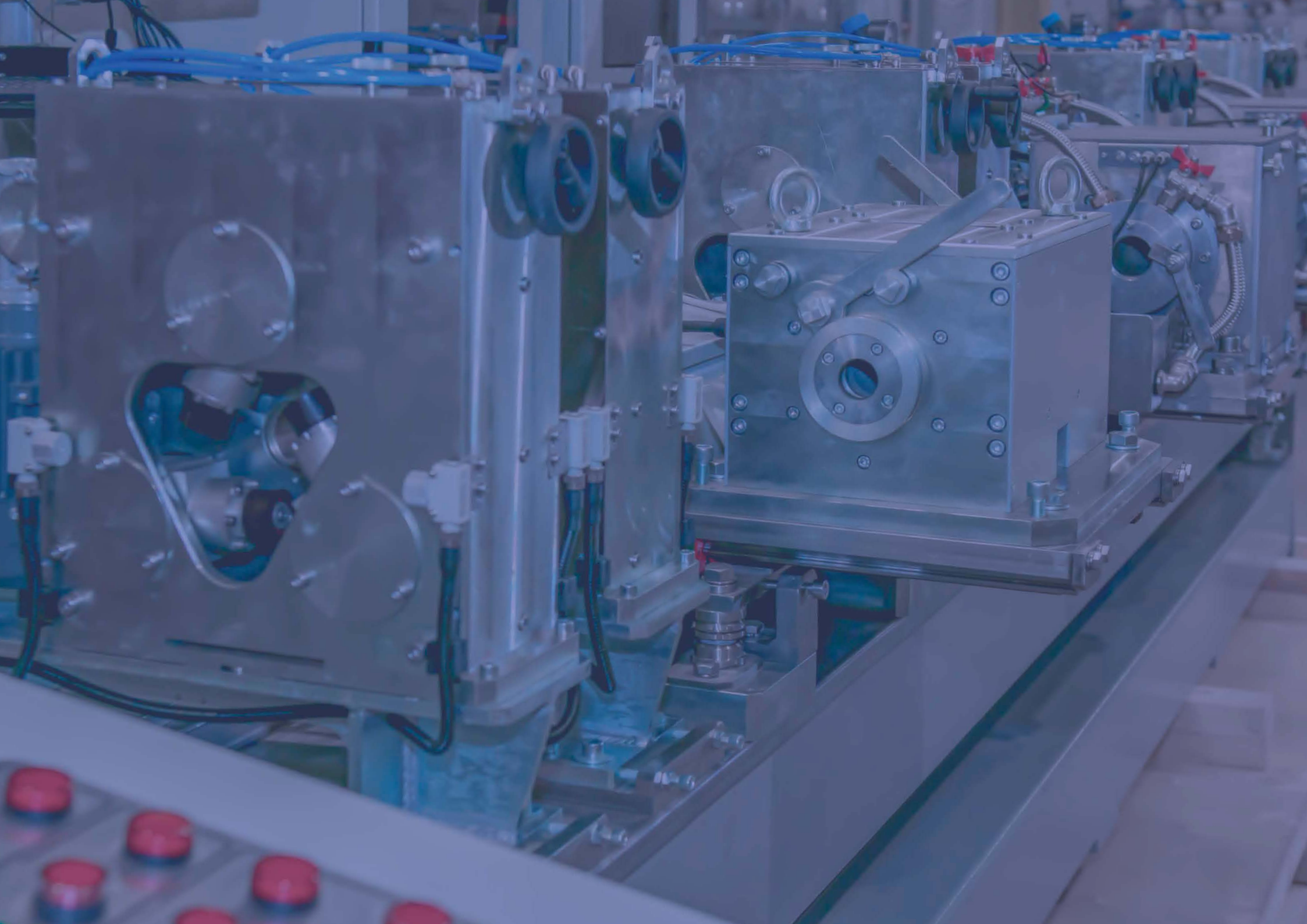
AUTOMATED UT SYSTEM ROTARY TYPE

for pipe and bar inspection

PRUF TECH

HIGH-SPEED
ULTRASONIC INSPECTION

PIPE DIAMETER
FROM 4 TO 180 mm



Application

The automated rotary type inspection system is designed for high-speed ultrasonic testing (AUT) of pipes and bars made of various grades of steel with diameters from 4 mm to 180 mm.

