DR SYSTEMS

DR SYSTEMS

INNOVATIVE TECHNOLOGIES IN INDUSTRIAL RADIOGRAPHY

WWW.DR-SYSTEMS.COM

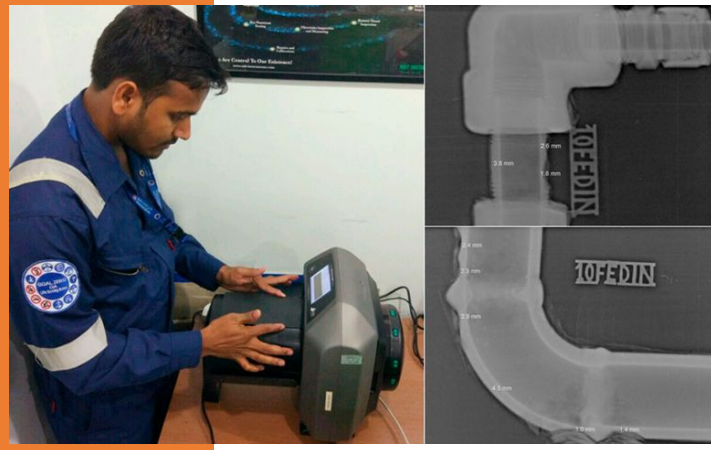
HISTORY OF DR SYSTEMS GROUP OF COMPANIES

1991	The first company of the Group was founded in as a supplier of Agfa X-ray films and ERESCO X-ray generators.
2006	The company became an official distributor of GE with annual sales of over 600 000 m^2 of X-ray films.
2011	A new division of our business launched — Digital Radiography (DR).
2015	Start of sales of our first DR system XPRESS-SCAN® — automatic solution for fast and convenient inspection of pipeline welds.
2019	Introduction of SCANRAY® — a portable wireless DR system.
2024	DR SYSTEMS is an advanced manufacturer of digital radiography solutions with offices, production facilities and training centers in Russia, Kazakhstan and South Korea. We have supplied more than 1 200 of our complexes to a great number of projects all over the world.

TYPES OF RADIOGRAPHIC TESTING

X-ray
film

Computed
Radiography (CR)

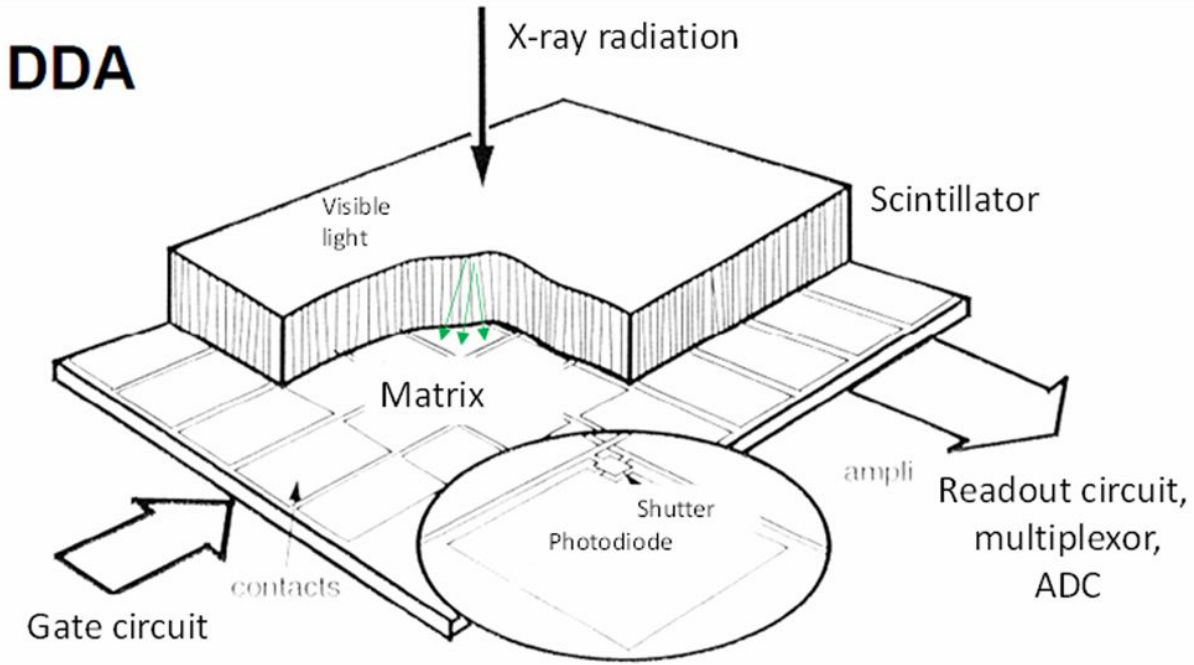


Direct Digital
Radiography (DDR)

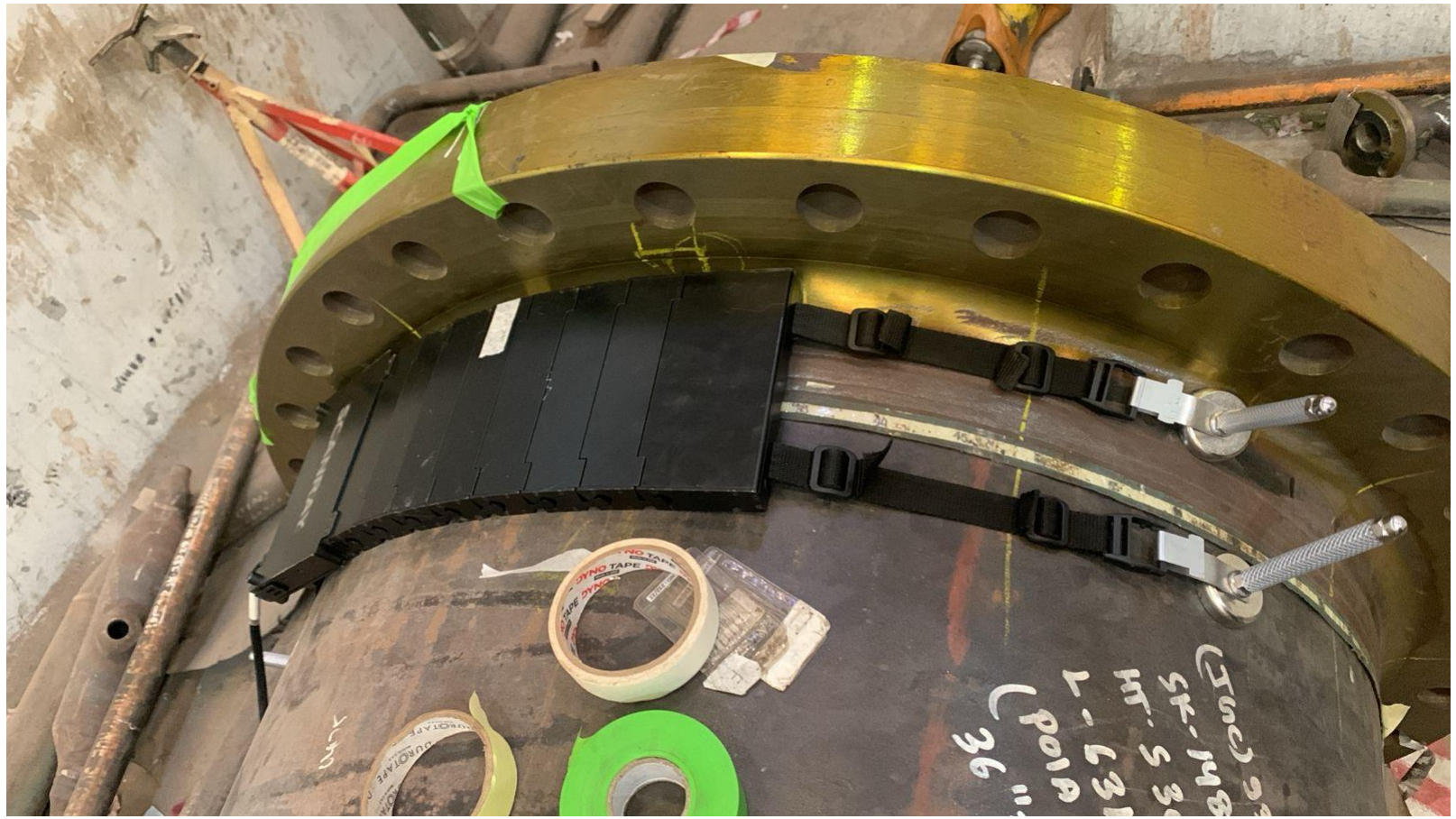
Direct Digital Radiography – How does it works?

