

LHP 109 WELDING TRAINER LAB



A 21 is a State of Art **welding simulator** aimed for the vocational training world. Offers a modern teaching trainer that will improve the quality of the welder training process and will reduce the time of training versus a real welding machine.

The A21 simulator offers the following benefits:

1. Not using real power and electrodes or welding gases offer a **risk-accident free environment** for beginners.
2. By not using real consumables is reducing the **cost of training to zero**.
3. By statistical performance measurements, **students save time** in learning by even 40% of the time used when training with real equipment for equivalent tasks.
4. Overall, the system will tell you who is to become a welder and who has no capacity' after all, is a craftsmanship.

The simulator offers a platform of a **3-Dimensional Real time video**, using Virtual reality technology and Augmented reality utilities . **Records and Replays** the welding environment, process and viewing of it realistically, in real time, detailed image and hand motion presentation while accurate records the motion and the process steps during welding from any viewing angle, offering an unlimited viewing perspective of the process assisting the evaluation by the teacher. Additionally the critical performance indices of each student trial are recorded in the Teacher computer database.

A21 offers training in **3 Different types of welding**:

- * **SMAW** Shielded Metal Arc Welding
 - * **GMAW / MIG/MAG** Gas Metal Arc Welding
 - * **GTAW- TIG** Gas Tungsten Arc Welding
- in the same device for the same cost. The equivalent torch replicas for each modules are easily connected to the handheld joystick of the A21 trainer.



RECORD and REPLAY

With its state of art, real-time video technology and real-time motion tracking system, A21 **replicates a real life welding workshop** and process environment.

The real-time motion sensors in the helmet and the torch, allow instant replication of the motion of the user in 3D, real time environment and real time interaction between the user and the A21 system platform.

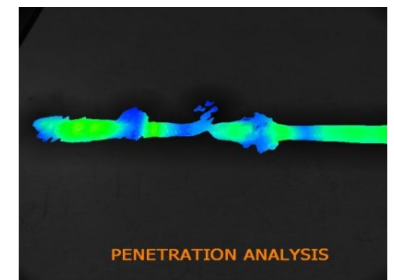
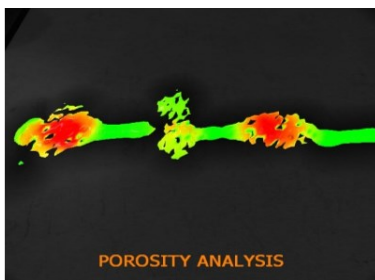
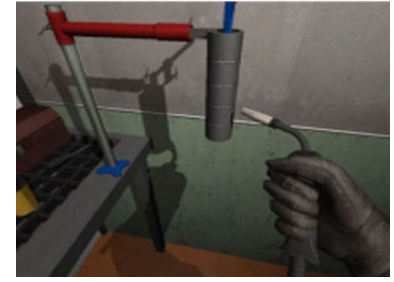
The 3D, real time video, Virtual reality platform allows the recording from **ALL viewing angles** as in a viewing sphere and not only from the viewing angle of the trainee during the process. That also allows the viewing of the work ,in process or after completion, by the replay feature from any angle ,in the 3D coordinates. All students' 3D video work files are kept in the A21 system for a period pre-defined by the instructor. Statistics and student results can be kept in the teacher workstation for unlimited time.

DIDACTIC PLATFORM

The A21 welding trainer offers to a teacher a **theory and quiz presentation** and welding work process simulation platform. With A21 the instructor has the facility to setup the welding parameters of a selected welding process for each student and the type of exercises. The setup of Exercises for all 3 types of simulated welding are categorized by type of welding joint / welding piece. For each exercise, appropriate variants as welding machine power type (AC or DC), power intensity for all types of welding (SMAW, GMAW, GTAW), electrode size for SMAW, wire speed for GMAW, Filler rod diameters for GTAW and other parameters are easily changeable at setup with the help of the 5 button on the welding torch replica with click-and-select utility before and/or during the welding process. Basic exercises can be altered by the instructor for variations of metal types and other welding scenarios.

A 21

WELDING TRAINER



These exercises then can be repeated with any combination of the above parameters or scenarios for 4 different types of welding pieces – Joints, as per **training standards** for welding training:

- * EN according to ISO 6947, NENN-EN 287.
- * AWS according to ASME section IX.

EXERCISES

The basic system offers **50+ different typical exercises**, preset, for each welding machine type, grouped in **4 modules** for Joint / Piece types of welding simulations, standard welding positions, operators orientation and operators hand selection.

JOINT TYPES

Deposition of weld beads on plates

Plate Fillet welds

Butt welds

Pipe (TEE and Butt) Various Diameters

POSITIONS Per Standards

PA, PC, PF/PG, PE, PH/PJ, H-L045/J-L045, PB, PD, 1F, 2F, 3F, 4F, 1G, 2G, 3G, 4G, 5G, 6G

Orientation of welding

The orientation modes provided by the simulator allow to set the motions on:

- ***Upward** welding
- ***Downward** welding
- ***Vertical** piece welding
- ***Welders Hand:** Right handed or left handed welder.