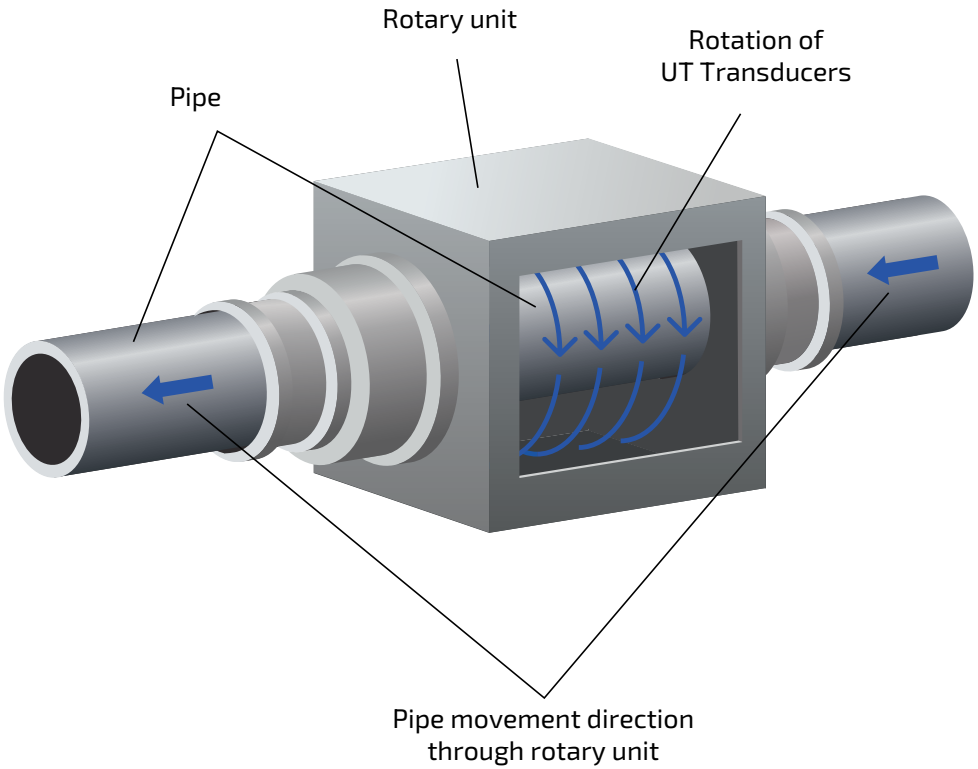
Inspection objects

- Seamless and welded pipes
- Heat exchanger pipes
- Oil and gas pipes
- Boiler tubes
- Round billets
- Hot-rolled bars
- Finished bars

Inspection scheme

In the rotary type AUT system, the unit with transducers rotates around the object being tested. Meanwhile, the object (pipe or round bar) moves through the unit.

This allows the transducers to scan the surface of the object in a spiral pattern. The AUT is performed using the immersion method, where water is supplied to the rotary unit during its rotation



Types of defects

Pipe inspection:

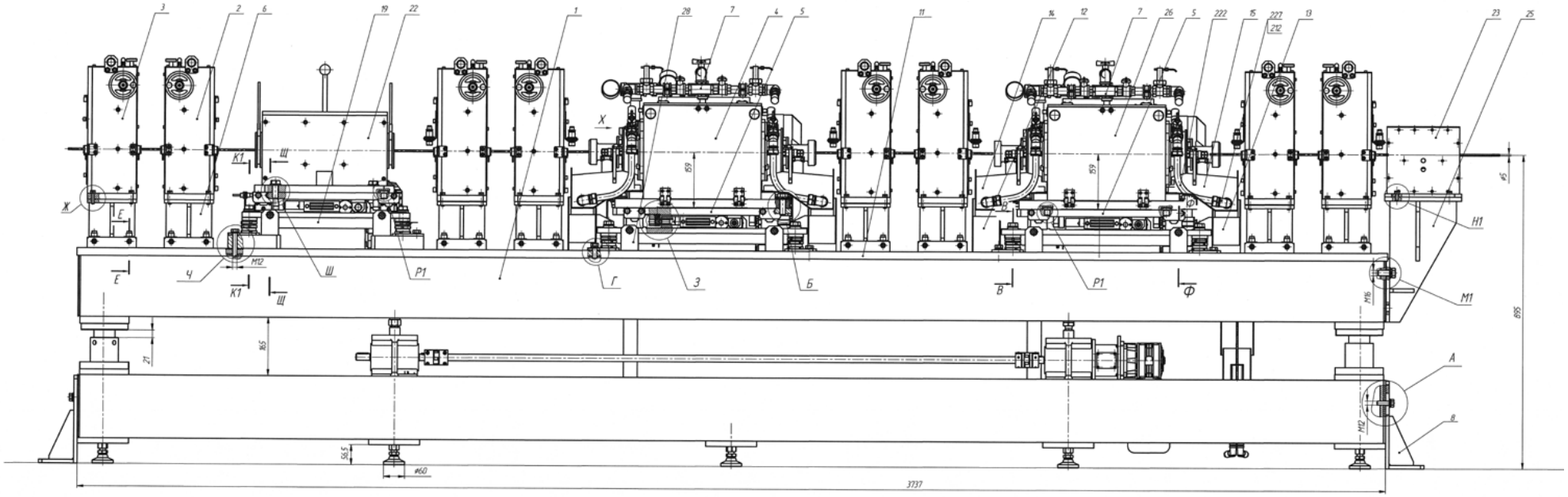
- Longitudinal and transverse defects
- Laminations
- Wall thickness measurement
- Outer and inner diameter measurement

Bar inspection

- 100% cross-section inspection
- Surface defects
- Internal structure defects
- Inclusions and other longitudinal and transverse defects

Features

- **Up to 16 positions for ultrasonic transducers** in one rotary unit, depending on the diameter of the inspected pipes. Transducers of various types can be installed depending on application.
- Possibility of **installing a double set of rotary units** in line to increase inspection speed.
- **Option to equip the system with additional inspection methods:** eddy current or magnetic induction depending on specification.
- Use of high-quality materials andup-to-date electronic base ensures long-term operation.
- **Easy maintenance and setup:** Rotary units can be moved out of the control line to a maintenance position for servicing and setup.
- **All system elements are centered** with an accuracy of ±0.05mm during assembly, ensuring safe and precise passage of the control object and enhancing result accuracy.
- **Durability:** Contactless signal transmission ensures long-term operation of the transducers, ease of maintenance at the customer s site, and excellent signal-to-noise ratio.
- **Reliability:** Synchronized with production speed, integrates into the overall production system at the customer s enterprise, providing reliable 24/7 control.
- **Informative inspection:** Defect locations are automatically marked on the pipe, and a detailed test report is issued for each pipe.



System components

- Rotary unit with sliding table
- UT electronics
- Control systems
- Height -adjustable test bench
- Tripple roll drives
- Water circulation system
- Flaw marking system
- Software

Rotary unit

Each rotary unit contains up to 16 positions of transducers. Transducers of various types can be installed depending on test specification, enabling different inspection configurations.

The contactless signal transmission ensures long-term operation of the transducers, ease of maintenance at the customer site, and excellent signal-to-noise ratio.

Rotary unit is installed on the sliding table for easy system setup and maintenance

UT Electronics

The UT electronics is based on fully parallel flaw detector UPNK, consisting of independent ultrasonic test channels.

The distinctive feature of the flaw detector is the parallel modular architecture, where each channel is an independent, interchangeable module connected to the control bus of the built-in interface controller, providing communication with a PC via LAN.

Flaw detectors can be networked for control from a single PC, with the possibility of synchronizing the start of measurements in the flaw detector channels with timing separation.

- Parallel start with a pulse repetition frequency of up to 10 kHz allows for high-performance inspection tasks.
- The test result contains the maximum amplitude and its time position in digital form.
- The number of control zones is 4, one of which can operate in immersion synchronization mode.
- Standard software solutions are available for the operation of devices in pipe inspection systems for the detection of longitudinal and transverse defects, laminations, wall thickness measurement, outer and inner diameter measurement.