Digital Detector Array (DDA)

DDA Construction (a-Si)



Direct Digital Radiography – Still RT



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X-RAY FILM

DR ADVANTAGES OVER X-RAY FILM FOR THE NDT LAB

- Digital X-ray detectors are 10 to 40 times more sensitive compared to D7 film. That means 2-10 times increase in labor productivity.
- Lower image cost: starting from 0.7 USD/image with DR against approximately 5 USD/image with D7 Pb film.
- Remote image interpretation, no need for a level 2 NDT expert on the work site.
- No need for a film development room/vehicle.
- No need for the utilization of chemicals.
- Possibility of determining the depth of a defect with a two-angle exposure.
- Possibility of carrying out corrosion monitoring, even for pipes with the product and insulation.
- Lower radiation dose rate and a reduction in the radiation zone.
- Comfort of working with radiographic images (scaling, filtering, adding comments and markers, etc.).

DR ADVANTAGES OVER X-RAY FILM FOR THE PROJECT OWNER

- Inspection reports and data are 100% reliable thanks to the protected DICONDE format.
- Instant inspection results with the ability to quickly adjust welding parameters minimize project delays.
- Provides the possibility to eliminate the human factor when determining the sensitivity of control thanks to software tools.
- The exact date, time and GPS coordinates can be defined automatically and stored as a part of the data file to prevent confusion or fraud.
- Increased quality of control helps to improve weld quality.
- A digital library of the inspection results allows quick finding of any data, statistics preparation, etc.

FILM DIGITIZING IS NOT THE SOLUTION

Significant time wastes on the additional function and extra labor cost

The need for certification and periodic monitoring of the equipment

The need to train a large number of specialists (for each team)

High cost of digitizing equipment to create a 100% digital archive

The unsuitability of film digitizer for mobile use

The need to purchase expensive equipment for each NDT team

Serious problems with equipment failure

The inefficiency of using expensive digitizing equipment

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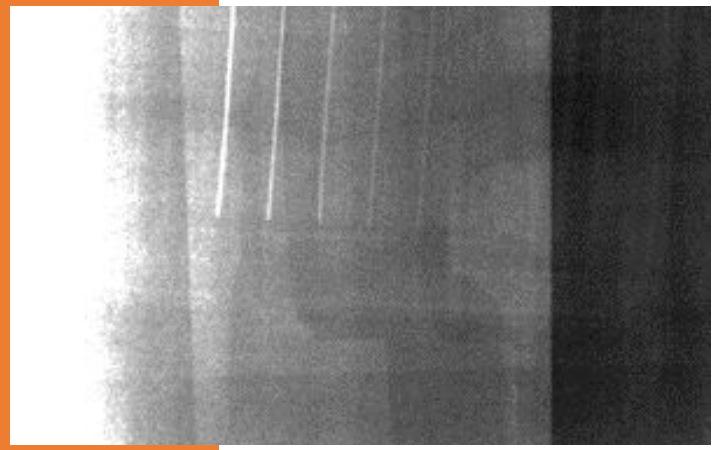
COMPUTED RADIOGRAPHY

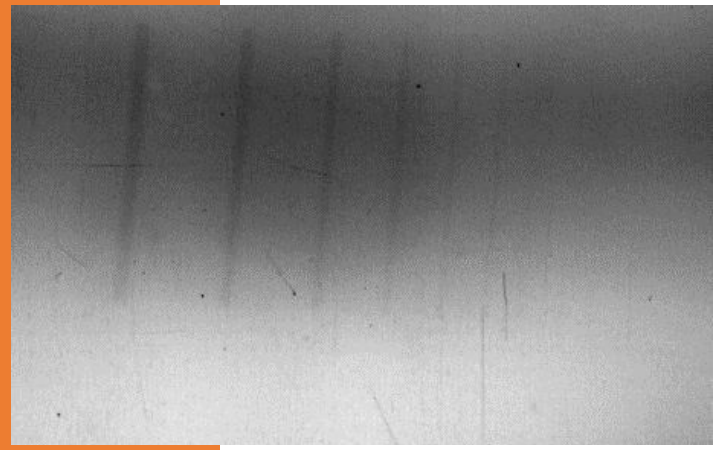
MAIN PROBLEMS OF COMPUTED RADIOGRAPHY

Afterimage



The image does not completely disappear after erasing.

Plate wear



All damages are visible in the image.

No immediate result

Stationary scanners are required for image transition and erasing.

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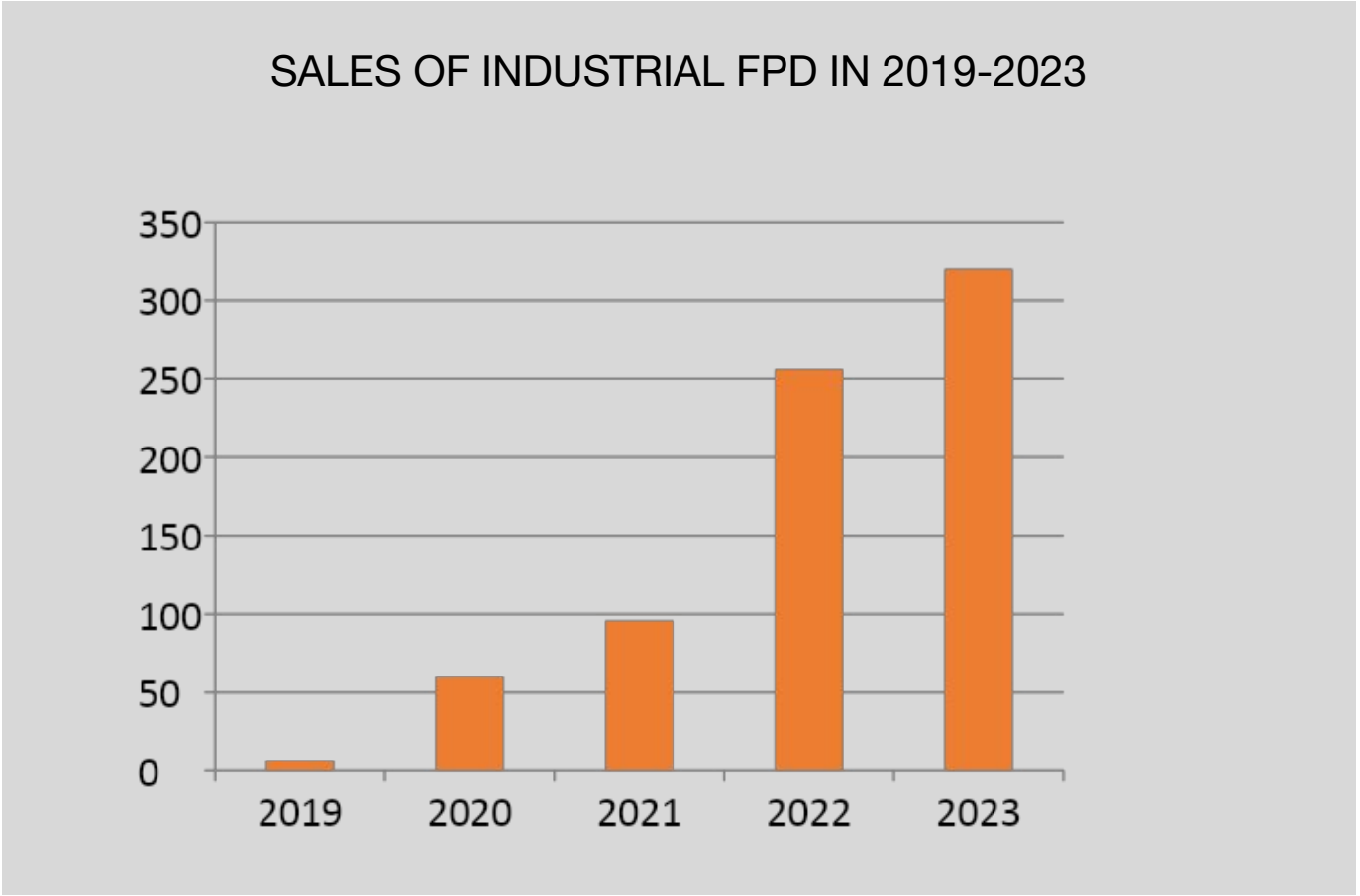
DIGITAL RADIOGRAPHY

CURRENT DEVELOPMENT STAGE OF THE INDUSTRIAL DR TECHNOLOGY

The technology has passed into a mass implementation stage.

Numerous companies in many countries have already successfully adopted the detectors for various applications weld inspection and corrosion monitoring.



RELIABILITY AND DURABILITY OF DETECTORS

Many detectors are being used in the harshest field conditions, from -40°C to +50°C.

The radiation hardness of our detectors makes it possible to use them for such applications as pipe mill inspection: 24 hours × 7 days, 1800 W, 225 kV, 40 cm SSD for as long as 7 years since 2016.

The number of detectors sent to the factory for repair during the last 5 years was 15 out of 1 000 devices.

