

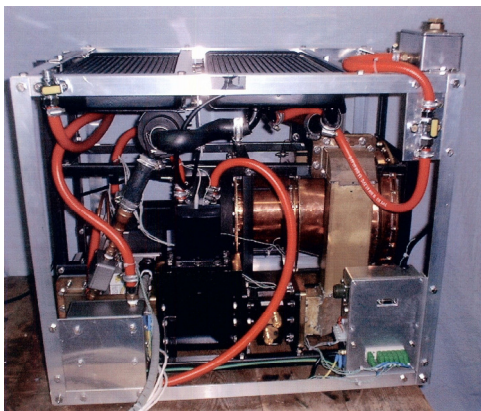
INVESTMENT MEMORANDUM

Satellite Propulsion Research Ltd: "The EmDrive"

1. EXECUTIVE SUMMARY OVERVIEW

Roger Shawyer, with a 20 year history as senior engineer and manager with Matra Marconi Space UK Ltd, has designed and developed the EmDrive (Electromagnetic Drive). This uses solar powered microwave energy to generate low amounts of thrust without needing to carry propellant. This would halve the cost of a satellite launch from £80m to £40m and have a similar effect on the cost and even feasibility of deep space travel. It has the potential to change the space industry as much as the jet engine changed the aircraft industry.

The project has had a DTI SMART Award of £45,000 for a successful feasibility study followed by a further development grant of £81,000 to create a Demonstration Model which is on schedule. Existing shareholders have contributed a similar amount of £135,000 in loans, and in November 2005 a private external investor with links to the space industry purchased 5% of the company for a working capital injection of £250,000.



As the Demonstration Model is nearing completion, commercial activity is increasing. Two parties are respectively taking the proposition to a) the European and American space market in particular the US Air Force at General seniority level which has provoked contact from both Boeing Space and Intelligence Systems and Loral Space & Communications, the two market leaders in the Satellite Industry and b) the Chinese and Oceanic space market specifically China Aerospace Corporation

It is proposed to licence the technology on an exclusive basis to an initial partner to take the product to a flight qualification stage (18 – 24 months), to have them build and operate satellites using the technology, and later to offer the technology on a sub-licence basis.

The minimum value of such a licence over 10 years would be in the region of £100,000,000 plus royalties.

2. COMPANY BACKGROUND

Satellite Propulsion Research Ltd was founded in October 2000 by Roger Shawyer who is Managing Director and principle shareholder (65%). It has two other (part time) employees; a company secretary and accountant; Mike Sheridan, and an administrator; Roger's wife, Margaret.

The company also has several non-executive board members and active shareholders listed below in section 5. It operates out of a Business Park workshop near Portsmouth, UK and it has a basic web page at www.emdrive.com.

3. THE EMDRIVE

Originally conceived and designed by Roger while working at Matra Marconi, who were offered but formally declined the opportunity to develop it, the EmDrive has the capability of halving the size and therefore also the launch cost of a satellite. It could alternatively enable the doubling of the capacity of a currently sized satellite, which is of significant interest to commercial and military customers, as these could accommodate much more powerful transponders with wider footprints.

As well as the lower cost of launch, satellites using EmDrive technology would be able to stay in orbit longer than the current 15 years as they have no finite limit imposed by their fuel load. Although this is a considerable advantage in cost terms, it also means that the existing Chemical and Ion Drive manufacturers would be resistant to the introduction of this technology, as it would ultimately entirely replace theirs.

The EmDrive achieves these savings as it does not require chemical propellant. Rocket fuel needs only to be used by the launch vehicle to attain low earth orbit (LEO). Afterwards the EmDrive propulsion system (patent GB2334761) uses solar power generated electricity ($\sim 3\text{kW}$) to generate microwave thrust from a specially formed waveguide.

Although this is a radical departure for a propulsion device, the science is not new. The device uses the principles of

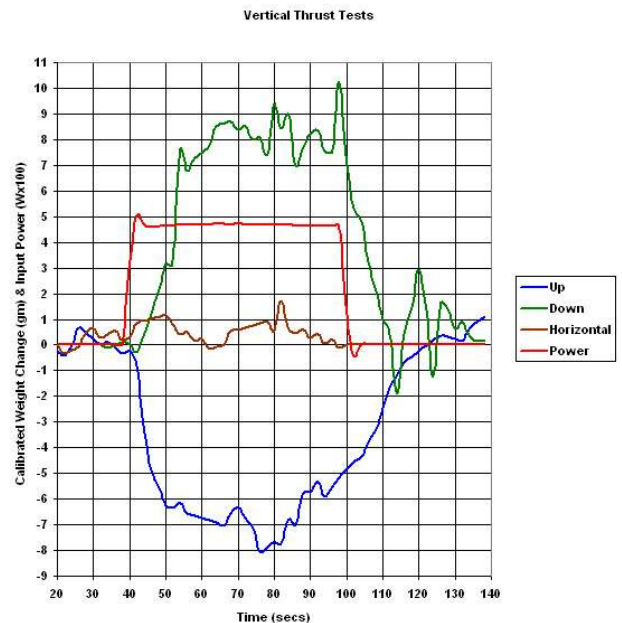
1. radiation pressure (the same concept behind solar sails, already in use in space) and
2. Einstein's relativity theory, in particular group velocity, creating an "open system" as the EM wave is in an external reference frame, in the same way as are the light beams in a laser gyroscope (widely used, for example, in missile guidance systems)

The mathematical derivation of the theory behind the EmDrive propulsion system has been reviewed and verified by Dr Richard B Paris, a senior mathematics lecturer at University of Abertay Dundee.