The exercises also include scenarios for welding process with various types of metals, Carbon steel, Aluminum, etc.

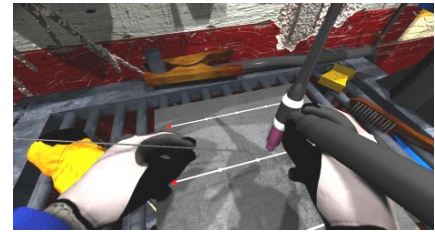
The menu screen offers the welding parameters exercise control screen. By using the torch base buttons, the user can select for each welding exercise by welding type (SMAW, GMAW, GTAW), Joint type, Position, Orientation of welding and operator. Depending on the selection for exercise when the simulation is launched and a weld bead is started, the system will display a numeric error checking for each one of the telemetric criteria versus the set training parameters for such welding process. Parameters are not disabled and will also display an acceptance range based on the lenient or strict selection.

EVALUATION AND REPORTS

The simulator performs **ON LINE Activity Evaluation**, keeping track of the welding process performance. By using the motion tracking system, the simulator can record in real time and display to the screen Telemetric performance parameters as the **welding distance** between the welding surface and the torch/electrode, the **travelling speed** of the torch, **angle of travel** and **angle of orientation** at any instant versus the preset telemetric criteria for such type of welding as per standards. The instructor has the capacity to set these evaluation criteria versus the performance to be disabled, lenient or strict.

A21 creates a **Welding evaluation report** for each welding trial of the student, with **statistical and graphical presentation** on the deviations of the user performance from the preset settings by the system for the corresponding activity.

A 21 WELDING TRAINER



Additionally, for each trial, creates a realistic **3D image of the welding piece**, a **Porosity scan image** with colors and a **Penetration scanned image** with colors so the instructor can observe the **microscopic result** of the welding result. The reports are stored in the database of the trainer and also on the teacher PC class management database (in case of classroom network) where the teacher has the overall class performance data, per student, day and time of trial, etc. The real time videos are stored on the A21 trainer with the overall reports. The instructor sets the time of keeping the video reports, by default the system keeps them for the length of the academic semester.

WELDING PIECES

The welding pieces for the various Joint types are simulated. **There is no need for hardware pieces or mock-up replicas.** The simulator also has the capability to integrate customer defined pieces additional to the preset ones making the simulator unlimited as far as welding pieces. This practice concerns retraining existing welders into specific industrial welding work pieces training but also allows instructor to expand to more complicated and specialized joint types and expand the training course to specialized industry work pieces. Customer can supply the Joint /Piece type design in AutoCAD format to Polytech for transforming them to 3D simulation and for integration to the system at request. The integration transforms the files to connect to the 3D virtual reality real time video platform of the simulator, not as augment video images, but real time 3D images. Polytech, at any time, will receive and transform these custom made files to a 3D/A21 item, fully incorporated into the system and at no cost for the period of 3 years from the day of installation.

CLASS NETWORK /FILE MANAGEMENT

The instructor can create locally to A21 **sessions per student**, where each students' welding files, videos and evaluation results can be kept in separate media, USB disk or Flash memory, besides the trainers hard disk.

Many A21 trainers can be interconnected in a classroom via an Ethernet network to the Teacher PC, running Windows 8 or higher, with a class data base management application running on the Teachers personal computer. The **telemetric results** and **statistics** of each student in a class, for all sessions during the period of training are **automatically saved** on the database application

files. The application offers all the features a relational database offers in creating data tables, user accounts, data searching, data analysis and reporting as described with any available variant keys i.e. student name, session, date and time, activity name or stage in case of series of interrelated exercises, class, group etc. The data base records are unlimited, subject to the Teacher PC storage capacity only, so number of registered classes or number of students per class have no limitations.



The A21 welding Trainer includes:

1. The A21 trainer **Base workstation**.
2. The **Tracking motion** controller-transceiver.
3. The **welding helmet** with 3D glasses and head motion sensing.
4. The **Torch replica base** with the 5 key controls and interface for interchanging the appropriate SMAW,GMAW and GTAW probes. It includes the hand motion sensing subsystem.
5. A 40 Inch **screen** or larger with HDMI interface.
6. **SMAW** Training Module + SMAW torch probe.
7. **GMAW** Training module + GMAW torch probe.
8. **GTAW** Training module + GTAW torch probe.
9. The A21 Teacher workstation classroom management **application** which runs on all PCs with MS Windows 8.0 or higher.
- 10.Theory and exercise **electronic handbook**.
- 11.The training course is fully computer aided and offers theory presentations and questions, prior to the following welding activity for each topic.

Power requirement: 220 VAC.