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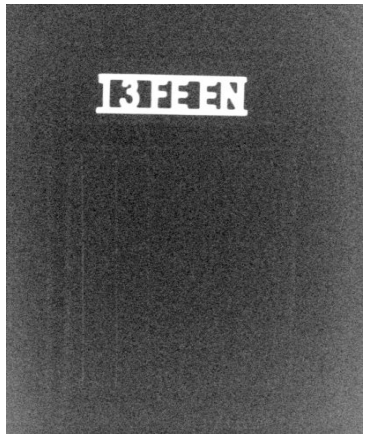
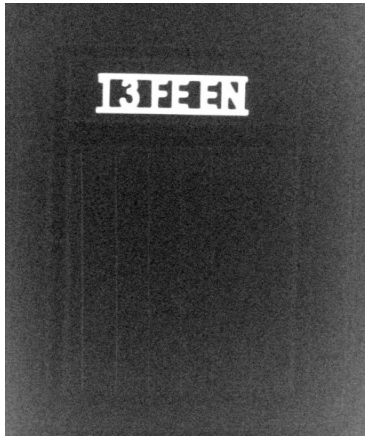
SENSITIVITY IN DIRECT DIGITAL RADIOGRAPHY

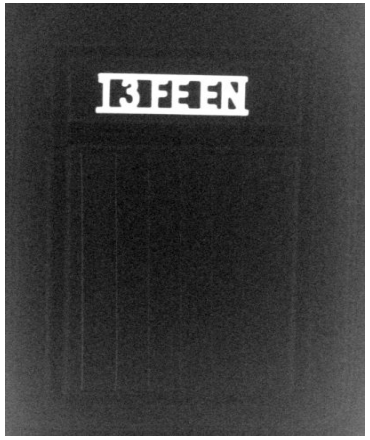
Shifting to direct radiography is the best way to improve the inspection sensitivity. The image quality can be enhanced by increasing exposure time per frame or the number of frames, which is impossible when using other types of radiographic inspection.



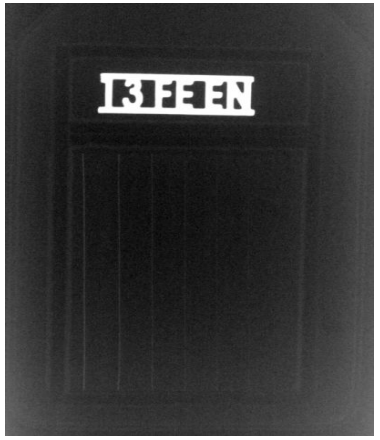
1 sec exposure



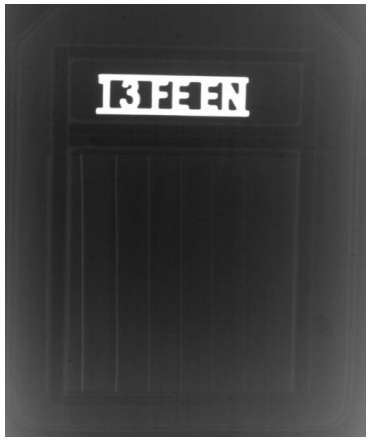
2 sec exposure



4 sec exposure



8 sec exposure



16 sec exposure

WHAT WE OFFER

HIGHEST IMAGE QUALITY

DR SYSTEMS offers the highest image quality in the portable digital radiography industry.

RELIABILITY

Our systems are designed for extreme outdoor operations, so we use only the best components.

SIMPLICITY OF USE

The lightest detectors, intuitive software and user-friendly overall system make our equipment effortless to set up and operate.

PROFESSIONAL SUPPORT

Fast response, the expertise of our team brings you the right solution.

DR SYSTEMS

SCANRAY® SERIES

Industrial portable Digital Detector Array (DDA) system aimed at replacing X-ray film and phosphoric plates in radiographic inspection of various objects.

Available in several specifications with a pixel pitch of 75-140 microns to fit the exact needs of our partners.

Image is saved in protected digital format DICONDE and can be transmitted immediately to remote location for interpretation.

DR SYSTEMS

TECHNICAL SPECIFICATIONS OF SCANRAY® SERIES

PORTABLE DR SYSTEMS	SCANRAY® 1230	SCANRAY® 1723	SCANRAY® 2329	SCANRAY® 2532	SCANRAY® 3643	SCANRAY® 3643 PRO
Scintillator	Gadox	Gadox	Gadox	Gadox	Gadox	Gadox
Pixel pitch, µm	124	75	75	124	140	99
Image size, mm (inches)	127 × 317 (5.0 × 12.5)	173 × 230 (6.8 × 9.1)	230 × 288 (9.1 × 11.3)	254 × 317 (10.0 × 12.5)	358 × 430 (14.1 × 16.9)	351 × 427 (13.8 × 16.8)
Pixel matrix, pixels	1024 × 2560	2304 × 3072	3072 × 3840	2048 × 2560	2560 × 3072	3548 × 4316
Grayscale, bits	16	16	16	16	16	16
X-ray voltage range, kVp	40-450	40-450	40-450	40-450	40-450	40-450
Max exposure time, s	180	180	180	180	180	180
Image transmission time, s	1.5-3	1.5-3	1.5-3	1.5-3	1.5-3	1.5-3
Dimensions, mm	160 × 400 × 25	208 × 257 × 28	322 × 355 × 17	322 × 355 × 17	400 × 470 × 17	384 × 460 × 15
Weight, kg	3.2	2.4	3.4	3.4	5.4	4.2
Operating environment, °C	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50	-20 to +50
Battery life, h	7	7	7	7	7	7
Dust and water resistance	IP67	IP67	IP67	IP67	IP67	IP67

CONTENTS OF DELIVERY OF SCANRAY® SERIES

Computer mouse

Additional Wi-Fi module

Magnetic holders

Detachable detector handle

Lashing straps

Laptop with pre-installed software DR-SOFT®

Industrial tablet with pre-installed software DR-SOFT®

Detector in the universal protective cover

Wire set

2 sets of batteries with the charger

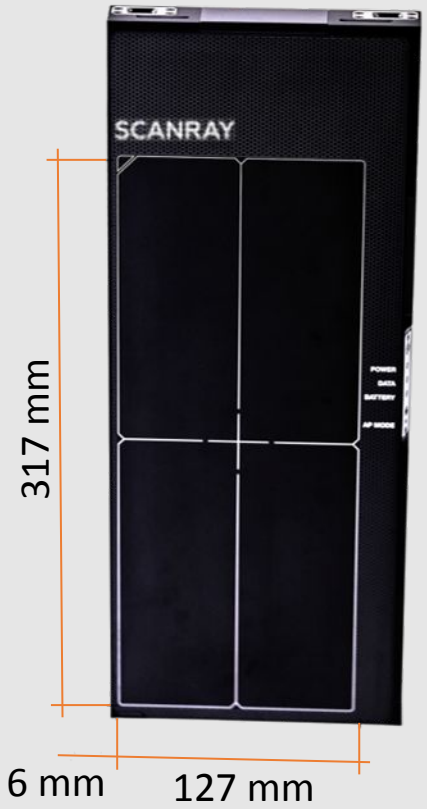
SCANRAY® 1230 – A UNIQUE COMBINATION OF PARAMETERS AND CAPABILITIES

The optimal size of the active area: 127 × 317 mm with a minimum distance from the edge of the detector housing along the long side of 6 mm.

Can work with X-ray generators of constant potential of up to 450 kV and with all models of half-sine and pulsed X-ray generators as well as Se-75 and Ir-192.

The pixel size of 124 µm, the grayscale of 16 bits and the minimal noise level of the detector make it possible to obtain a digital radiographic image of the highest quality.

The detector's low weight of 3.2 kg and the use of wireless Wi-Fi communication technologies provide an unsurpassed level of mobility and convenience in real working conditions.



ADDITIONAL ACCESSORIES FOR SCANRAY®

MAGNETIC HOLDERS

Used for mounting a flat-panel detector in a protective cover on objects made of magnetic metals. They allow easy changing of the detector's position on the control object by switching off magnetic systems.

