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In Focus

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New TMD Amplifier for Vehicle Testing

Jan Welinder, Swedish National Testing and Research Institute (SP)

There is a growing demand for testing the immunity of vehicles to radiation from radar transmitters. (Vehicle testing photos courtesy Krister Kilbrandt (SP).

TMD Technologies Limited (TMD) has delivered a unique set of high power, L band pulse amplifiers to the Swedish National Testing and Research Institute for testing the immunity of vehicles to radar transmitters.

The modern car is now controlled more by electronics than by the driver. In a new luxury car the driver has no direct control of the throttle or the gearbox; instead these are controlled by computers which have a number of sensors connected to them.

To the computer the driver is just another input. The brakes and the steering are already often assisted by electronics, but soon the driver will be mechanically disconnected from them too. This may seem somewhat unreliable, but that is only because most people are not aware of the many tests that a car has to pass before it is allowed on the public highway.

Electromagnetic fields are one of the threats a car has to be immune to, and a radar transmitter generates the strongest fields likely to be encountered. All car manufacturers check that their cars are immune to electromagnetic fields but, currently, only a few include the more stringent radar threat tests. Radars are not that common and, for example, it is not a major problem if a transmitter affects your mobile phone on the airport car park. But, what if your brakes fail to work because of radar electromagnetic interference! This could be a different situation altogether, and is one of the reasons why there is a growing demand for testing the immunity of vehicles to radiation from radar transmitters.

A wide frequency range with unusually high field strengths has to be covered to simulate the large number of different radar installations in use worldwide. Standard technology is available if it is required to simulate just one radar type, but SP needs to simulate

continued overleaf

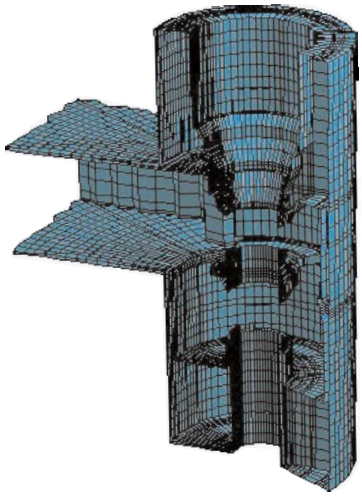
EFA Contract

TMD's recent EFA contract for high voltage power supplies has been increased to cover the first batch of Eurofighter Typhoon aircraft to be delivered to UK and European customers.

Full production will start at the company's Hayes, West London manufacturing plant later this year, on the new production line set up specifically for this product.

Over the past years TMD and BAE SYSTEMS have worked together on a number of microwave projects culminating in this contract, which is the largest one to date.

News from Tubes R & D



TMD has invested in MAFIA software to achieve greatly enhanced design performance.

The Tubes Division is experiencing the biggest period of change for many years. Several new tube developments are now coming on-line, and although demand for some of our traditional products remains strong (as illustrated by sales of our magnetrons substantially exceeding expectations last year), it is the demand for our new products that will be expected to dominate in future, replacing product types for which requirement will inevitably decline.

Probably the biggest news over the past six months has been the progress of the Wide-Band Klystron Project. At the end of last December we received the contract for Phase II of this project, awarded by the USAF. This phase of the project follows on from Phase I completed in March 2001, wherein we had defined the design of a wide band klystron based on our previous experience of tubes developed for the UK's Nimrod AEW project. Phase II of the USAF programme entails the build and test of prototype and pre-production klystrons to confirm our design and establish 'Qualification' levels of performance.

Work on new ring loop tubes is gathering pace. As well as the major new developments in Ku band tubes and higher power X band tubes (reported in previous issues of *'In Focus'),* the department has been working closely with the newly expanded Production Engineering team to improve the design, manufacturing methods, and process effectiveness, as applicable more widely to X band ring loop TWTs.