The test results from the drive on its static test bed demonstrate that these principles and theories work in practice. The drive produces lift when oriented one way, and an equal down force when turned the opposite way as shown in the graph across:

Today's space industry is limited by the need to launch propellant into space to power the vehicle. Over half the launch mass of a typical satellite is its fuel load. Although the present EmDrive development work is aimed at producing a propulsion system for commercial and military satellites, potential applications cover all future space missions.

Deep space science missions will benefit particularly from the long periods of thrust available. Instead of high thrust for minutes, the microwave system offers low thrust for years. As long as a source of electrical energy is available (solar or nuclear) then thrust can be produced. Future manned missions will see dramatic reductions in flight times resulting from the next generation of microwave thrusters. It is anticipated that future space based infrastructure will have microwave propulsion as its fundamental enabling technology.



4. MARKETS

The Feb 2003 market analysis by The Teal Group, a respected US aerospace consultancy, predicts a total of 1,173 satellites will be launched during the next ten years. Only a small proportion (324) will be commercial satellites the rest will be military or otherwise government sponsored.

EmDrive technology will be suitable for all the orbits other than LEO below 100kg. (Low Earth Orbit [LEO] and Medium Earth Orbit [MEO] satellites orbit around the earth. Geostationary Earth Orbit [GEO] satellites are sited in a much higher orbit and maintain a constant position over a specific point on earth. Deep Space satellites are generally used for research beyond Earth's orbit.)

The satellite telecommunication industry is by far the most important space sector for the satellite manufacturing industry, representing more than 50% of satellite activities. The annual revenue accrued from the lease of the approximately 7500 FSS and DBS (36 MHz equivalent) transponders in orbit is more than US\$6.6 billion.



The average number of telecommunication satellites launched per year in the 1990s was 23, while the estimate for the first decade of the 2000s is less than 20. This figure is reflected in the turnover figures of satellite manufacturers and launch providers.

In the USA this downturn in commercial markets has been compensated by increased institutional investments, notably by the US Department of Defence (DOD), in R&D and operational telecommunications systems for the military.

These toughening market conditions actually work in EmDrive's favour, as its cost reductions will allow economic pricing elasticity to come into effect and stimulate demand.

NUMBER OF MILITARY SATELLITES LAUNCHED

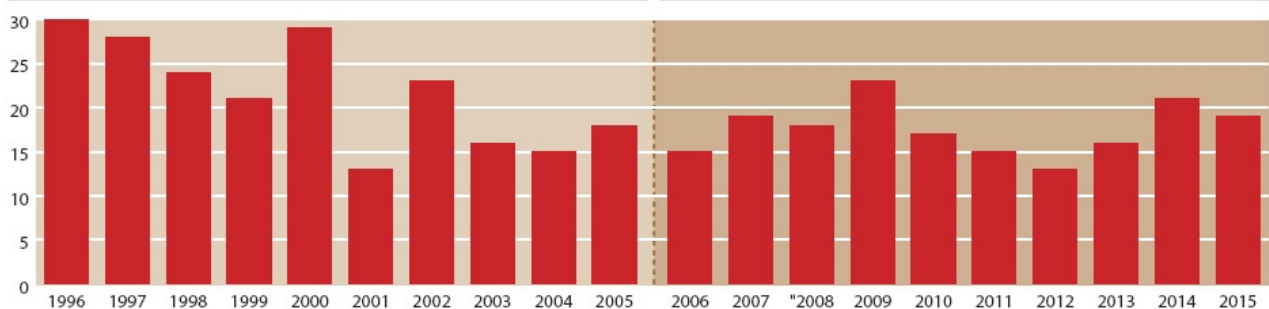
	1999	2000	2001	2002	2003	Total
U.S.	8	15	10	1	13	47
Rest-of-the-world	10	17	15	9	15	66
Total	18	32	25	10	28	113

VALUE OF MILITARY SATELLITES LAUNCHED, \$MILLIONS

	1999	2000	2001	2002	2003	Total
U.S.	2,428	2,941	2,650	800	2,961	11,780
Rest-of-the-world	749	505	840	661	1,341	4,096
Total	3,177	3,446	3,490	1,461	4,302	15,876

GEO Commercial Satellites Launched

GEO Commercial Satellites Forecast for Launch



5. THE MANAGEMENT TEAM

A brief summary on each of the key management team members follows.