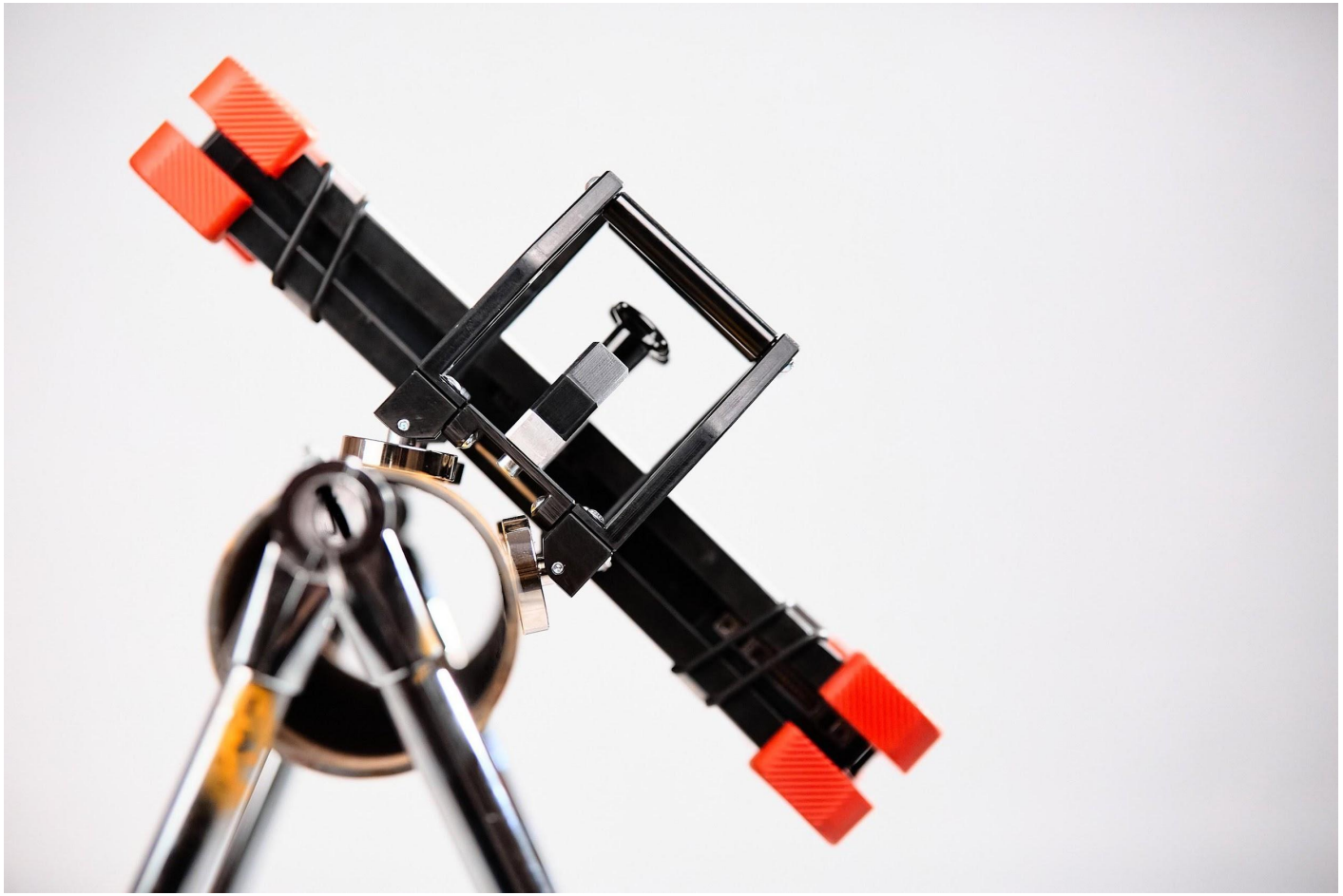
MAGNETIC WHEELS

Used for positioning the detector in the protective cover on pipes and flat surfaces of objects made of ferromagnetic steel. An additional magnet performs the function of an anchor and prevents the device from rolling off the inclined surface.

Subsequently, one can get the entire weld in one image using the image stitching function in DR-SOFT®.

BELT MOUNT

Intended for positioning the flat-panel detector in the protective cover on objects made of non-magnetic materials.



SCANRAY® 1025F and 1043F – Bendable revolution

SCANRAY® F is a cutting-edge flexible wireless DR system designed to revolutionize industrial radiographic testing of pipes and tanks. Traditionally, such inspections have relied on conventional X-ray films or flexible CR plates due to their compatibility with curved surfaces.

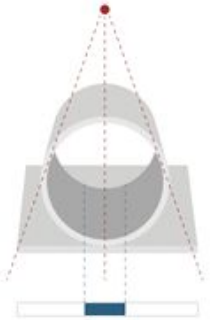
However, these methods pose challenges related to extended exposure times, intricate imaging processing procedures and dependence on consumables.

The SCANRAY® F complex addresses these limitations by offering a solution to eliminate image distortion on curved inspection objects, overcoming a significant

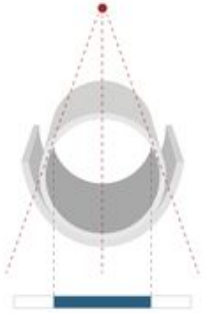
drawback of ordinary digital flat-panel detectors.

The main feature of the **SCANRAY® 1025F and 1043F** systems is its flexible detector, which can adapt to different inspection objects, ranging from cylindrical to flat shapes

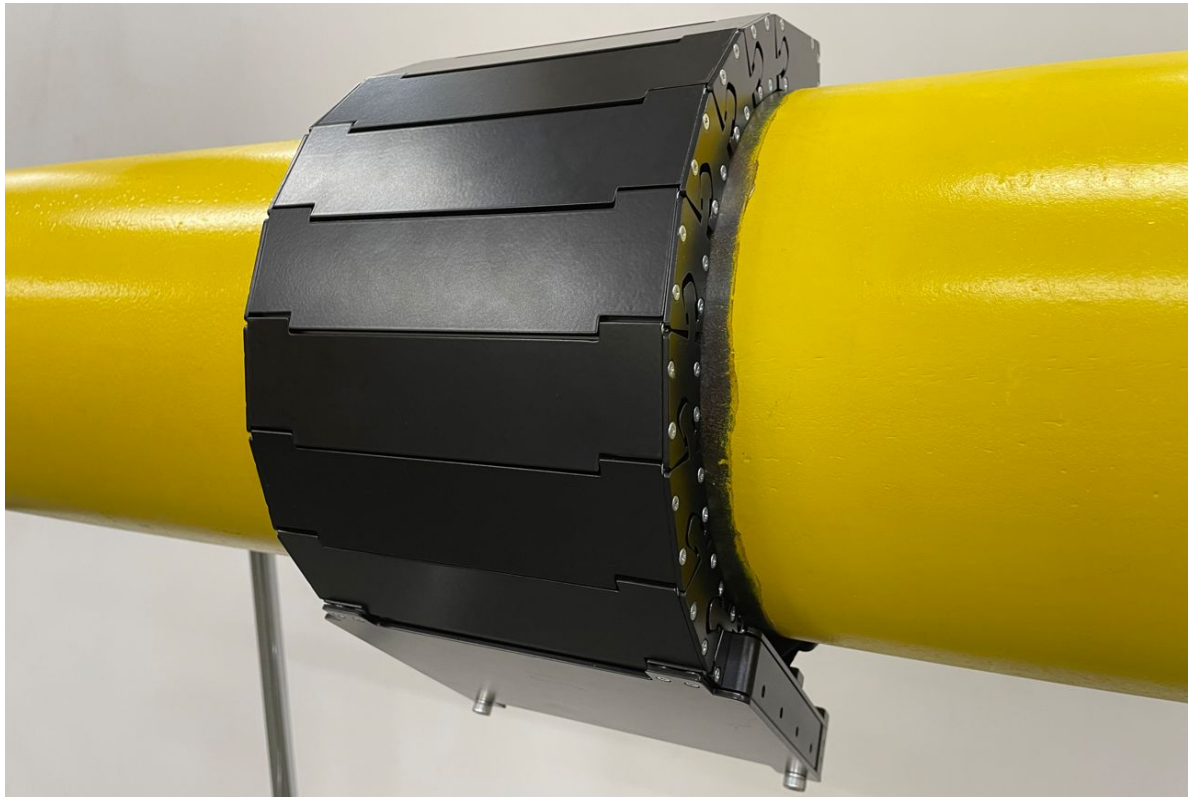
Parameter	SCANRAY® 1025F	SCANRAY® 1043F
Technology	Flexible TFT, a-Si	Flexible TFT, a-Si
Scintillator	Gadox	Gadox
Pixel pitch, µm	99	99
Pixel matrix, pixels	988 × 2524	988 × 4316
Image size, mm	98 × 250	98 × 427
Grayscale, bit	16	16
X-ray voltage range, kVP	40 - 450	40 - 450
Maximum exposure time, sec	180	180
X-ray sensor	AED	AED
Dimensions, mm	182 × 453 × 20	182 × 633 × 20
Weight, kg	1.5	1.7
Battery life, h	7	7
Dust and water resistance	IP67	IP67



