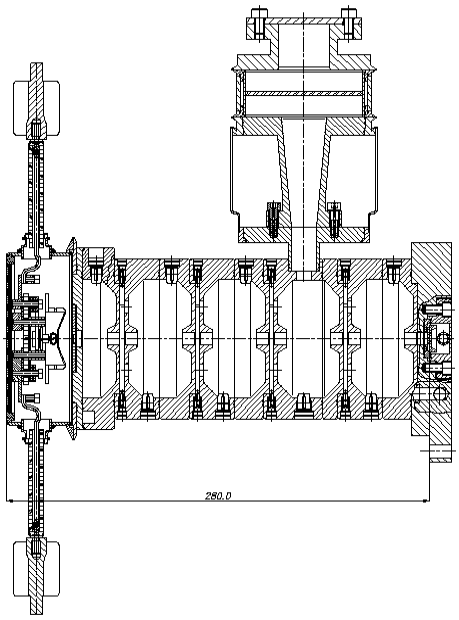

Fig. 1 Scheme of an acceleration structure integrated with electron gun.

Other technical improvements in the construction of acceleration structure are planned. Inner geometry of cavities was designed by SuperFish software. Cavities were designed in such a way that the accelerator structure can be brazed. A set of adjustment holes for each cavity was designed. They are used for structure in line as well as before and after brazing frequency adjustment. For such operations two steps soldering procedure should be elaborated. A special attention will be paid to the sealing of the adjustment holes, because designed structure should be vacuum tight. A cooling system should be integrated with the structure body, too. A cooling system should work in close loop and use deionised water.

A direct heating electron source was used. The soldering operation was chosen to assemble a chimney and electron gun with the structure body. The ion vacuum pump was integrated with the chimney body. A scheme of the acceleration structure integrated with electron gun and RF waveguide is presented in Fig.1. The series of cavities were manufactured. Their resonance frequency was measured. The measured frequency was close to 2998 MHz. A possibility of further frequency adjustment by special rods was checked and confirmed. The structure was turned and prepared for brazing.

The basic technical requirements for accelerating structure are listed in Table 1.

Table 1
The 6 MV accelerating structure characteristic.

Parameter	Specification
Energy	6 MV
Frequency	2998 MHz
Length	280 mm
Spot size	< 2 mm
Gun injection voltage	15 kV
Magnetron source	2.6/3.1 MW

14.4 The System for Visualization and Registration of Large Objects Radiography Results Using the Beam of Bremsstrahlung Radiation Emitted by Accelerator Dedicated for Cargo Screening

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Designed within the project no 6 ZR9 2005 C/6577 the 50cm long model of the radiographic system for cargo screening has been built, Fig.1. The linear accelerator was used as a source of X radiation for testing the system, while the line of BPW34 photodiodes with CsI:Tl scintillating crystals attached was the main detection part. The effective range of megavoltage radiation allows for radiography of thick objects, e.g. the fully loaded lorries.

Pulsed cone beam radiation from accelerator is collimated and probes the tested object. Each pulse creates one line in the image. Final picture is produced due to the object movement, thus further lines appear successively on the screen.

The 50 cm model is designed as a basic element of the final system; further elements can be easily attached in a chain. Full-size system includes 10 elements (5 m length). Dedicated electronic circuits allow for communication with the application on PC-computer. Simple set of commands is prepared for calibration, data transfer and picture visualization.

Described model was tested both with keV and MeV X-rays. The results of measurements confirmed the reasonableness of the assumed conception of the device, and particularly the choice of the detection system for megavoltage X radiation imaging.

Collected pictures of different phantoms confirmed also the wide range of detected energies, therefore the presented solution can be used with different radiation sources.

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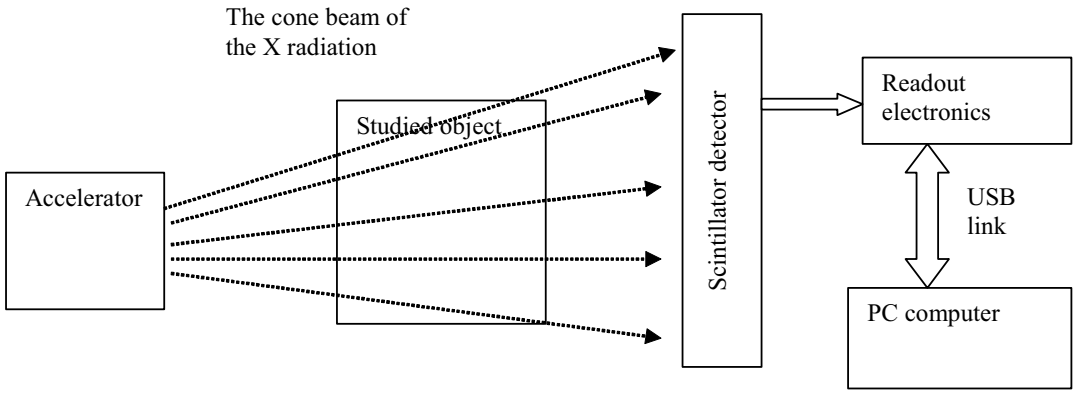

Fig. 1 Schematic diagram of the system for cargo screening.