Cabinets for electronics with Air conditioning

2 VXI racks, including an interface;
Multichannel flaw detector in a 19-inch rack;
19-inch TFT monitor* (can be changed by order)
Software
Rotating operation panel, printer, operator console

Water circulation system

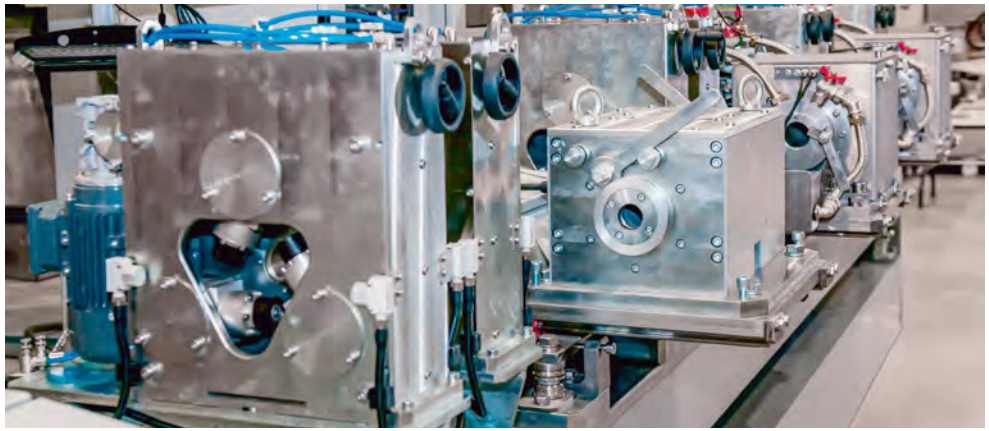
The water treatment and circulation system is designed for storage, purification, temperature maintenance, and supply of immersion liquid to the installation.

Normal water is used as the contact liquid in the line. The preparation system operates in a closed loop.

Temperature maintenance accuracy of the contact liquid ±2 °C

The system includes:

- Tank with filtration system;
- Temperature maintenance system (heating and cooling);
- Pump station;
- Fabric separator for preliminary cleaning and return of used liquid to the tank with filtration system.



Transportation mechanics of the Inspection Line

The mechanization system is designed to ensure smooth movement of the inspection object at a specified speed through the inspection units for accurate inspection results.

Tripple rollers are used for transportation, centering and pulling, located 2 at the input and output of the rotary unit.

Structurally, triple roll drive is a three-roller mechanism with rotation drive from an asynchronous electric motor.

The drive rollers have a pneumatic clamping and spreading system. The clamping force is manually adjustable by the operator.

All mechanisms are mounted on a frame with height adjustment capability depending on the diameter of the controlled pipe or bar.

Aquisition software

The software and hardware system for managing and registering the results of the ultrasonic system is designed to manage the operation of the measuring system and register test results.

The system provides:

- Input of signals from position sensors of the transportation system;
- Setup of operating parameters for the measurement system;
- Calibration of sensitivity;
- Input of initial data on the inspection object;
- Display of equipment status;
- Formation and storage of test reports for pipes / bars;
- Generation of reports and inspection protocols by batches, shifts, and dates;
- Print out of reports and inspection protocols;
- Data transmission to a local network;
- Data export to an external storage (FLASH cards).

