VIRTUAL WELDING

/The welder training of the future
Ever since 1950, we’ve been developing innovative comprehensive solutions for arc welding and resistance spot-welding. So we want to play our part when it comes to welder training, too. Our “Virtual Welding” simulator familiarises users with welding basics, right from the beginning. Day-in, day-out, we’re working at full power on our vision: to “decode the DNA of the arc”. So it’s no wonder that we’re the welding-sector’s technological leader worldwide, as well as being the European market leader.

WE MAKE IMPOSSIBLE WELD-JOINTS POSSIBLE. BECAUSE WE KEEP GOING WHERE OTHERS QUIT.
WHY VIRTUAL TRAINING?

Nowadays, many occupations let their trainees try things out virtually before they do so for real: Pilots do countless take-offs and landings on a simulator before taking the controls of a real-life aircraft. Train drivers hone their skills on a simulator that recreates all the challenges encountered when working on the railways, like observing signals, operating safety devices correctly, and keeping to the timetable. Driving schools, especially those for heavy-goods vehicle drivers, use simulators to let trainees master standard procedures “dry”, giving them more time and opportunity to perfect their skills. Possibilities such as these reduce the safety risk, and at the same time allow considerable savings to be made in terms of consumables.

So why not facilitate welder training with virtual tools as well? Particularly as it normally needs several consumables (metal, wire, gas, ...) which are expensive because of the quantities involved, and that can easily be reduced in the early stages. Also, the safety risk is higher with welding than other craft professions. Saving resources, and with no risk to safety, novice welders learn basic manual skills using an ergonomically shaped torch, typical workpieces and adjustable parameters, acquiring basic welding knowledge in a play-centred, hands-on way.

Virtual Welding also interactively fosters group dynamics at training centres, as the various tasks can be discussed, practised and solved by all trainees working together in the group.

Fronius Virtual Welding is available in two versions: as a stand-up terminal and in a compact carry-case for mobile use.
**PROCESSES**

As its learning model, Virtual Welding stays with the tried-and-tested sequence of conventional welder training, beginning with manual-electrode welding (known for short as MMA = manual metal arc). The difficulty with this process lies in obtaining perfect ignition, and accurate manipulation of the electrode for the welding position and task concerned. These are the aspects Fronius has focused on here, to help trainees rise to this challenge. Later, Virtual Welding trains/simulates the gas metal arc-process (GMA), the most widely used weld process. With MMA and GMA, then, Virtual Welding covers both the main weld processes. Users can rely on the system undergoing continuous development.

**TRAINING SEQUENCE**

In this sequence, the “Ghost” (i.e. the virtual instructor) provides the best assistance one could imagine, by showing trainees the optimum welding speed, the tip-to-work distance and the tilt angle that they should maintain for the torch or electrode holder. Traffic-light colour signals and real-life welding noises give the trainees real-time feedback, showing them where and how they are on-target or deviating from target. This makes direct, instant correction possible, from right inside the process. A new feature is the Variable Ghost: this lets trainers store their own know-how and special manual skills in a virtual format, and to present this to their trainees as the target to train towards. This means that there is no difference between how the trainer manipulates his torch or electrode in practice and the desired torch manipulation shown on the simulator. This can easily be adjusted via the menu, in a few simple steps.

**GMA**

This, the most commonly used weld process, is practised here in several separate training steps.

**MMA**

In manual-electrode (MMA) welding, the training focuses first on ignition. Igniting the electrode is an important motion sequence that has to be practised again and again before trainees can melt off a rod electrode successfully. Once they have mastered this, they practice the other motion sequences needed in MMA welding.
GMA

/ In the simulation sequence that follows, trainees set the necessary parameters themselves. This phase of the training aims to make trainees aware of the different settings in GMA – particularly with dip-transfer and spray arcs – and of how these affect the welding process.

SIMULATION SEQUENCE

/ After trainees finish the training sequence, they move on to Simulation Mode. In this sequence, trainees start practising in a real welding situation – with no help from the Ghost. The result is a virtual weld-seam, displayed in a true-to-life three-dimensional way.

MMA

/ The Virtual Welding system also gives trainees a realistic practice environment in its MMA simulation sequence. This offers a choice of several different electrode diameters. To get even closer to real-life welding, users can even “remove” the slag from the seam after finishing the weld.

ADDITIONAL FEATURES

/ Curricula and courses: By drawing up curricula and courses himself, in line with his own requirements, the trainer can tailor the assignments given to trainees so that they exactly match these requirements. This means that the training can be flexibly and individually adapted to each target group, and focused on specific manual skills.

/ Lexicon function: A click on the “Details” button gives the trainee basic welding information on the selected topic, such as workpiece, welding position etc. This is a helpful reference tool for the novice welder.
SCOPe Of SuPPly & funC tiOn PrinCiPle
Of “StanduP terminal” and “MOBiLe CASE”

Virtual Welding is so easy that it’s self-explanatory. The software scores for its well thought-out structure and its easy-view menu navigation. The touchscreen makes it easy for users to select the parameters and work through the tutorials. As an optional extra, VR (virtual reality) goggles can be integrated in the helmet. This makes work on the workpiece even more realistic, as the user’s gaze remains focused on the workpiece.