An image of curved object obtained with flat panel detector

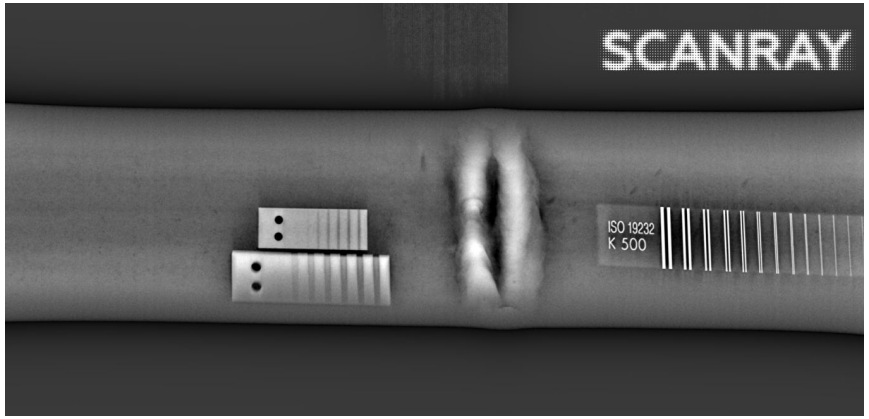


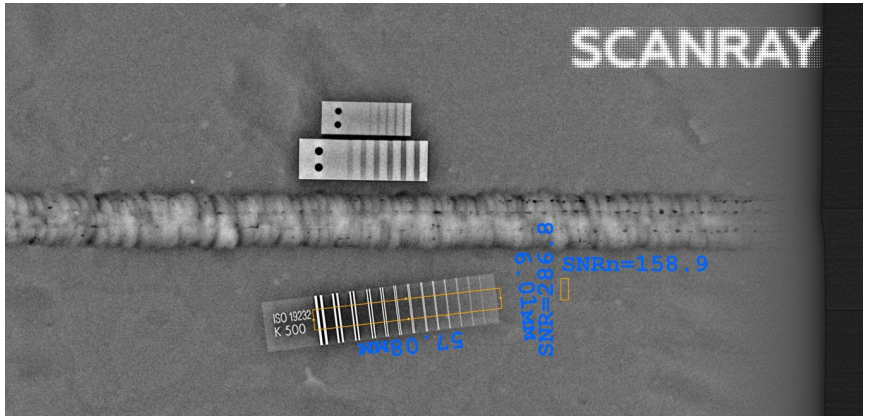
An image of curved object obtained with flexible detector

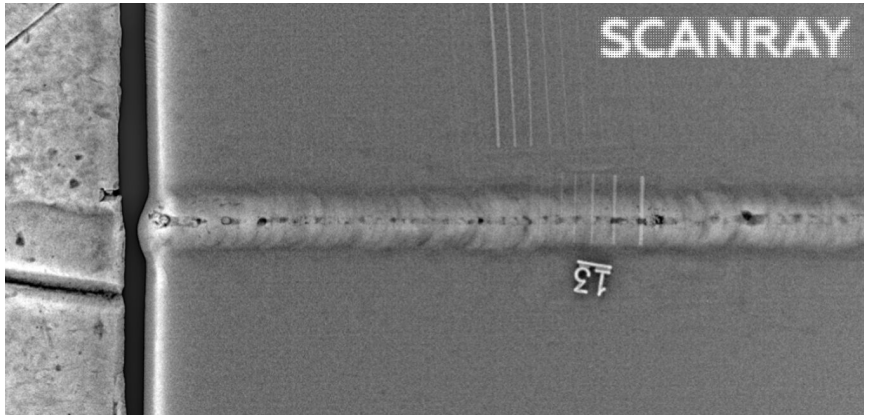


DR SYSTEMS

IMAGES TAKEN WITH SCANRAY® SERIES







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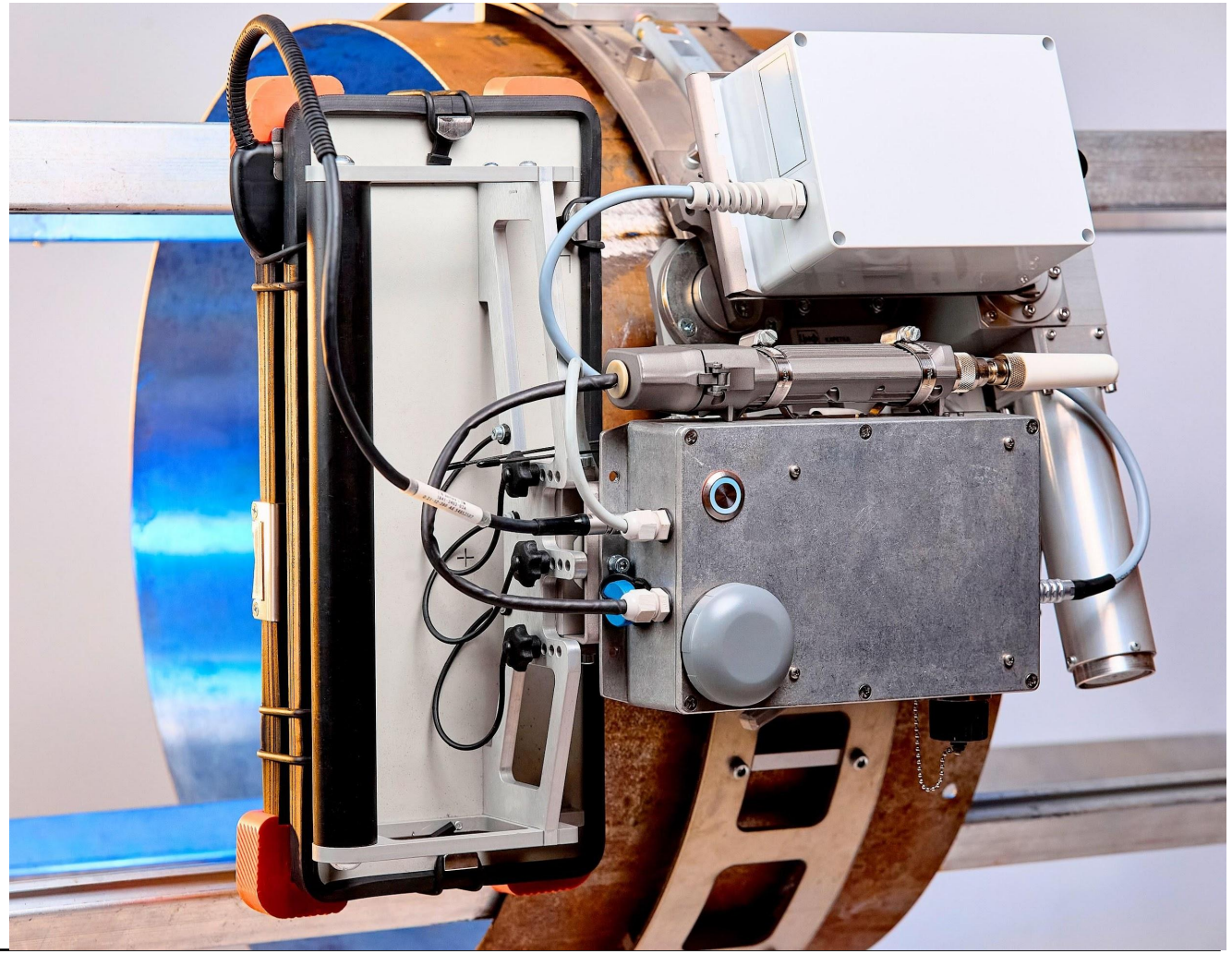
XPRESS-SCAN®

XPRESS-SCAN® – AN AUTOMATIC PIPE WELD INSPECTION X-RAY SYSTEM

A know-how mobile digital radiography system, which is used for single- or double-wall inspection of annular pipe welds from 6” and more in pipeline construction, maintenance or repair.



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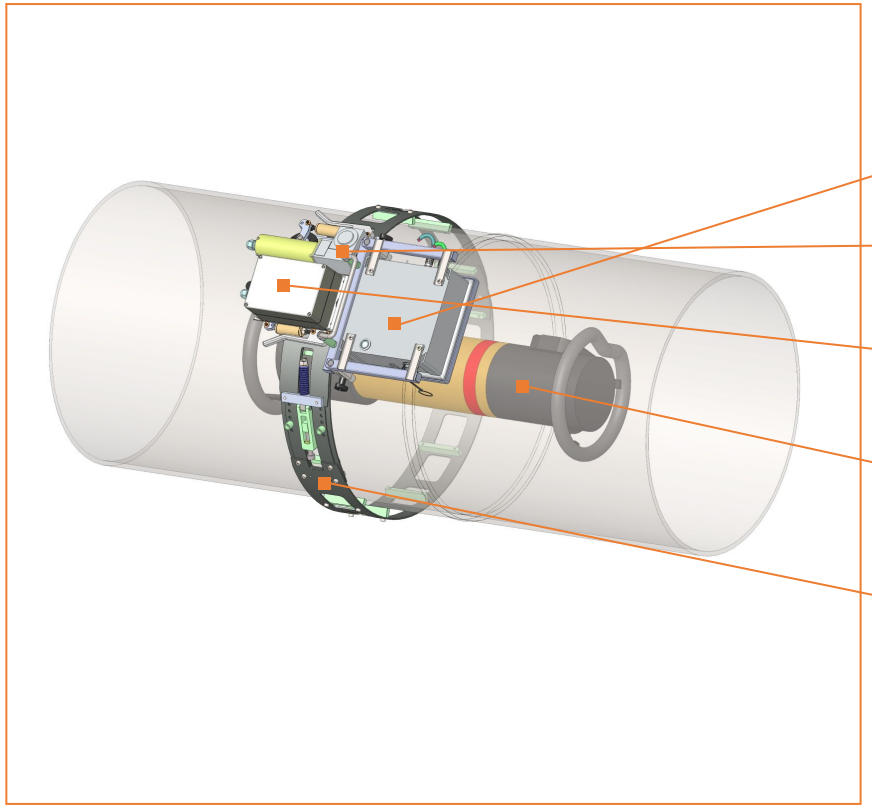
ADVANTAGES OF XPRESS-SCAN®

