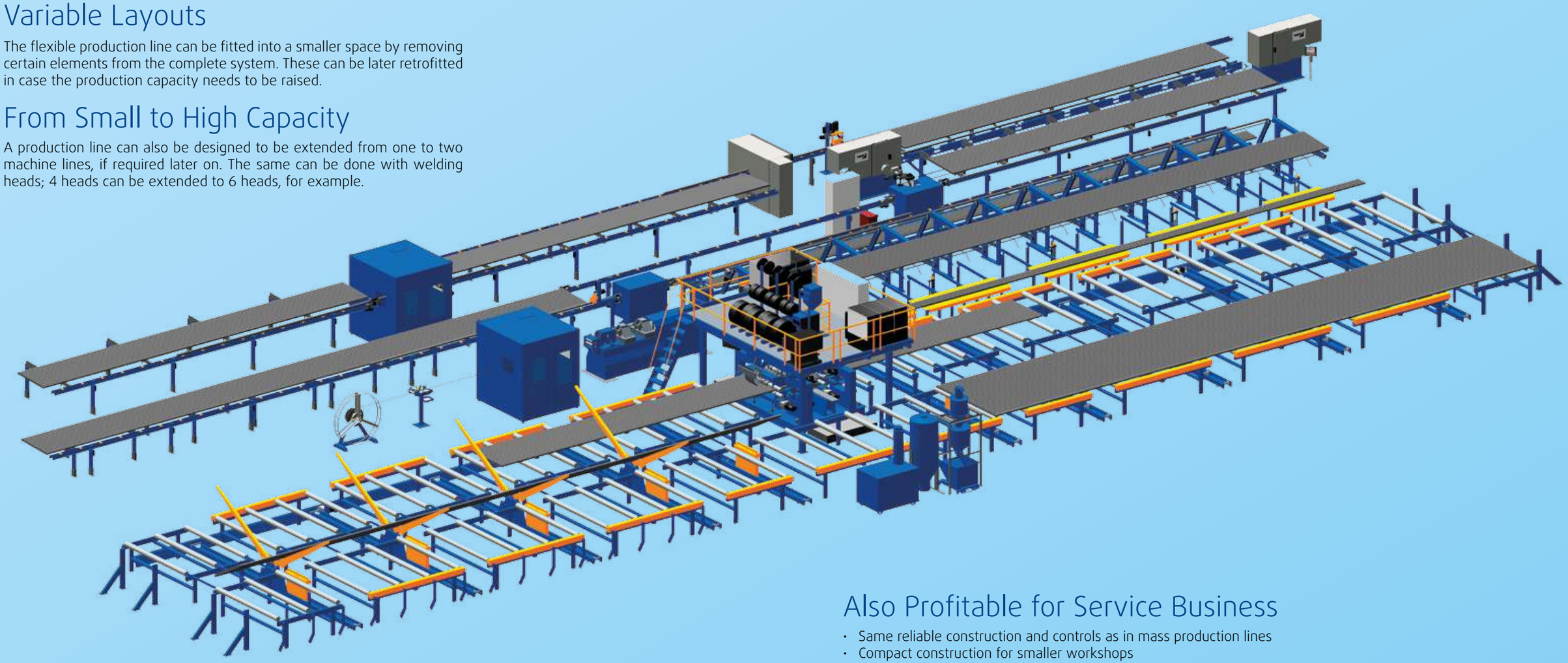
PEMA stationary panel welding line with one panel welding machine is usually designed for small or medium-scale batch production and can have 2-6 SAW Lincoln PowerWave power sources.
The typical panel width is up to 2000 mm.

Variable Layouts

The flexible production line can be fitted into a smaller space by removing certain elements from the complete system. These can be later retrofitted in case the production capacity needs to be raised.

From Small to High Capacity

A production line can also be designed to be extended from one to two machine lines, if required later on. The same can be done with welding heads; 4 heads can be extended to 6 heads, for example.