Flaw marking system

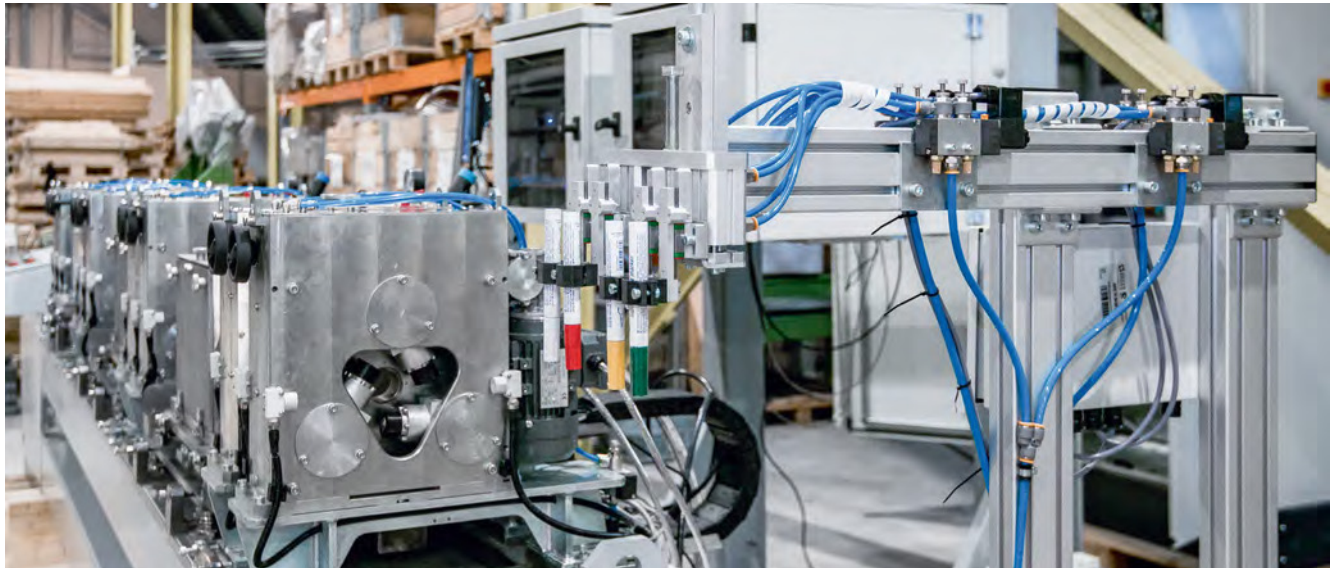
The flaw marking system is designed to mark sections of the inspected product with identified flaws.

- The number of marking channels is usually 4 (the number of channels is agreed with the customer);
- Marking accuracy in mm not more than ±50 mm;
- The marking mode is selected in the software system;
- marking is performed by a paint marker (the application method may differ)

Additional options

Optionally, the scope of supply may include transport mechanization for feeding pipes/bars into the inspection line and sort-out

- Loading table with dispenser;
- Input roller conveyor;
- Output roller conveyor
- Product sort out mechanism



Specification

Inspection system

Inspection objects: round-section pipes and bars made of various grades of steel

Types of Defects:

- Longitudinal and transverse orientation defects
- Oblique defects (optional)
- Laminations
- Wall thickness measurement
- Outer and inner diameter measurement

Power supply requirements:

Power supply: 3 phases + protective grounding conductor

Voltage: 400 V

Frequency: 50 Hz

Total power: 30 kVA (excl pipe handling system)

Water and Air

Water inlet for filling the immersion tank system
Water quality: industrial water with pH 7–8, 150–400 kPa, particles <100 microns

Compressed air: 300 kPa or higher

Foundation

The foundation for the test system is provided by the buyer according to the information provided by the seller after receiving the order.

Type	Inspection object diameter range, mm	Rotary unit speed, rpm	Inspection speed, mm/sec
UKV-25	∅ 4-25	4700	500
UKV-60	∅ 10-60	3000	500
UKV-90	∅ 20-90	3000	500
UKV-130	∅ 30–135	2000	1000
UKV-180	∅ 100-180	1500	1000

UPNK Flaw Detector (UT system)

Pulse Amplitude: square wave ±400 Vpp with adjustable fill frequency and number of half-cycles

Amplifier: 100 dB, step 0.5 dB, frequency range 0.5–15 MHz (-3 dB), 15 band-pass filters

Signal digitization: 100 MHz, 10-bit

Time measurement:

- by maximum,
- by front,
- by zero crossing,
- resonance thickness measurement method from 0.2 mm with an accuracy of ±1%