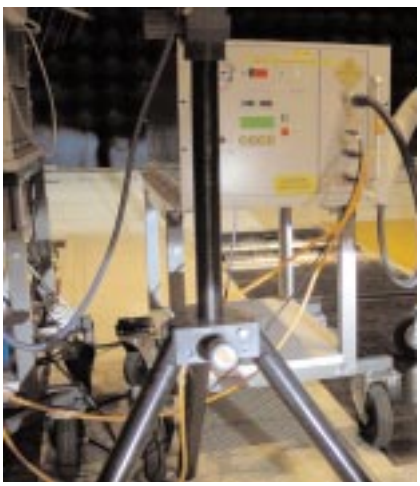
This effort will enable us to deliver established levels of performance, with improved consistency and substantial cost savings.

The investment of time and energy into the continuous improvement of our existing product designs is enabling us to compete favourably for new business, and is every bit as important as challenging the performance frontiers, when it comes to meeting customer needs.

A final newsworthy item is our decision to invest in some important new software, called MAFIA (MAxwell Finite Integration Algorithm). This software will enable us to achieve very much more effective simulation of new design performance, before tubes are built and tested as hardware. Our starting point for using the new software will be the Wide-Band Klystron programme, but ultimately we would expect to be exploiting this capability across the whole range of our tube developments. Competence in using this type of simulation will greatly improve our design capabilities and bring us significant advantages in the marketplace.

(contd from front page) New TMD Amplifier for Vehicle Testing

a wide range of them. The greatest challenge was with the L band. Radars just above 1 GHz are used particularly for Air Traffic Control and have a particularly high output power.



The PTC6468 amplifier had to meet a particularly demanding specification.

TMD has supplied the very special amplifiers needed. The company was presented with a demanding specification requiring the production of L band frequency radiation at unusually high field strengths, and achieved the development of the new amplifier in just six months. The new PTC6468 operates from 1.1-1.5 GHz at 20 kW minimum, with typically 24 kW at the band edges and 35 kW mid-band.

Development of this unit represented a considerable departure from TMD's standard range of amplifiers covering 1-18 GHz at 2 kW pulsed or 250 W CW; and 18-40 GHz at 40 W CW. The PTC6468 design comprises a high power L band TWT, a switched mode power supply which is a re-engineered version of TMD's standard 50 kW radar power supply, and control circuitry. The unit is liquid cooled, using water with anti-freeze and anti-corrosion additives. Control is via a digital front panel, but operation would normally be carried out remotely via the IEEE interface.

As for all TMD instrumentation amplifiers, the technology used is based on that developed for the company's military radar subsystems offering particular advantages of superior performance and high reliability.

Guy Howard, TMD's International Sales Manager, Commercial Products commented: "We were delighted to be asked to develop this innovative product for the Swedish National Testing and Research Institute. It was an interesting technical challenge and we have learned a great deal from it. We look forward to offering similar products to other test houses that are seeking to expand the scope of their facilities".

New Contracts Require Steady Recruitment

In the past year TMD has been taking on many new people from many different backgrounds and disciplines, and this process has gained momentum in recent months.

Firstly, we have gained several excellent new design engineers who will be responsible for the continued development of new products for the future, thus ensuring the growth of the company.

Another important expansion area has been in programme management, which has been driven largely by the many new contracts that the company has recently received. TMD fully recognises the importance of good programme management in giving vital support to the design engineers and ensuring that projects are completed on time and to budget. In several cases existing project engineers have successfully developed their careers to take on these roles and responsibilities. However, with the large quantity of new contracts and heavy workload in the Equipment Division, additional recruitment has been necessary and two more programme managers have been recruited.

Yet another important growth area is Production Engineering. The Tubes Division has been running a production engineering programme for the past 18 months, which has proved its worth in terms of optimising production processes to improve efficiency and performance and, at the same time, reduce costs.

The Equipment Division is now embarking on a similar programme by employing a production engineering specialist, who has many years experience in a variety of industries. His main tasks will be to improve existing processing methods and also to investigate new ones; improve speed of production and the quality and flexibility of manufacturing resources.

In July this year, David Pike was appointed Operations Manager for the Equipment Division, responsible for all aspects of production. Richard Patrick remains overall Divisional Manager but will now be free to concentrate on new product development.