Also Profitable for Service Business

- Same reliable construction and controls as in mass production lines
- Compact construction for smaller workshops
- Less workforce required to produce panels
- Flexible for different tube and pitch sizes → fast changeover times

A long-term partnership ensures expansion of your business.

Flexible production line in repair business with two SAW welding heads. Production can be started by one operator.



Panel welding line with possibility to extend to two welding lines to double your production.

Flexible Panel Production

If you require various sizes of tubes and fins with varying production batches, we can offer flexible panel lines. The fast changeover time for tools makes the line flexible for different tube and fin-bar sizes.

An efficient control system makes it possible to use minimal production staff when batch sizes are small. Custom-made design enables enlargement of equipment from service station to mass production. The number of welding heads can be increased for more capacity.

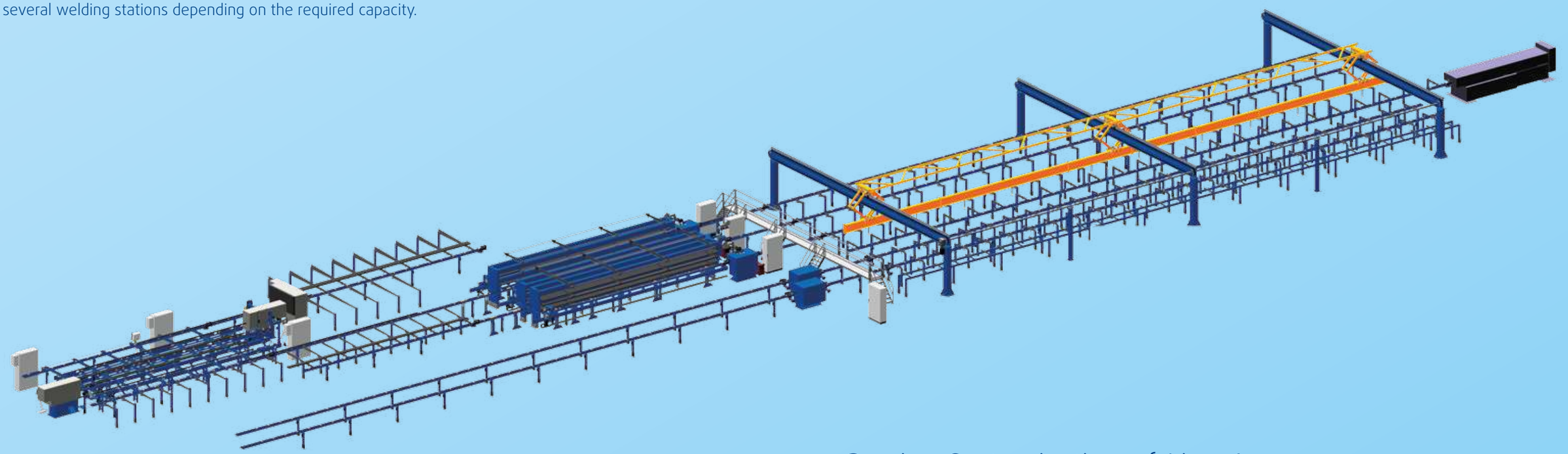
PEMA flexible panel production makes it possible to have first-step investment extended to meet various production expansion needs.



More Productivity with PEMA Tube Shop

1. Up to 600 tubes in one shift
2. Hot wire TIG process with possiblity to control multiple wire feeders
3. Possibility to run production with one operator

PEMA has a wide variety of products available for tube shops. Complete lines are highly automated and can even be controlled by one operator. The combination of efficient cells and fully integrated conveyor systems creates the ultimate in productivity with a solid and constant quality. Modern welding techniques include conventional TIG as well as multi-hotwire TIG and plasma hybrid processes. Efficient storage and material handling solutions are a prerequisite for coiled production systems. One line can be equipped with several welding stations depending on the required capacity.



Standard cells can be utilized in production lines customized according to customer needs thanks to modular PEMA construction.

