

...the power in microwaves!

OUR CAPABILITY DELIVERING YOUR SOLUTIONS

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www.tmd.co.uk www.tmdus.com

TMD TECHNOLOGIES

TMD Technologies Ltd (TMD) is a world leading supplier of rugged high power amplifiers, microwave power modules and transmitters for Radar, Electronic Warfare (EW) and Communications applications. Our product range and capability also covers microwave tubes, cathodes and electron guns, high voltage power supplies

and instrumentation amplifiers; for EMC Testing, Communications, Threat Simulation, Scientific and Medical applications.

We have gained an unrivalled reputation for reliability, customer support for system integration and technical innovation.

OUR HISTORY

We can trace our history back to the 1940s with several key milestones.



1944 - High power klystron group of EMI Electronics working on wartime radar.

1969 - We formed a partnership with US high tech company Varian, becoming EMI-Varian, based in Blyth Rd, Hayes. Developed worldwide reputation for technical advances in microwave tube technology.

Early 1980s - Became Thorn EMI Varian following an industry takeover by Thorn. Late 1980s - Started Developing high voltage power supplies, amplifiers and complete transmitters.

> 1989 - The partnership with Varian was terminated and we became Thorn Microwave Devices.

> > 1995 - Peter Butcher and Howard Smith completed a management buyout

from Thorn EMI Electronics and a year later the new company moved to our current premises in Swallowfield Way, Hayes.

2000 - The company name changed to TMD Technologies Ltd.

2004 - We won a UK Queen's Award for International Trade having achieved $\pounds18M$ overseas sales over three years.

2005 - We won a UK Queen's Award for Innovation in low noise power supply design, enabling important technical advancement to radar systems.

2013 - A new management team was appointed under Dave Brown, Group CEO.

Our Mission "To Continuously Challenge Ourselves to be the Best Partner for "To Novative and Reliable RF & HV Power Solutions"

Our Values We operate within a framework of core ethical values which include: Collaboration, Customer Focus, Quality, Pride & Creativity

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TMD IN THE USA

In recognition of the growing importance of TMD's business in the USA, TMD Technologies, LLC was established in 2012, operating from a facility in Baltimore, Maryland. TMD Technologies, LLC is fully operational, providing both technical and commercial sales support for our USA customers, together with a comprehensive repair and maintenance facility.





Our Customers are our Partners

Our products are positioned on hundreds of platforms and programmes worldwide, and we work closely with major Primes such as Raytheon, Leonardo, BAE Systems, Telephonics, Aselsan, MBDA, LIG Nex1 and many more.

We pride ourselves on collaborating with our customers to provide innovative solutions to difficult design and environmental requirements.

We have strong competency in RF, high voltage, vacuum technology, assembly and brazing and electronic and mechanical packaging into very small envelopes to provide leading edge product.

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Commitment to Research & Development

Over a period of nearly 30 years we have invested more than 10% of our total revenue in research and development of new products and technologies. This investment is more than doubled by customer-funded developments of products specific to major programme needs. As a result, we have introduced many new products into the marketplace.

We are working closely with universities and research and development agencies on new programmes at the cutting edge of science. An example of this is the Quantum 2.0 programme looking at the latest atomic clock technology.

Our engineering competence is multi-disciplined, combining electronics, mechanical, PCB, thermal analysis, RF design, production engineering and rapid prototyping. We follow a New Product Introduction and Design for Manufacture and Assembly philosophy.

MICROWAVE POWER MODULES

One of our most recent and important rugged amplifier developments has been a range of modular design ultra-compact TWT based microwave power modules (MPMs) covering the range 6-32 GHz, designed for those radar, EW and communications applications where space and weight are critical.

At only 1.7 kg and delivering typically over 100 W these units exhibit probably the highest power density available in the marketplace. TMD also produces solid state MPMs aimed at the specific requirements of EW applications and featuring advanced GaN MMIC technology.

RUGGED AMPLIFIERS & TRANSMITTER

We have designed and manufactured numerous subsystem products which combine tube and power supply including complete transmitters. Product design is driven by system technology and customised to meet specific platform needs. Applications cover radar, EW and communications for air, land and sea platforms, from S – Ka band.

