THE NEXT GENERATION OF MICROWAVE SYSTEMS

Microwave Ablation
Regulatory pressure is now forcing developers to re-evaluate a number of aspects of the microwave generator. Surgeons need systems they can rely on and products that consistently deliver positive, repeatable outcomes.

Emblation has drawn upon extensive industry experience to develop microwave generators specifically for medical applications – turnkey solutions for product development teams that provide 60601 compliant systems and dramatically reduce time to market when seeking regulatory approvals.

MICROWAVE ABLATION IS A RAPIDLY GROWING FIELD OF MEDICINE. AS PRODUCTS AND TECHNOLOGY CONTINUALLY EVOLVE, BIOMEDICAL ENGINEERS AND MEDICAL RESEARCH TEAMS ARE LEARNING MORE ABOUT HOW MICROWAVE ENERGY CAN OFFER NEW TREATMENT OPTIONS AND CHANGE THE WAY OPERATIONS ARE CARRIED OUT – BUT THERE ARE SIGNIFICANT SAFETY ISSUES WHICH MUST BE CONSIDERED AT THE DESIGN STAGES FOR ANY MICROWAVE BASED MEDICAL TREATMENT.
EMBLATION HAS INVESTED IN NEW TECHNOLOGIES AND DEVELOPED UNIQUE TECHNIQUES THAT PRODUCE A MORE STABLE, EFFICIENT POWER OUTPUT

**An Investment in New Technologies**

**WHAT’S DIFFERENT?** While significant attention is paid to the design of the microwave applicator, organizations often overlook the microwave power source – relying on magnetron-based generators or industrial solid-state systems. Emblation has invested in new technologies and developed unique techniques that produce a more stable, efficient power output and mitigate the risks associated with high voltage microwave power sources.

**WHY SHOULD I CARE?** Aside from the safety issues relating to high voltage magnetrons, standard solid state systems can suffer from inefficiency problems. In many microwave transistor designs, the microwave generator efficiency is down to thermal management – current cooling mechanisms are outdated and suited to industrial applications rather than medical treatments.

Emblation has incorporated a novel, high capacity cooling system that also reduces the airflow requirement – for medical applications this results in a more efficient generator which can produce very stable output power.

**ONE MORE THING...** Emblation’s systems benefit from modular architecture, providing significant system reliability advantages over competing technologies. Vacuum tube based magnetrons and TWT based systems experience shelf-life issues due to eventual loss of cathode emission – standard life time values are typically around 2000 hours for low-power magnetrons. The emergence of solid state systems in communication has led to higher efficiencies while driving costs down, and as solid state generators rely on transistors rather than tubes, shelf life reliability is not an issue.
Advanced Measurement Techniques

WHAT’S DIFFERENT? Emblation has developed and patented a comprehensive solution to significantly reduce the common errors in measuring forward and reflected power to improve user feedback and internal control.

When the microwave applicator has a poor match with the target tissue (which is typical in medical procedures because treatment causes tissue properties to change), energy is reflected back from the target load to the generator. This creates a standing wave and causes a problem – the traditional method of measurement cannot determine if the real value of reflected power is at the minimum or maximum (or somewhere in-between) of the standing wave.

Standard measurement techniques also make the measurement of forward power susceptible to load conditions – such as mismatch and phase length. Emblation’s measurement system operates independent of load conditions – thereby ensuring a stable and regulated output power.

WHY SHOULD I CARE? In medical microwave systems the measurement of forward and reflected power is often used as a safety mechanism - to monitor treatments, detect and react to device failures, connection issues and potential misuse. Any inaccuracy in these measurements has the potential to result in either insufficient power being delivered - resulting in poor treatments and a perception of unreliability, or excessive power being administered – potentially causing serious patient injury. The advantage of Emblation’s novel measurement solution is that now blind treatments can be monitored in real time without requiring the user to inspect the treatment site. There is also an opportunity for improving treatment specific safety through measurement repeatability during a procedure. This allows the clinician to monitor and control the treatment based on the tissue phase changes.

EMBLATION’S MEASUREMENT SYSTEM OPERATES INDEPENDENT OF LOAD CONDITIONS – THEREBY ENSURING A STABLE AND REGULATED OUTPUT POWER.

ONE MORE THING... Emblation’s patented advanced measurement technique, safe sweep®, comes as standard on all Emblation microwave generators. The technology works by varying the operating frequency of the signal over a predetermined frequency band and as a result, shifting the position of the standing wave. By sweeping the frequency the full standing wave can be measured and an algorithm to accurately measure the level of reflection can be obtained. Widespread implementation of this technique has the potential to dramatically reduce failure rates and improve the safety of microwave-based medical procedures.
Emblation’s microwave systems have been developed with regulatory compliance in mind.

**Why should I care?** Size matters! Portable medical devices create a number of opportunities, from new treatments to reduced cost of care. By utilizing compact technology, some procedures can now be carried out in an office setting rather than an operating room. Opinion leaders have suggested that as healthcare evolves the future lies in a decentralized model, where non-life threatening procedures will be moved from hospitals to smaller, treatment-focused clinics.

The next generation of medical devices must reflect this evolution shift – or risk being left behind by forward-thinking competitors.

**Compact Microwave Systems**

**What’s different?** A big problem with existing microwave based medical systems is their size and weight. Emblation’s solid state systems are compact (about the size of a ream of paper) and weigh just 4kg (around 9lbs) – a significant improvement on existing microwave systems.

**One more thing...** Emblation’s microwave systems have been developed with regulatory compliance in mind. This means when it comes to applying for regulatory approvals, the microwave generator is already fully 60601 compliant and more importantly absolutely software free – saving the need to approve individual components or to validate software in turn reducing regulatory and development costs and time to market significantly.
About Emblation Microwave

Emblation is a medical device company founded on solving difficult problems. Established in the USA in 2007, the company then relocated to Scotland the following year to continue research into novel microwave based medical products. Utilizing our next-generation microwave platform, we have manufactured and launched a range of innovative products for a number of global markets. Our systems include several unique features, making our products some of the safest and most advanced systems available today.

Emblation has a dedicated product development team trained in the use of state of the art software and modeling tools. With a wealth of experience in the design, development and manufacture of market leading products, Emblation is certified to ISO 13485 and ISO 9001 standards for design and manufacture and is committed to providing next generation solutions for today’s innovative medical device organizations.