Technical Data

Test Sample	**Width** max. 160 mm (max. 6.3 “)	**Depth** max. 80 mm (max. 3.15 “)	**Height** max. 40 mm (max. 1.575 “)	**Weight** max. 1 kg (max. 2.2 lbs)	
	Width with platform	**Depth**	**Height with platform**	**Total weight**	**Total height**
Radiation Protection Cabinet	2515 mm (99 “)	1530 mm (60.24 “)	1510 mm (59.45 “)	ca. 3700 kg (8155 lbs)	2100 mm (82.677 “)
Control Cabinet	1200 mm (47.244”)	600 mm (23.622 “)	1900 mm (74.8 “)		incl. holder for control panel

Voltage supply 3N PE 400/230V 50 Hz, 35 A, TN-S or TN-C-S power connection

Consumption approx. 10 kW, peak value 30 kW

Grounding Separate grounding for X-ray and high voltage generator (< 2 Ω) with at least 6mm²

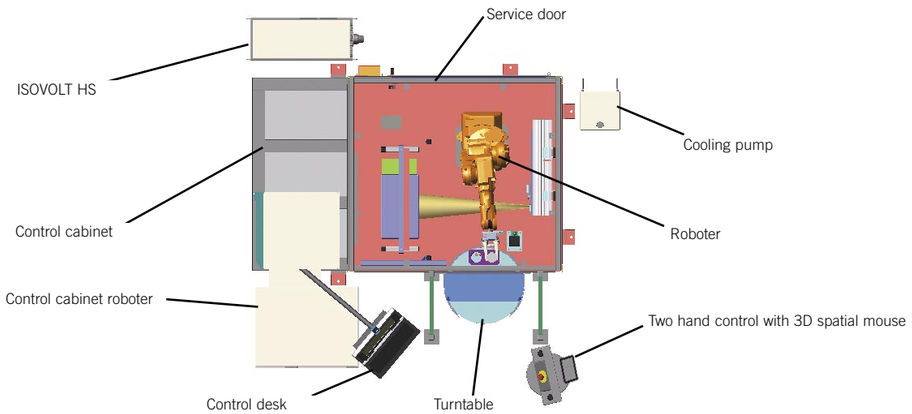
Air pressure Connection ½“; min. 6 bar, consumption 10 Nl / min

Transport Methods Radiation protection cabinet complete with control cabinet and high voltage generator by fork lift trucks

Options Available

- Diaphragm
- ISDN-router for remote maintenance
- Prefilter
- Custom features on request

Layout of the DP 469.2 ROB



National and International Regulations

The DP 469.2 ROB construction fulfils, among others, the following national and international regulations and standards:

- ISO 9001
- UVV, VBG 4
- RöV of 1987 (extended to up-to-date version)
- CFR 1020.40
- CE conformity
- VDE 0100
- DIN EN 60204 (VDE 0113)
- DIN EN 954-1, DIN 54113
- DIN EN 60529 / IEC 529

GEInspectionTechnologies.com

GE Inspection Technologies X-ray

SEIFERT DP 469.2 ROB

Radioscopic Inspection System

Extensive engineering and application know-how come together

The DP 469.2 ROB X-ray system performs inspection in the production line for a turbine blades. The performance level of this X-ray Robot System lies particularly in its very high speed inspection process and the part changes combined with a compact design. The use of a six axis robot as a workpiece manipulator ensures maximum flexibility for possible inspection geometry. The examined parts are firmly clamped according to shape or by force (gripper jaws) from recorded workpiece beam-transparencies.

The system concept of the DP 469.2 ROB Radioscopic X-ray System enables both manual and connected automatic loading and unloading. The ergonomic arrangement of the multible workpiece holders for the loading/unloading process simplifies manual loading for the operator and enables easy loading with handling equipment (robot).

Features

- High speed inspection and part changing
- High positioning accuracy and speed of optimised courses of motion
- Shading-free radiography in all inspection positions by grip arm principle
- 'Accept' part marking with industrial compliant stamping mechanism
- Small utility space by compact design
- High availability at low maintenance costs
- Easily serviceable by large service door
- Manufactured in accordance with (CE) ISO 9001 certified quality management
- High safety standard in accordance with German X-ray Regulations (RöV), DIN 54 113 and EU guidelines

GE imagination at work

The DP 469.2 ROB X-ray System in the inspection sequence

The DP 469.2 ROB Radioscopic X-ray System in its standard version is laid out for manual loading. The workpieces to be inspected are loaded into the X-ray system via a turntable after reproducibility placement on the magazine by a worker or handling equipment.