- Automatic control of the whole weld joint in one go without operator involvement.
- A short time of control: a single digital image of the whole annular pipe weld will be ready in just a few minutes.
- Installation time on the pipe weld: 1-2 minutes.
- Battery operated.
- Instant wireless data transfer.
- Compatible with any X-ray or Gamma source and any crawler.
- The internal storage of control results to make sure nothing is lost in case of wireless connection problems.
- Use of protected image format under DICONDE protocol.
- Can be supplied with constant-potential X-ray generators from the world's leading manufacturer – TELEDYNE ICM.
- Complete set of accessories for easy start of operations.

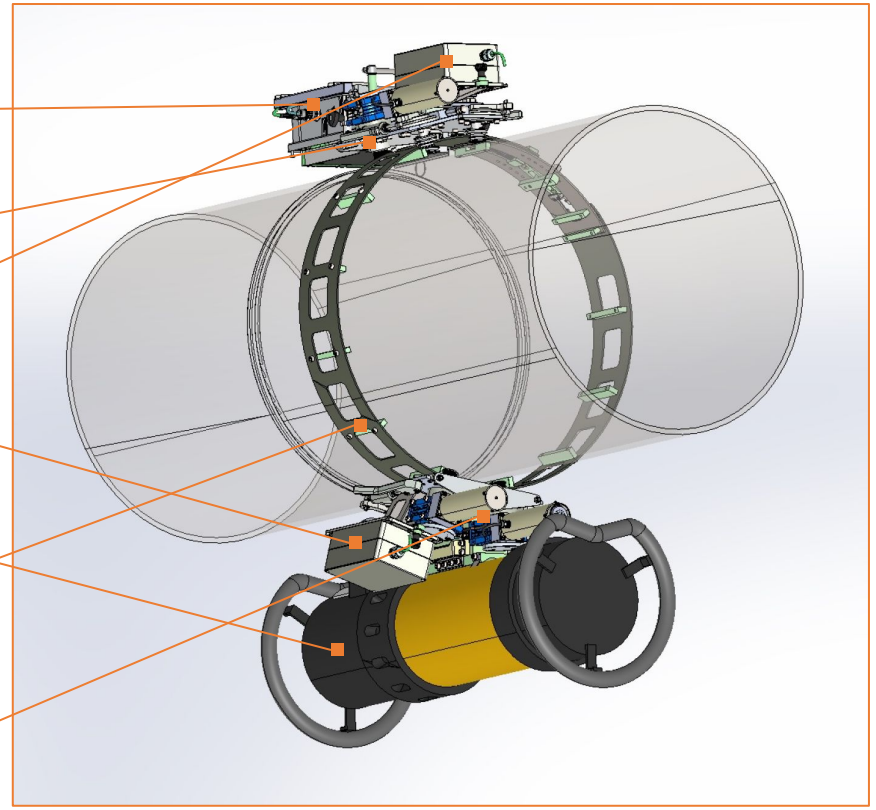
XPRESS-SCAN® APPLICATION VARIANTS

LAYOUT XPRESS-SCAN®



- Detector unit
- Detector carriage
- Battery
- X-ray source
- Pipe band
- X-ray source carriage

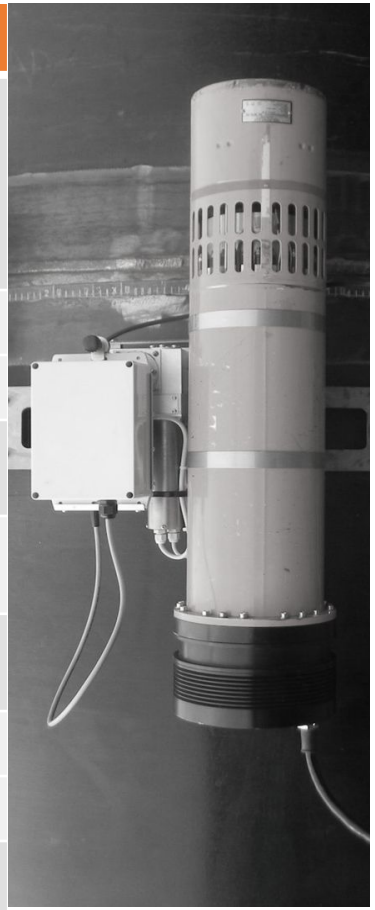
LAYOUT XPRESS-SCAN® DW



CONTENTS OF DELIVERY OF XPRESS-SCAN® DW

TECHNICAL SPECIFICATIONS OF XPRESS-SCAN®

	XPRESS-SCAN®	XPRESS-SCAN® DW
Detector	SCANRAY® 1230 Pixel pitch: 124 µm Image size: 127 × 317 mm (5.0 × 12.5 inches) X-ray voltage: up to 450 kVp Operating environment: -20°C to +50°C	
Productivity	6 min/weld	16 min/weld
	Pipe D = 1420 mm (56”), 21 mm thickness	
Image storage capacity	200 data files	
Data transfer	Data transfer to the operator’s laptop with Wi-Fi, up to 300 m. Data storage: internal memory of the detector; in case of Wi-Fi connection failure, the exposure continues, and the data is secured	
Power supply	110-220V AC detector power supply: 4 Li-Ion batteries (UN 38.3 certified). Battery life: 3 hours × 4 batteries = 12 hours	An additional set of 4 Li-Ion batteries for X-ray carriage
System’s dimensions and weight	1 transportation case of 860 × 560 × 360 mm, 30 kg	2 transportation cases of 860 × 560 × 360 mm, a total of 55 kg
	Titanium pipe band of 1420 mm (56”): 1000 × 130 mm, 7 kg	
Dust and water resistance	IP67	



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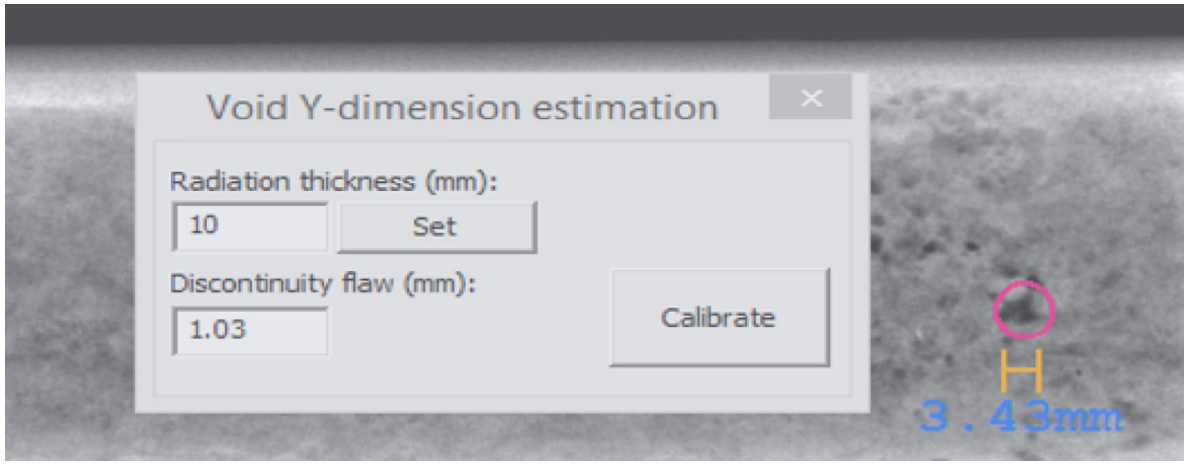
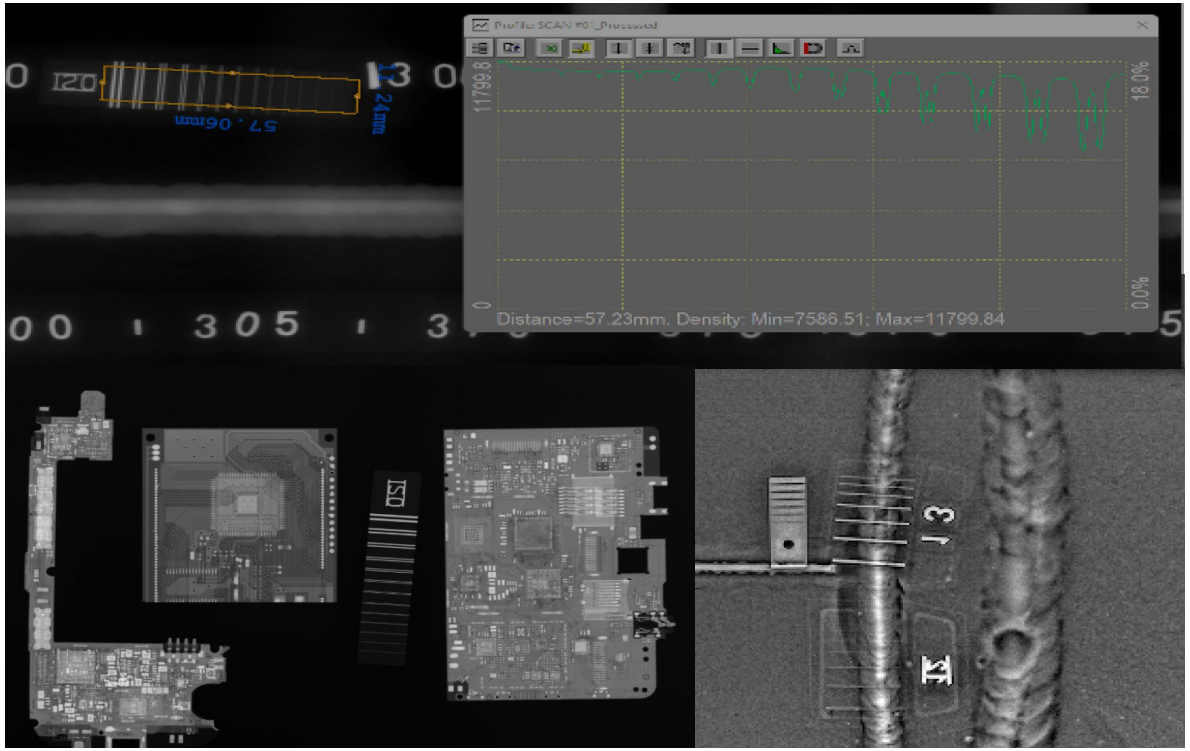
DR-SOFT®