EASE OF OPERatiON
/ Self-explanatory software, ultra-simple menu navigation and touchscreen option-selection all combine to make this training tool very easy to use.

WORKPiECES
/ In addition to the existing workpieces such as V-seam (1- and 2-/3-pass) and fillet seam, Virtual Welding has been extended by the addition of a workpiece featuring two different weld seams – a pipe-to-pipe weld and a pipe-to-sheet weld.

POSSiBLE WEliNDiNG PosiTiONS
/ Virtual Welding thus provides training in the following welding positions: PA, PB, PC, PD, PE, PF and PG.
/ The following types of seam have been implemented: V-seams (single and multi-pass), fillet seams (single and multi-pass) and melt-run (single-pass).

HELMET
/ Helmet with integral VR goggles: To allow the helmet and VR goggles to work together better, the helmet has an enlarged viewing panel which makes it easier to adjust the VR goggles.

RESuLTS:
/ A pedagogically sophisticated points system means that comparable training results can be achieved again and again; this in turn allows the trainees to be assessed objectively and transparently. Assessment is made easier by the automatically generated ranking lists. Another factor that promotes learning is the playback function. Every single welding operation is recorded and can be played back whenever needed, allowing the welding operation to be exactly analysed.
Learning is a lot more fun for trainees when they can measure up against one another; this enlivens the group dynamics and motivates trainees to achieve ever-better results! By spurring one another along and interacting in this way, and being assessed professionally and objectively, they learn swiftly and effectively.

DATA DOCUMENTATION:
/ All results are automatically backed-up and archived, protecting users from the unpleasant “surprise” of accidental data loss. At the same time, the saved data can be retrieved whenever they’re needed.
DISPLAY

/ Language: Thanks to the ingenious structure of the software, Virtual Welding is available in many different language versions, so trainees do not need to overcome a language barrier in order to work with it.

/ Software updates are easy to carry out using an external DVD drive. Ranking lists, detailed welding results, curricula and courses and the Variable Ghost can all easily be transferred to a USB stick and stored for documentation/archiving purposes.

ELECTRODE HOLDER

/ For practising ignition, there are 2 different types of electrode: a long version for trainees to perfect their ignition technique, and a short version for the actual welding operation where the electrode virtually “melts off”.

TORCH

/ For GMA work, there is a real MIG/MAG torch, complete with the JobMaster function. Depending on the practice assignment they have been given, trainees can set either a dip-transfer or spray-arc range on the JobMaster.

OUTLOOK:

/ Virtual Welding is fit for the future – easy to set up, and easy to keep updated with the latest versions of the software. In short: Virtual Welding is the future of welder training!

<table>
<thead>
<tr>
<th>INPUT DATA</th>
<th>VIRTUAL WELDING TERMINAL</th>
<th>VIRTUAL WELDING MOBILE CASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions W x H x L</td>
<td>62.8 x 190 x 60.8 cm / 24.72 x 74.8 x 23.9 in</td>
<td>66.6 x 67.9 x 56.8 cm / 26.2 x 26.7 x 22.4 in</td>
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<tr>
<td>Weight</td>
<td>92.17 kg / 203.2 lb</td>
<td>52.77 kg / 116.34 lb</td>
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<td>Power consumption</td>
<td>1.2 A</td>
<td>1.2 A</td>
</tr>
<tr>
<td>Mains voltage</td>
<td>110 V – 230 V 50/60 Hz</td>
<td>110 V – 230 V 50/60 Hz</td>
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</tbody>
</table>
WE HAVE THREE DIVISIONS AND ONE PASSION: SHIFTING THE LIMITS.

/ What Günter Fronius started in 1945 in Pettenbach, Austria, has now become a modern day success story. Today, the company has around 3,000 employees worldwide and owns more than 850 active patents. Since the very beginning, our goal has not changed: to be the technology and quality leader. We shift the limits of what’s possible. While others progress step by step, we innovate in leaps and bounds. The responsible use of our resources forms the basis of our corporate policy.

BATTERY CHARGING SYSTEMS
/ We started a technological revolution with Active Inverter Technology and are now the know-how leaders in battery charging technology. We are driven by the aim of providing intelligent energy management systems that ensure maximum energy efficiency and battery life in intralogistics together with total safety and top performance in the vehicle workshop.

WELDING TECHNOLOGY
/ We develop welding technologies, such as entire systems for arc and resistance spot welding, and have set ourselves the task of making impossible weld joints possible. Our aim is to »decode the DNA of the arc«. We are the technology leader worldwide and the market leader in Europe.

SOLAR ELECTRONICS
/ The greatest challenge of our time is to make the leap to a regenerative energy supply. Our vision is to use renewable energy to achieve energy independence. With our grid-connected inverters and products for monitoring photovoltaic systems, we are now one of the leading suppliers in solar electronics.

Further information about all Fronius products and our global sales partners and representatives can be found at [www.fronius.com](http://www.fronius.com)