The turntable with the workpieces on the magazine to be inspected is rotated into the radiation protection cabinet activated by a two hand control. Subsequently the robot grips the workpiece to be inspected and moves into the inspection area between the X-ray tube and the imaging system. The DP 469.2 ROB can be equipped with almost any commercial robot system.

Turntable with workpiece magazine

X-ray protection cabinet with ABB robot

In the inspection area programmed test positions are passed through and the radioscopic X-ray images are stored on the Evaluation-PC. For each workpiece a separate directory with the name of the turbine blade is created while the radioscopy X-ray images of this turbine blade are saved.

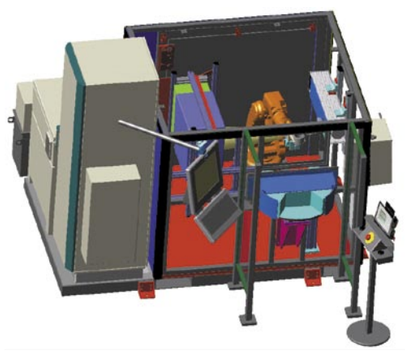
After the inspection is complete the turbine blade is placed on the magazine by the industrial robot.

When the inspection of the last workpiece of the magazine is completed and placed back, the turntable rotates the magazine with inspected workpieces outside. With the same movement the magazine with the new workpieces rotates into the protection cabinet.

On the Evaluation-PC the saved radioscopy X-ray images can be processed and evaluated off-line via image enhancement system VISTAPLUS III wherever suitable for the user.

The X-ray tube and the imaging system of the DP 469.2 ROB System are arranged to create a horizontal beam direction. Shavings, other processing residues and fallen workpieces cannot fall on the X-ray tube or imaging system or obstructing the X-ray procedure.

The radiation protection cabinet and the switch gear cabinet stand on a single platform and are transported as one unit. The external dimensions enable transport with truck or container. The DP 469.2 ROB is delivered completely installed with all cables connected. The time requirement at the customer's work site for installation, putting the system into service and future in-house relocation is minimal.



Individual components of DP 600 ROB in the inspection sequence

X-ray Unit

For acquiring optimum image quality and radiography performance for inspecting turbine blades, we integrated the ISOVOLT 160 HS X-ray unit with the ISOVOLT 160 / M2 X-ray tube into the DP 469.2 ROB. Advantages of the X-ray unit itself are:

- High radiographic capacity by a high dose rate connected with very low high voltage ripple content (40 kHz technology)
- Excellent reproducibility of X-ray results
- Flicker-free image by high stability of operating values (supported by fast monitoring systems)
- High operator security by integrated safety circuits on the ISOVOLT 160 HS and the entire X-ray system
- Long-life X-ray tube with an automatic, real-time controlled tube training program and two redundant switchable focal spots on the X-ray tube.

Radiation Protection Cabinet

In dimensions and equipment the radiation protection cabinet is a fully protected system in accordance with current German X-ray Regulations (RöV). The structure of the DP 469.2 ROB is designed to be very user-friendly by its service door which is equipped with force-lock safety switches in accordance with VDE 0113 (EN 60204). Two independent safety circuits (interlock) of the X-ray unit (in accordance with EN 954-1, Safety Class 4) assure security during operation. The service door of the cabinet can be locked with an integrated safety lock to prevent unauthorized entry. It is also possible at any time to open the service door from inside using the door's panic lock.

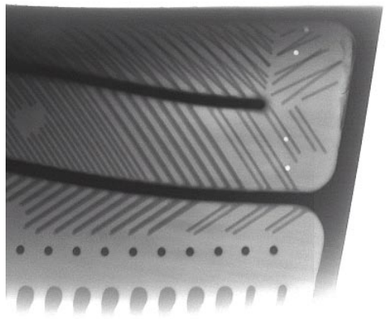
Imaging System

The DP 469.2 ROB contains the DIGILUX 512 H imaging system with a high-quality surface detector using amorphous silicon technology. Alternatively, a VISTALUX 9/3-CCD radiograph intensifier TV system can also be employed. The radioscopic image is displayed on a 19" TFT monitor. The image enhancement and analysis is supported by our praxis proven VISTAPLUS III Image Enhancement Software.

Radioscopy X-ray image of a turbine blade with flat panel detector

Operation modes

In "manual" operation mode the robot axes can be moved with a 3D spatial mouse (joystick for six axes) within the inspection area of the radiation protection cabinet. The X-ray parameters are manually pre-selectable. In "programming" operation mode the test positions can be stored using the Teach-In procedure and the complete program can be run later under automatic operation. Switching the operation mode between "automatic" and "manual" and back is possible at any time. After switching from "manual" back to "automatic" the robot first starts at home position and repeats the inspection step from where it left "automatic" operation mode.



Radioscopy X-ray image of a turbine blade improved by a VISTAPLUS III