DR-SOFT® DIGITAL RADIOGRAPHY SOFTWARE

The in-house software is intended for obtaining static and dynamic radiographic images from various devices, processing the resulting image, measuring linear dimensions and intensity/optical density on the image, automated filling in the inspection protocol, archiving images and control results in the database.





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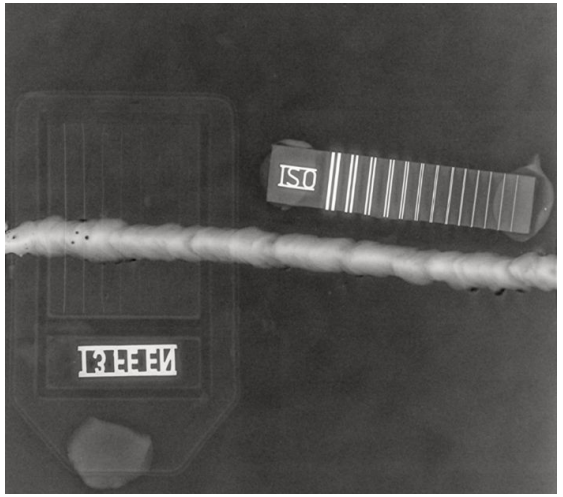
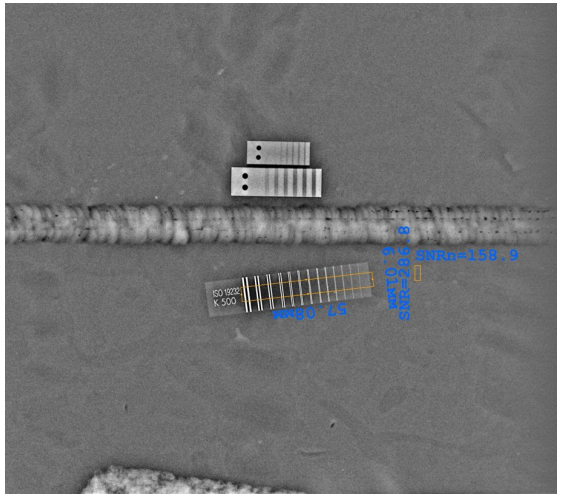
FEATURES OF DR-SOFT®

- Measuring the linear dimensions and area of defects, the distance between any points on the image.
- Measuring metal thickness at any point of the image (after calibration).
- SNR/SNR_N automatic evaluation, SR_b determination by duplex IQI according to ISO 17636-2.
- Image inversion (positive/negative), setting the optimal image brightness and contrast.
- Geometric image transformation: scaling, rotation, mirroring, fragment cutting.
- Pre-installed filters to notice all defects with one click, fine-tuning of the filters operation parameters.
- Markers drawing (signs, text, arrows, etc.).
- A built-in algorithm for stitching several images into one for convenience of viewing.
- Advanced histogram tools.
- Possibility of recording all dimensions in the inspection protocol.

DATA FORMAT OF DR-SOFT®

- Saving images with metadata in DCM format (DICONDE standard).
- Export of images to BMP, JPEG (8-bit), TIFF (8 or 16-bit) and PNG (8 or 16-bit) formats.
- As metadata, one can insert information about the control object (material, thickness, seam number), exposure parameters (generator type, voltage, exposure time), etc.
- Viewing images with metadata on any third-party computer using a free DR-SOFT® viewer.
- Printing of images in 1:1 scale for marking the areas to be repaired.
- Metadata is attached to the image and can be easily viewed, automatically entered into protocols and used for searching.
- Edit-protected DCM format allows storing up to 100 images in one file with 16-bit data representation (65536 grayscale).





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EXPERIENCE AND SERVICE

APPLICATION OF OUR SYSTEMS WORLDWIDE

DR SYSTEMS is an exclusive supplier of digital radiography solutions to Gazprom Holding.

Our complexes have been successfully tested in all climate zones from -42°C in Lensk (Siberia, Russia) to +50°C in California (USA).

More than 1 200 of our systems operate all around the world: over 900 SCANRAY® and 320 XPRESS-SCAN® complexes.

APPLICATION ON CRITICALLY IMPORTANT PROJECTS

Oil-trunk pipeline “Power of Siberia”: construction and control at extreme conditions with temperatures as low as -42°C.

Compressor stations “Russkaya” (“Nord Stream”) and “Portovaya” (“Turkish Stream”): control of pipes with a metal thickness of 39 mm through 2 walls.

Gas-trunk pipeline “Nord Stream”: double-wall control on-land.

Oil-trunk pipeline “Tikhoretsk-Novorossiysk-2”.

Production service base “Neryungri”.

Oil-trunk pipeline “Krasnoyarsk-Irkutsk”…

APPLICATION ON CRITICALLY IMPORTANT PROJECTS

NDT of 813x39 pipes at the compressor stations “Russkaya” (“Nord Stream”) and “Portovaya” (“Turkish Stream”):

- Double-wall control scheme.
- Source: ERESCO 65 MF4 X-ray generator.
- Focal length: 1000 mm.
- Operating mode: voltage 295 kV, current 3 mA.
- Exposure mode: 5 × 20 sec = 100 sec/frame.
- Number of frames: 23.
- The total time of joint control: 42 min.
- Control quality achieved: Class A according to ISO 17636-2.

