Abstract. In the present report, we summarize our experience in the development of high-resolution position sensitive gas detectors for medicine and synchrotron radiation experiments at Budker Institute of Nuclear Physics. The MWPC measured X-ray intensity distribution in horizontal direction and distribution in vertical direction was measured by mechanical scanning. The scanning method has several intrinsic advantages over conventional two-dimensional systems: large image size in scan direction, significant rejection of radiation scattered in a patient’s body and a simpler detector design. Initial application at the All-Union Center of Mother and Child Protection (Moscow) showed that the technology originally dedicated for nuclear physics gave the possibility to reduce dramatically the patient irradiation doses and improved diagnostics possibilities. Industrial production of the installations in Russia based on the technology developed by BINP has started since 1997. More than one hundred installations based on MWPC operated in hospitals. At the beginning of the present decade, after the experience of application of MWPC in medical systems and following the increasing requirements of physicians, a new detector was introduced instead of MWPC - Multistrip Ionization Chamber (MIC). The MIC working in charge integration mode made it possible to properly separate the contribution of the x-rays on the characteristic of the detector and to improve spatial resolution by a factor 1.5 (0.4 mm). Moreover, the application of the new detector solved the problems of limited counting rate capability and gas aging. More than two hundred Multistrip Ionization Chambers with 1024 registration channels were produced. During the last few years, we have designed several detectors that have different parameters depending on particular application. For example, for the installation intended for medical treatment, the mass of sensitive mass of the detector with the inlet aperture collecting 100% of primary beam but with the limited spatial resolution (0.26 mm). In this case, the lowest patient irradiation dose for chest radiography – 4 μSv is obtained. For comparison, the reported doses for routinely used systems are 7-50 μSv. For general-purpose radiography where a higher resolution is required, we have designed a detector with a pitch of strips - 0.2 mm. The technology of production of such a detector was transferred to the South Korean company “Advanced Digital Technology”. The clinical studies of the installations manufactured there show that scanning system provides a better image quality at a lower entrance dose. This system is capable to get images with a length of up to 100 cm at 21 cm scanning speed and its maximum field of view is usually 70 x 70 cm.

Conclusion. In the future, we are planning to use multistrip detectors for the beam position monitoring for Heavy Ion Therapy System. The prototype of beam position detector for Heavy Ion Therapy System was designed. Due to high dose rate in one “pellet”, there are several possibilities to realize beam position monitor. One of them is a low-pressure gas ionization chamber. The technology of production of such a detector was transferred to the South Korean company “Advanced Digital Technology”. The clinical studies of the installations manufactured there show that scanning system provides a better image quality at a lower entrance dose. This system is capable to get images with a length of up to 20 cm at 21 cm scanning speed and its maximum field of view is usually 70 x 70 cm.