Ian G Williams - Chairman

A plc director (Vega, Nomura, Docklands Light Railway) with over 30 years business experience working for both governments and multi-national private sector companies, in the UK and overseas. He has developed corporate strategies; devised and successfully managed practical implementation and management programmes and has lead project teams on major assignments. He has strong technology and business development skills.

Roger J Shawyer C.Eng MIEE – Managing Director

A consultant Engineer with extensive senior technical and managerial experience including 20 years in the space industry. Mr Shawyer is the Inventor of the microwave thruster.

Mike K Sheridan, FCA – Financial Director & Company Secretary

A Chartered Accountant with many years experience in providing support for small and medium sized businesses. In the last ten years assignments have included finance directorship in a consulting engineering practice employing up to 725 people; and working with one of the UK's leading private equity advisors. Primary role is to control the company finances and ensure sound business practice is applied.

Charles L Dawes MITI. AIM - Marketing Director

Originated and launched Inventorlink Products Limited, and has 20 years experience of managing the transition from invention to commercial success for many products. Provides marketing and venture capital search expertise for Satellite Propulsion Research Ltd.

G Alan Limpkin C.ENG MIEE - Technical Advisor

Co-founder of Inventions Direct Ltd, with many years experience of engineering and management of high technology developments. Acts in a technical advisory role for Satellite Propulsion Research Ltd

Dr Richard B Paris. DSc. FIMA - Consultant

Senior Lecturer and Reader in mathematics, University of Abertay Dundee. A specialist in Magnetohydrodynamic theory and has considerable experience in space propulsion and nuclear physics. Acts as a consultant for the theoretical aspects of the work.

Philip Owen and **Brian Milnes** have been retained to negotiate the sale of a licence to develop and use EmDrive technology. They are approaching the European and American markets and the Chinese and Oceanic markets respectively.

Philip is founder of MMO Associates and President of Travis Consulting Group - Europe. He has held top-level executive positions in over 10 high growth technology companies in Europe, most with parents in North America, during the past twenty years. His most recent assignments have included positioning a Swiss based broadband multi-media company for IPO. He recruited and managed a team of 28 people from ten countries in marketing and product management and was the executive interface to key clients such as BT, Deutsche Telekom, Telecom Italia and Astra Satellite Services.

Brian works through his consultancy firm the Independent Technology Group from where he has run many successful business growth, rescue, turnaround and rapid development projects. Previously he was responsible for the commercial success at several companies including Dr Solomon's Anti-Virus software. In 1996 he setup Satellite Digital Systems plc to create a channel on behalf of Hughes Network Systems for DirecPC (now HughesNet).

6. FINANCIAL INFORMATION

The company has been funded with the following:

Funds	£
Director's Loans	£132,000
DTI awards	£126,000
External investor	£250,000
Total	£508,000

The current remaining working capital is around £100,000 and the current cash burn rate is £7,000 per month.

Three of the company's existing minority shareholders are looking to divest some of their shares and the company is looking for new investment by a simultaneous and bound new share issue which will bring additional working capital into the company. The purpose of the new cash injection will be to

- a) hire an understudy for Roger Shawyer to reduce key man dependency and share an increasing workload and
- b) establish a more robust and sustainable organisation especially with respect to more permanent staff of 4 or 5 people

The shares available for sale are up to 79 (7%) of the existing 1077 shares together with up to 79 new shares.

The base negotiating figure for shares is £20,000 per share, valuing the company at £21,500,000 pre new share issue.

As the company is approved as an EIS qualifying company under the terms of Section 311 of the Taxes Act, investors would be allowed a 20% tax refund on up to £200,000 worth of their new investment in the year of their investment (i.e. up to £40k tax refund).

The company believes that in the next 9 months it can negotiate an exclusive licence and royalty structured in the following way.

EmDrive Licence: 10 year exclusive master licence £100,000,000 comprised of

2 years development to Flight Qualified status @ £10m per year pro rata, plus consultancy from Roger Shawyer to divest expertise.

Break clause at 2 years, if project fails to achieve FQ status all rights revert to SPR.

A further 3 year exclusive use of EmDrive @ £10m per annum.

After 3 years of exclusive use, master licensee is required to sub licence technology on similar terms, if requested, to third parties.

For 10 years, royalties of £150k per space vehicle using EmDrive (equivalent to 10% of the saving on build cost).

After 10 years, master licensee has first right of refusal on renewing master licence.

FULL BUSINESS PLAN AVAILABLE ON REQUEST

SYNDICATION IS AVAILABLE

Please note that this document does not constitute a public offer to sell or a solicitation to buy shares in Satellite Propulsion Research Ltd. Only those individuals deemed "High Net Worth Individual" or "Sophisticated Investor" under the criteria defined by the FSA and UK Inland Revenue should consider this plan. Investment in new business carries high risk as well as the possibility of high rewards. Potential investors are advised to seek advice from a person so authorised under the Financial Services and Markets Act 2000 (FSMA) who specialises in such investments.