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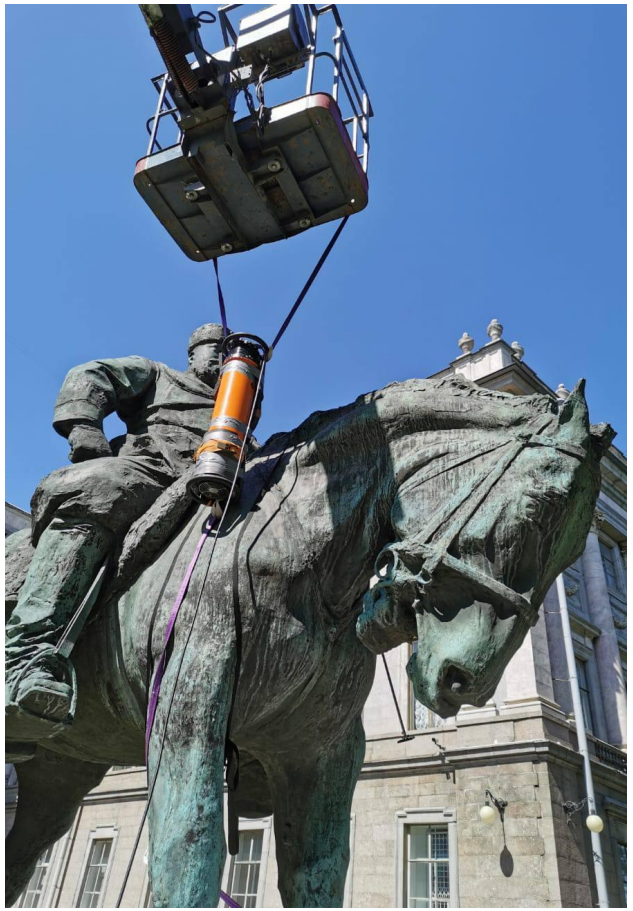
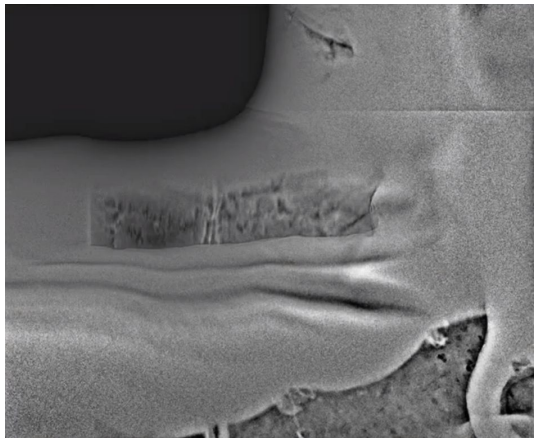
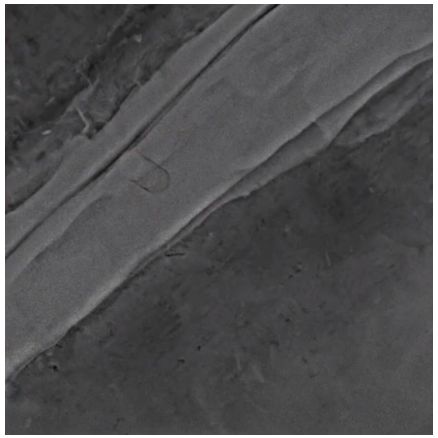
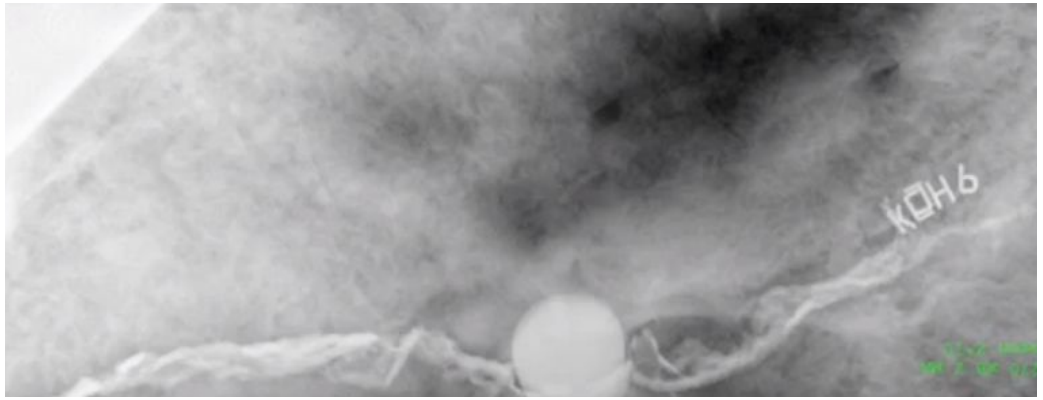
NON-STANDARD OBJECTS CONTROL (MONUMENT TO ALEXANDER III)



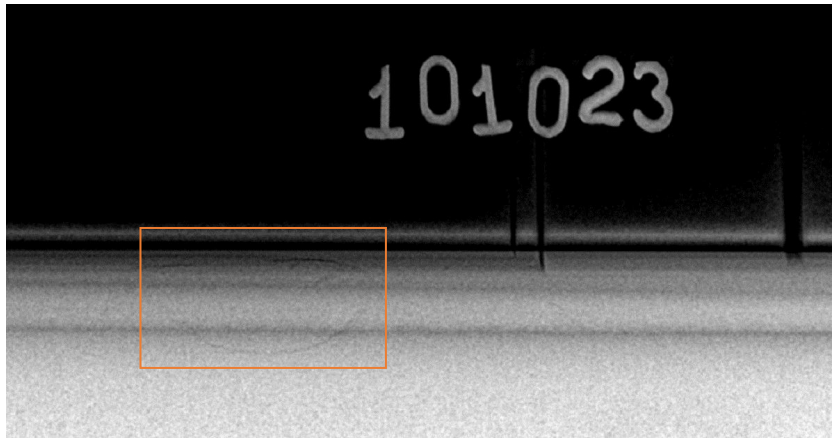


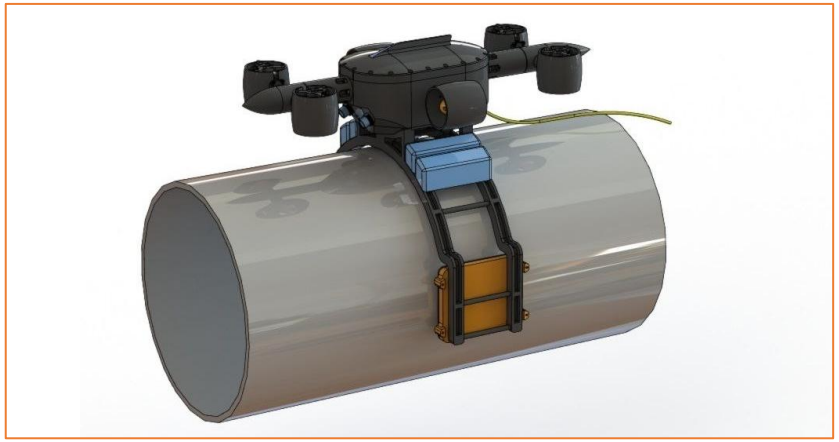


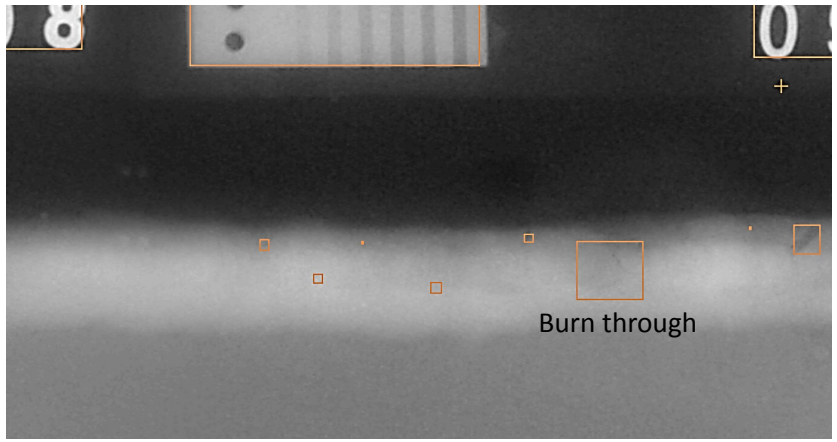


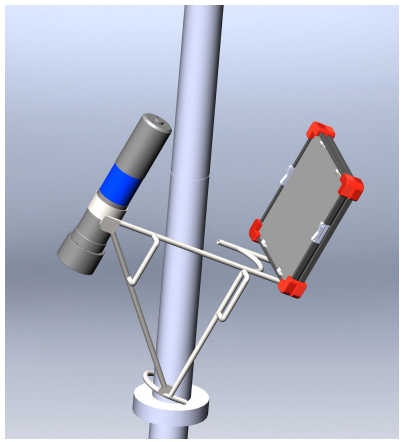
NEW SOLUTIONS UNDER DEVELOPMENT

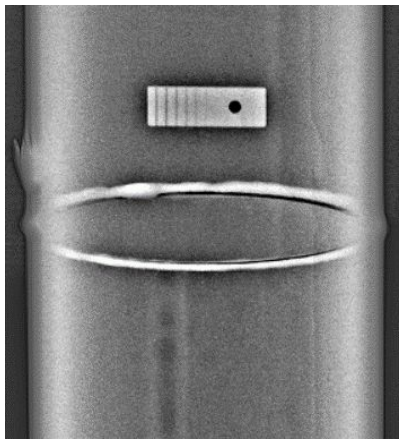
- Rail inspection.
- AI interpreting of defects.
- Offshore pipeline inspection.
- Instant inspection of oil well pipes before lowering.
- Wall thickness measurement for pipes of any diameter.











OUR SERVICE

- Equipment warranty.
- Prompt support on emerging issues.
- Remote webinars.
- Free training at our centers in South Korea, Kazakhstan and Russia.
- Possibility of field training, equipment commissioning and maintenance.
- Help in developing control methodology.
- Marketing and technical support.

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We are open for cooperation!

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THANK YOU FOR ATTENTION!

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