WeldWatcher
Quality Assurance in the Laser Material Processing
The 4D WeldWatcher is the superior complete solution for the process monitoring and quality assurance during the laser welding, cutting and brazing. The efficient online monitoring system is used in many areas of industrial production.
The WeldWatcher Technology

Partially ionized metal vapour is created during laser welding, cutting or brazing. This escapes from the weld pool and emits a broadband light, the so-called process light. The WeldWatcher measures this process light using a photo-electric sensor. By doing so, typical features, such as the beam flux density, spectral components, time or progress are analyzed and used for quality control.

Technical Components

- 19” industrial PC
- Windows 7 or Windows 10 operating system
- One line interface (only one sensor cable up to 75 m in length)
- Programmable sensor
- One sensor system (no space required at the optics)
- Automatic operation and set-up operation for process optimization
- Application-specific evaluation algorithms
- Direct, observable visualization of the results
- Long-term data storage
- PLC interfaces (configurable)
- Server/client operation

Additional Functions

- Protective glass monitoring
- Automatic data transfer for operational data recording
- Display of all results for a component at reworking stations
- Back-up/emergency laser operation
- Automatic adjustment at the various processing steps of a system (welding, smoothing)
- Evaluation for pulsed welds
- Database queries for the error status of a sub-assembly
Four Unbeatable Advantages. Combined in One System.

The WeldWatcher provides significant advantages for your business through an easy installation and a reliable continuous operation. It is easy to use and keeps your costs to a minimum in the long term - for example through maintenance-free sensors and optional remote support.

### Sensors
- Fast and easy installation, no adjustment and no system conversions required
- Standard adapter in the laser with manufacturer approval, partially retro-fittable
- One sensor per laser is sufficient, also with multiple processing stations
- No sensors in the welding area for the optics, no risk of collision
- Automatic setting (for a variety of welding operations)

### Data Transfer
- Error and interference storage with state messages
- Time stamps, error classes, warning limits, subsequent defects
- System security
- Database (FIFO)
- Data transfer tools for the central server / MDE / BDE
- Standardized interfaces for the system management

### Software User Interface
- User-friendly, clear user interface under Windows
- Color display of the seam positions and errors (welding group)
- A range of access levels with a tiered password protection
- Automatic switching for components / welding stations
- A range of languages

### System Upkeep Maintenance/Costs
- Maintenance-free sensors (no protective glass replacement, no adjustment)
- No complex image-processing software required
- Automatic calibration and training
- Fast commissioning / low follow-up costs
- Remote maintenance option
Ready to Meet Any Requirement.
The Special Applications.

The WeldWatcher can be utilized for a broad range of applications. It is able to detect errors or deviations immediately. And with its programmable sensors, automatic adjustments are performed within a few milliseconds.

Laser Brazing

With the laser brazing, the process monitoring with WeldWatcher includes the combined evaluation of process radiation and wire feeding. Faults, such as height and lateral misalignment, wire supply faults or volume and geometric deviations can be identified immediately and notified to the system controller.

Laser Cutting

During laser cutting the puncture process and the subsequent cut are monitored and evaluated and system faults are identified.

Pulsed Welds

A further major area of application for the WeldWatcher is the monitoring of pulsed welds. The requirement for a visual component inspection lies in the large number of pieces for brief weld durations. The WeldWatcher enables a fast and automatic monitoring of each individual pulse (single welding) or a series of pulses (burst). Through this, it is possible to immediately identify material and location deviations of the joining partners and process-related welding errors.

Combination Processes

The WeldWatcher can also be used for the process monitoring in laser combination processes, such as hybrid welding. It is also suitable for varying monitoring tasks. Through its programmable sensors, which can be automatically adjusted within a few milliseconds, it becomes possible, for example, to switch from deep welding to downstream smoothing welding.

Remote Welding

Welding with scanner systems provides an additional alternative to the traditionally used process for bodywork or sheet metal processing.
We are constantly developing the WeldWatcher further: To do so, we are in a continuous dialog with our customers to make adjustments and new developments to meet production requirements.
Comprehensive Service.
With Full Commitment.

Our experience and competence for your success. We will analyze your actual needs and optimize your procedures and processes for you. Likewise, we can train your staff and impart knowledge on the cutting edge of technology.

**Advice**

We will provide you with the most detailed consulting on the full range of beam sources and on drafting and reviewing specifications and feasibility studies.

**Procedure and Process Optimizations**

Often the parameters for a laser manufacturing process are determined in the laboratory in advance. For an optimal processing efficiency these parameters must be optimized when preparing the series component. For this, 4D offers expert production support on site to minimize errors and create a secure process window through quality evaluation, and researching the causes of errors.

**Training**

The range of training offers doesn’t just cover specific information for products sold by 4D, but also general training for the laser material processing. Training is provided at the customer’s site, in order to offer employees a training with the most practical relevance to their products. In the course of this training our colleagues explain the wide range of possible parameters for laser welding and provide training on concrete measures for process optimization.

**Project Process and Management**

As part of the project planning and coordination for new production installations, 4D offers a complete package, including drafting specifications, offer reviewing, project management and machinery acceptance.
The WeldWatcher is highly versatile and can be used in all industry sectors. Whether for laser welding, laser material processing, diode lasers or fiber lasers, the WeldWatcher monitors all laser processing stations involved in welding, brazing or cutting. To do so, usually one WeldWatcher per laser is enough – even for monitoring hundreds of different seams or points.

Areas of application include automotive parts for suppliers to the automotive industry, e.g. manufacturers of car seats, airbags, body components or vehicle electronics. The 4D WeldWatcher is commonly used for the quality monitoring of components and electric motors used in consumer goods and electronics manufacturing.

Satisfied customers and suppliers are the best reference. We successfully cooperate with several companies in a successful and partnership-driven manner:

ABB  AREVA  ASIC  Audi  AWL  Behr  Blum  BMW  BOA  BorgWarner  Bosch  Brose  Comau  Continental  Danfoss  EADS  ElringKlinger  Faurecia  FFT  Ford  GM  Grundfos  Hella  Hyundai  IWM  Kirchhoff  Lear  Magna  Mercedes  Nissan  Opel  Preh  SEAT  Sitech  Skoda  Toyota  Trumpf  ZF  TRW  Tyco  USK  Van-Rob
Consistently Innovative.
The Company 4D.

The 4D Ingenieurgesellschaft für Technische Dienstleistungen mbH was founded in 1995 by Dr. Jens Mommsen and Dr. Martin Stürmer. The company is based in Isernhagen near the Hannover-Langenhagen airport. 4D provides a strong partnership in the fields of laser technology and laser material processing thanks to its years of experience. 4D develops, manufactures and distributes systems for the observation and monitoring of laser processes for the quality assurance.

The 4D strategy is consistently focussed on customer-oriented solutions. This is based on constant contact between the user and the developer, as well as the timely and expert handling of projects and commissions.
You operate internationally - and as your partner, we will support you all over the world and supply you with products through our trade offices. We will provide you with a comprehensive service - from the process consulting all the way up to the commissioning of the system, including the documentation in many languages. We will train your employees on-site in English.