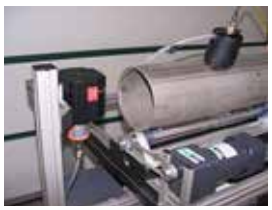
PROLINE

ULTRASONICS VOGT

PROLINE series multi-channel ultrasonic inspection systems

for mechanised and automated inspection processes



Inspection systems for cost-conscious ultrasonic testing of components for

- Aerospace industry
- Automotive industry
- Power supply industry
- Ceramic industry
- Steel industry
- and many more

www.vogt-ultrasonics.de

PROLINE series multi-channel ultrasonic inspection systems

for mechanised and automated inspection processes

System characteristics

The ultrasonic inspection device PROLINE^{USB} in combination with the inspection software PROLINE^{PLUS}, represents an extremely flexible PC-supported inspection system based on MS Windows. The system is designed for the mechanised and automated ultrasonic inspection and can be operated within production lines as well as a stand-alone solution for applications in laboratories.

Thanks to the user-friendly software layout, just a minor training effort and a short-term period of familiarization is needed to enable a safe handling with the system.

PROLINE enables a cost-conscious intersectional inspection of components in terms of discontinuities (e.g. in weld seams, brazed joints, the volume of casted materials, plastics, etc.) for the aerospace, automotive, railway, steel, plastic and ceramic industry as well as for universities and research institutes.

PROLINE^{USB} box (picture 1)

By means of developing this ultrasonic device, VOGT provides a basic system based on a USB Box *(refer to picture 1)*, which guarantees an easy integration, especially in automated production cycles for a continuously running 100% UT inspection including automatic and iSO-conform documentation. The one to eight channel ultrasonic inspection device is superbly suited for upgrading older systems with brand-new ultrasonic technique as well as an OeM-ultrasonic device in connection with scan mechanics provided by the customer or as a mobile version combined with mobile scanners.

Inspection software PROLINE^{PLUS}

Beside the A-Scan display (ultrasonic HF display) the multifunctional display provides combinable inspection procedures and inspection results such as „start", „stop", „good/bad-signals", statistics, graphical displays of ultrasonic signals (amplitudes, time of flight) or combinations out of them as well as conventional colour-coded and location-dependent C-scan and D-scan displays *(refer to picture 2)*. For further comprehensive information and main characteristics of PROLINE^{PLUS} please refer to the corresponding brochure „PROLINE^{PLUS}".

Example of test data display (picture 2)

Gear wheel inspection inline (picture 3)

Gear wheel inspection for laboratories (picture 4)

Ultrasonic device

Basically, the one to eight channel ultrasonic device is applied within the PROline system series. Technical information and more characteristics are provided in the „PROLINE^{USB}" data sheet. Multiple PROLINE^{USB} ultrasonic devices can be synchronized with each other and be linked with the PC via USB port.

Application fields

a) Gear wheel inspection
PROLINE inspection systems are used for the electron beam respectively laser weld seam inspection of automotive gear wheels with immersion technique.

In the process, the weld is inspected by means of a area or line scan. Various inline *(refer to picture 3)* and offl ine integrated *(refer to picture 4)* or also mobile inspection systems (refer to picture 5) are available for different types of gear wheels.

In all variations the gear wheel which is to be inspected is immersed in water and rotated during the inspection procedure. The position of the ultrasonic sensor

Testing of a differential gear wheel (picture 6)

is always axially centered in the shaft holder of the gear wheel, the scanning direction is radial. in combination with the PROLINE^{PLUS} software line or area scans can be created. The inspection and evaluation are carried out either manually or automated.

b) Inspection of differential gear wheels
The inspection of differential gear wheels is basically characterized by coupling of the probe via Bubbler (coupling via water jet, refer to picture 6). In this way the inside area of the differential gear wheel remains dry and can be subsequently be further assembled without any necessary extensive drying and corrosion protection measures. In combination with the PROLINE^{PLUS} software a rotation scan is performed.