Operating system: Windows 64-bit

Pulse repetition frequency: 10,000 kHz

Scalability by increasing the number of channels

Number of inspection zones: 4

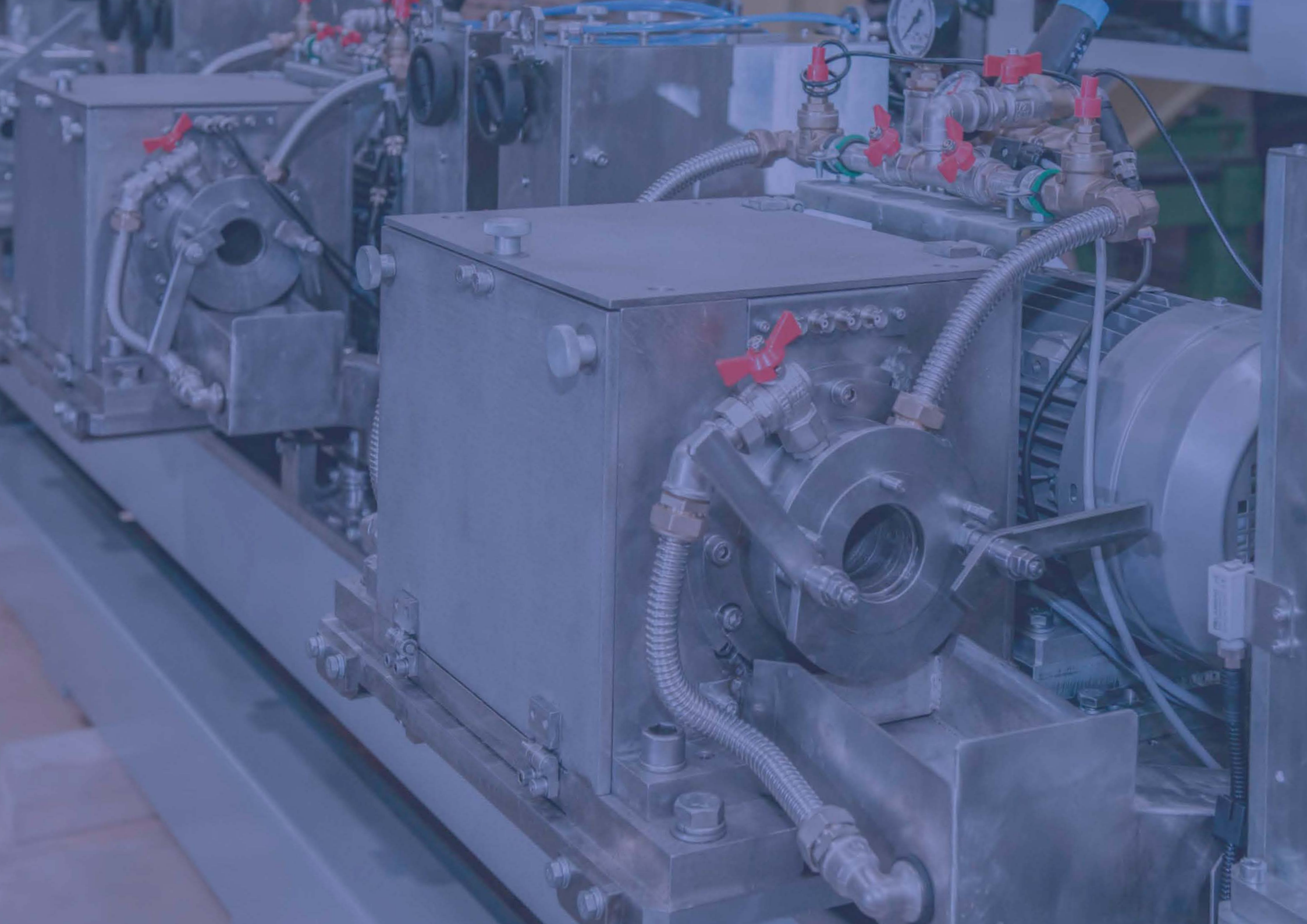
Immersion synchronization zone

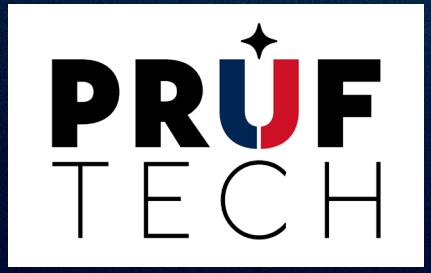
Channels operation mode - Parallel

Scalability by increasing the number of channels

Self-check and diagnostics functions

Geometry control of products (outer and inner diameter, eccentricity)





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