New People

Mike Clark

Earlier in the year, TMD appointed Mike Clark to the position of Engineering Manager, Tubes Division. Mike Clark heads the company's Tubes Research & Development Team with responsibility for all new tube products, and reports to Howard Smith, Business Development Director.

Commenting on the appointment, Howard Smith said: "We are pleased to have the benefit of Mike's wide experience. With over 20 years in the microwave components field, both in technical and managerial positions, his name is known to many of our customers. Mike is bringing a new dimension to our tubes R & D programmes, as well as focusing on enhancing our portfolio of new products."

"Joining TMD is proving to be an exciting career move for me", said Mike Clark. "We are heavily involved in new tube projects that offer great promise for the future". (see 'News from Tubes R & D' on page 2).

Mike Clark started his career with MOV in 1977, working for some ten years in engineering and management roles. He then joined EEV, Chelmsford for a substantial period, attaining the position of Engineering Manager and then Chief Engineer Microwave Division. Prior to joining TMD he held senior technical and business positions with Marconi.

Mike Clark

Sue Garg

Sue Garg has recently joined TMD as Sales Manager.

Born in Lincoln, Sue joined the RAF at 18 where she worked for over seven years as an Air Traffic Control Assistant. She then joined Mitsubishi Electric where she worked for almost nine years in various departments, finally dealing with HF/Opto Marketing for Europe.

Sue then worked for three years for European Microwave Components Ltd, a distributor of RF/microwave electronic components.

Looking for a new challenge, Sue Garg joined TMD at the end of April this year. With her long experience in electronics sales combined with her knowledge of radar systems and the user environment, Sue is proving a very valuable addition to the sales team.

Sue Garg

TMD

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Product information is subject to change without notice

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TMD Remains at Leading Edge of Radar Power Supply Technology

The latest development from TMD's power supply design team is the PTM7599 switched mode power supply. This ultra-high performance, flexible unit has been designed to meet the most stringent requirements of modern radars, including low, medium and high PRF, pulse compressed, SAR and ISAR systems.

The new power supply is designed to operate at 15 kV, 2 kW, from a 400 Hz 3 phase a.c. supply and can be adjusted to drive a variety of tubes from different manufacturers.

The innovative design employs a high bandwidth post regulator to achieve an impressive close-to-carrier phase noise performance of -120 dBc/Hz random; -90 dBc/Hz spurious, when driving a typical 8 kW, 5% duty cycle, X band TWT.

The modulator system provides a very high PRF up to 200 kHz, and a wide range of pulse widths is also available, from 200 ns up to 100 µs, and duty cycles up to 10%.

The PTM7599 provides an impressive close-to-carrier phase noise performance of -120 dBc/Hz random; -90 dBc/Hz spurious.

The efficiency of the unit is better than 80% with a power factor greater than 0.92.

In common with all TMD power supplies the PTM7599 is lightweight and compact, with excellent thermal management (employing conduction cooling via the baseplate) and is fully ruggedised for all the usual demanding air, sea or ground-based military environments.

TMD Around the World

Graham Brown 'relaxes' on Bondi Beach - at the weekend of course!

In Australia...

TMD has supported a number of systems purchased by the Australian Army and Navy over the past 20 years.

TMD's Sales Director, Graham Brown recently paid a visit to this part of the world to meet with our customers and assure them of TMD's continuing support for the years ahead.

Australia have an active High Commission in London, and this enables the Australian Services to expedite repairs and support quickly and efficiently.

In the Netherlands

Andy Crawford, Radar Sales Manager, recently visited Thales, Netherlands together with our local agent, to discuss the future supply of TMD's L band tubes for long range surveillance radars.

... Sweden and Italy

Guy Howard, International Sales Manager, Commercial Products went to Sweden in April this year where he visited customers in Stockholm, Linkoping, Karlstad, Böras and Gothenburg.

In July Guy also visited Italy and, together with TMD's new agents Aicom, visited customers in Turin and Rome.