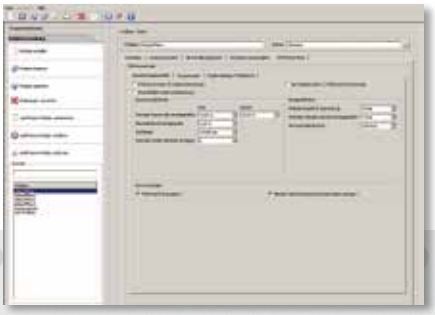
Universal 3-axis-area scan system (picture 8)

The resulting area scan is automatically evaluated (OK/not OK) according to a evaluation matrix (refer to picture 7).

c) Meander-scan systems
PROLINE is also perfectly suited for sophisticated industry applications. Thanks to the new ultrasonic inspection device, applications can be realized, e.g. multiple-axis-immersion systems (refer to picture 8) or simple fully automatic one or two-axis-scanner for theinspection of weld seam- and corrosion inspection as well as volume and crack detection in bar rods (refer to picture 9) and flat materials.

The PROLINE inspection system realizes single-channel as well as multi-channel ultrasonic applications.

PROLINE Mobile (picture 5)



Evaluation matrix (picture 7)

Mobile bar inspection system (picture 9)

PROLINE

PROLINE USB

Technical Data

Pulser

Pulse repetition frequency per channel	1 up to 20.000 Hz
Pulse repetition frequency overall	max. 20.000 Hz
Pulse output	adjustable in 38 steps
Max. pulse amplitude	160 V
Pulse fall time	< 5 ns at 50 Ω
Single pulse width	20 – 500 ns
Pulse width resolution	10 ns
Pulse shape	square wave negative
Number of channels	PE: 1 - 8* TR / TT: 1 - 4*
Channel isolation (PE/TR)	> 65 dB @ 5 MHz
Channel triggering	internal and external

Receiver

Receiving amplifier	linear, broadband, voltage controlled
Calibrated gain	80 dB(hardware compensated)
Linearity	+/-1 dB
Input voltage	0,35 mV_{p-p} – 2 V_{p-p}
Frequency band width	0,2 - 25 MHz (-3 dB)
Input dynamics	100 dB (regulated)
Attenuation	none
Operation mode	PE, TR, TT
Filter	digital via software

Calibration

Range	0,01 – 640 µsec 100 MSPS 0,01 – 2560 µsec 25 MSPS
Delay	0,01 - 640 µsec 100 MSPS 0,01 – 2560 µsec 25 MSPS
Resolution	10 ns
Waveform	full wave, positive, negative, RF

Gates

Hardware gates	4 (overlapping), master gates, triggered on event
Software gates	more 4
Delay and range	0,1 - 640 µsec 100 MSPS
Resolution	10 ns
Amplitude detection	positive, negative or absolut
Alarm threshold	positive or negative
Interface echo triggering	depends on threshold

Digitizing

A/D converter type	sampling converter
Digitizing depth	14 Bit
Sampling rate	100 MSPS

Hardware depth compensation

Dynamic range	0 – 80 dB
Supporting points per channel	up to 1024
Amplitude resolution	0,25 dB
Range	full reception range
DAC steps	30 ns
Step resolution	10 ns (first step)
Sampling rate	20 dB/30 ns

Interfaces

Encoder	max. 4 potential-free ports* (0 – 24 V)
External trigger signal (input / output)	1 of each*
SYNC input / output	1 of each*
Customized I/O's	2 – 4 inputs* (0 – 24 V), 2 – 8 outputs* (Open-Collector)
Predefined I/O's	2 inputs (0 – 24 V), 1 output* (Open-Collector)
PC interface	USB 2.0
Connection for ultrasonic inspection probes	Lemo 00, socket

Speed of data acquisition

Data transfer rate	30 MByte/s (depending on channel)

HOST Computer (minimum requirements)

Port	USB 2.0
CPU	depends on application
RAM	depends on application
Hard disk	depends on application
Operating system	WIN XP/WIN 7, 32 Bit

General

Power supply unit	100 – 240 VAC/12 VDC
Power consumption	20 W (max.)
Operating temperature	5 °C up to 50 °C
Splash water protection	IP 65
Dimensions	w x h x l 189 x 58 x 195 mm (7,44 x 2,28 x 7,67")

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- accredited acc. to DIN EN ISO / IEC 17025:2005
- certified acc. to ISO 9001:2008 / EN 9100:2009