Precise Customization of Line According to Space Available

- Tube shot blasting
- Tube cutting and measuring
- Tube end beveling
- Tube end buffing
- Tube welding machine with grinding
- Tube inspection
- Storage systems
- Conveyor line and control system
- Tube bending machine with integration to coil line

Productive Tube Shop

Double welding machine panel lines and coil shops require efficient tube lines. Typically, raw tubes are a maximum of 12 meters long which can then be extended to up to 30 meters by panel tubes or over 100 meters with coil welding. This means several joints to the tube and often a 100% inspection rate.

A productive Tube Shop demands a high degree of automation. With PEMA's tube shop, one operator is capable of handling the whole system in one shift.

Capacity can be defined according to the customer's needs. Preset parameters ensure a reliable process without the possibility of human errors during the welding and cutting process. Repeatable functions without interruptions guarantee solid and reliable quality of the tubes.

The tube line can be fully integrated with the blasting, grinding, cutting, measuring, beveling and buffing processes.

Defect-free welding combined with a high inspection rate demand reliable processes and system control.

All PEMA tube line machines are designed to meet these requirements without any compromises. The joint preparation is carried out with special tools, designed specifically for certain types of joint. Welding is performed with a hot wire TIG, enabling high deposit rates. The welding control system has a wide range of parameters which can be adjusted to achieve the best possible result. One welding lap can be divided into several smaller sectors to fine-tune the parameters for even the most challenging materials.

The x-ray system can be fully integrated to the tube line. The automatic selection of tubes, depending on the inspection results or production requirements, can be included in the system.



With PEMA tube lines you'll get constant, reliable capacity.

PEMA's know-how in heavy robotized welding applications can be now utilized also in boiler manufacturing. PEMA has created an unique control and welding solutions for robotized applications.

Customized Solutions

Our know-how in heavy-duty welding applications opens new possibilities for boiler manufacturers. Robotized applications can be equipped with multi-process systems, including SAW. We have delivered a number of flexible production cells which can be utilized in demanding boiler part manufacturing. Robotized welding increases productivity and decreases labor costs.

Gantry-type panel welding machines are designed for special constructions and pre-bent tubes and fins.

Gantry-type panel welding enables welding of special constructions which cannot be welded in stationary panel welding lines. The gantry method can also be used to weld extremely wide panels, so that sub-panel production is carried out by a stationary panel welding machine.

Take Advantage of PEMA Competence

- Experience of robotized applications in other industrial solutions
- Possibility to build multi-process solutions
- TIG/WIG/SAW/MIG combinations
- Precise and highly automated equipment





PEMA heavy-duty robotized welding station with SAW head.

”Welding automation is the only solution for a successful boiler production.”

Mr. Klein
CEO, Meeraner Dampfkesselbau GmbH
Hitachi Power Europe

Results That Speak for Themselves

Hitachi Power, South Africa:

2700/6 double stationary panel welding machine line with tube prefabrication and welding line. Focused on mass production of up to 2.7 m panels. One of the essential processes for Hitachi Power in its project in South Africa.



Rafako S.A., Poland:

2000/6 double stationary panel welding machine line with fully integrated tube and fin-bar handling system.

Metso Power, Finland:

One of PEMA’s key customers. Stationary panel welding line gantry-type panel welding systems and fin-bar preparation line

Foster Wheeler, Finland:

Long term co-operation with PEMA. Latest delivery: 900/2 stationary panel welding line for service business.



Babcock Borsig Service and Babcock Borsig Steinmüller, Germany & South Africa:

2000/6 complete panel welding line for both destinations.

Thermax Babcock Wilcox Energy Solutions:

3000/6 panel welding line several tube fabrication lines.

Thermax Limited, India:

Three complete panel lines for various production needs. 2700/4 double stationary panel welding machine line, 2500/6 panel welding line, 2700/6 panel welding line, tube prefabrication and welding line.



BHEL, India:

Several deliveries from PEMA starting from 2001. 2500/6 panel welding line. Special tube preparation line with very high capacity.

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