

The application of 100kHz technology in x-ray generators

Since its foundation almost two decades ago, Innomed Medical Inc. has continuously been engaged in the development, manufacturing of x-ray technology and x-ray equipment.

More than 10 years ago, as part of a high importance, decisive project that founded continuous development, cooperating with the Budapest University of Technology and Economics, Innomed developed a mid-frequency diagnostic x-ray generator family. Since then it has had its own x-ray power supply as well, which it has marketed as an independent (OEM) unit.

The sales figures of the mid-frequency x-ray power supplies has been increasing year-by-year since their introduction, continuously increasing their share in Innomed Medical's annual turnover, half of today's net sales. The number of mid-frequency x-ray generators sold has surpassed 2000 units.

The result of the research-development work and innovative activities, the product realized through the integration of extensive technological knowledge in precise manufacturing processes, the **TOP-X HF x-ray generator family in 1999 won the Innovation Grand Prize and the Blue Ribbon of the Budapest Chamber of Industry**, verified the importance of achieved development, manufacturing and market results.

The advances in high-power, semi-conductor based switching equipments in the last decade, but mostly in the last 4-5 years (the appearance of IGBT transistor) made the development and realization of high-power, high-frequency based, switching transforming circuits, and complete equipments in both power electronics and application fields.

Recognizing the above possibilities in time, placing continuous development at the forefront to keep its leading market position, Innomed Medical Inc. has decided to apply the new possibilities, the modern high-frequency technology – a pioneer even on a world scale – in x-ray generators, and thus develop a new high-frequency generator.

For this purpose Innomed Medical Inc. has asked for and received tender support, so development was realized between 2004-2005 with joint financing with the European Union as part of the National Development Plan's **"100kHz high-frequency technology application in x-ray generators"** GVOP project (**GVOP-3.1.1.-2004-05-0081/3.0**).

As part of the above project the 32-65kW power span high-frequency x-ray generator prototype was produced, and a specific application for the high-frequency x-ray generator was realized, namely fitting to a line-detecting, digital imaging chest-screening equipment.

There were **two applications for patents** during development:

- "Dynamic compensation of x-ray generators' high-voltage splitters fitting to construction" (P0600077/4),
- "Circuitual arrangement and procedure to minimize loss of mid- and high-frequency x-ray generators' power semi-conductor and high-voltage transformer with serial resonance inverters" (P0600076/4)

The patents were **published** in the **28th September 2007**. edition of the Gazette of Patents and Trademarks.

The developed **high-frequency generator became a product**. The required licensing procedures, the successful authority measurements required for distribution, test runs, ISO 9001 conforming manufacturing, service and user documents were finished during the project period. The product became ready for **CE** marking.

We consider the prototype *becoming a final product* and the beginning of mass production as a result of extensive theoretical and practical research during the project the biggest result. We believe that this is the real goal of tender system supported developments, and we have achieved this.

Due to the above results the project won the National Development Office's "Project of the year" technical award in 2005.

Mass production of the high-frequency x-ray generator started in 2006 and by the end of 2007 it has completely replaced the mid-frequency version.

Recently the high-frequency generator was successfully fitted to several manufacturers' x-ray examination device, different image amplifiers, phosphorous-free imaging devices at home and abroad.