Many environments are extremely hostile in terms of vibration and temperature and we have designed TWTAs to operate from +120 deg C down to -60 deg C. Complex innovative solutions are often required and we are committed to continuously pushing the limits of our technology to serve our customers more effectively - for example by using highly accelerated life testing programmes (HALT) to expose any design weaknesses.





HIGH VOLTAGE LOW NOISE POWER SUPPLIES

In the 1980s we began working on power supply design at the heart of all microwave and RF amplifiers. In 1989 we launched the first in a range of ruggedised military power supplies. These could be configured to drive virtually any manufacturer's TWT, for use in a wide range of radar, EW and communications applications worldwide.

The basis of the design was innovative switched mode technology, which offers many desirable features; high efficiency, ultra low voltage ripple (low noise), high inverter frequencies, ultra low pulse-pulse jitter, low throughput delay and high power density. The units are lightweight and compact with excellent thermal management, and employ a modular design for ease of maintenance.

In 2005 we received a second UK Queen's Award for the Innovation of a radar power supply with a noise figure 100 times lower than the current state of the art – enabling very significant improvements to radar performance, particularly in terms of target recognition.



INSTRUMENTATION TWTAS

These amplifiers incorporate TWT or solid state technology for such applications as high power EMC/RF testing, radar & EW threat simulation, satellite communications, Passive Intermodulation Testing (PIM) for space components, scientific experimentation and medical LINACs.

They are based on the same switched mode power supply technology as the rugged amplifiers with all the advantages of performance and reliability - but have been re-packaged for less demanding physical environments into compact, lightweight and affordable rack-mountable units. The product range covers 10 kHz – 40 GHz up to 50 kW, pulsed & CW.

Our strong links with the scientific community

For many years TMD has been providing instrumentation amplifiers to the science community. Projects have included: Driver Amplifiers for Anti-matter Experimentation (CERN in collaboration with Riken Laboratory, Japan), Amplifiers for the CERN CLIC Test Facility CTF3 and Kicker Amplifiers for Oxford University.

Repair service

We can provide a repair service for amplifiers - not necessarily of our own manufacture. Repairs are made at our Hayes, Middlesex factory or even customers' premises at short notice.

Our latest development is a brand new modular amplifier design with benefits such as improved user interface and maintainability.



MICROWAVE TUBES

TMD has over 70 years' experience in the design and manufacture of a wide range of pulsed and CW microwave tubes, which have gained a worldwide reputation for high reliability and long life. The extensive product range includes Travelling Wave Tubes (TWTs), Magnetrons and Klystrons.

Investment in tube design software

We have made significant investment in 'state of the art' software design tools, enabling us to consistently design new products with optimised efficiency and high reliability, in a relatively short time.

Cathodes and Electron Guns - 'A European Centre Of Excellence'

During the 1970s and 1980s, we were funded by UK MoD, ESA and US DoD to investigate the fundamental chemical and physical properties of impregnated tungsten dispenser cathodes, with the aim of extending the life of microwave tubes. As a result, TMD is a recognised European Centre of Excellence for dispenser cathode and electron gun technology producing some tubes with lives of more than 90,000 hours.

Travelling Wave Tubes for high reliability

TMD manufactures three main types of TWT - ring loop, ring bar and coupled cavity. Applications include naval surveillance radar, air traffic control radar and airborne radar. The coupled cavity TWTs we have produced for the Watchman air traffic control radar are providing up to 90,000 hours of service. This reliability is largely a consequence of our expertise in dispenser cathode technology.

Current TWT developments include rugged Ku and Ka band ring loop tubes for the most demanding airborne environments.



Magnetrons for tough environments

TMD magnetrons have proven their worth in many applications, including arduous helicopter environments for search and rescue radar and in fixed wing aircraft for terrain-following radars. An evaluation and repair service is provided for the many mature platforms still requiring support.

Klystrons that lead the world

TMD was responsible for much of the important development work on multi-cavity klystrons and resonant coupled cavity output in the 1960s, which enabled increased efficiency and wider bandwidths to be achieved. Markets are wide ranging and include military airborne radar, CW tubes for Satcom and high power linear accelerators for scientific research and medical applications. TMD makes the world's only electro-statically focused klystron (ESFK), developed during the 1960s, which is at the heart of the Rapier Short Range Air Defence System (SHORADS).

Repairs

We operate a comprehensive evaluation and repair service for a wide range of tubes, not necessarily of TMD original manufacture, offering full warranty and enhanced performance.

150cm wide



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