

Innovation in Heat Transfer & Fluids Management



Front cover photographs © Copyright (left to right) Boeing, Airbus Military & AugustaWestland.

Designed and Produced by Newmans Limited +44 (0)121 580 8220.

HS Marston Aerospace Limited
Wobaston Road
Fordhouses
Wolverhampton
WV10 6QJ
England

t: +44 (0)1902 572777
f: +44 (0)1902 572888
www.hsmarston.co.uk
email: enquiry@hsmarston.co.uk



Welcome to HS Marston Aerospace



HS Marston Aerospace provide a wide range of heat transfer and fluids management products and services for the military and commercial aerospace markets, motorsport and electronics industries.

Our ability to provide customers with an integrated approach to the development of value added systems, subsystems and equipment has made us a world leader in heat transfer and fluids management systems for global markets.

We have a long history of innovation, dating right back to our antecedent company's foundation in 1740. In the pioneering years of the British aircraft industry, the Company designed and manufactured aero engines and assembled aircraft under licence. Heat exchangers were among the earliest ancillary products developed.

Industry leading developments continue to keep the company at the forefront of aerospace technology. With the acquisition of Palmer Aero Products in 1983, HS Marston Aerospace became a major force in fluids management.



© Copyright Gripen International

COMPANY EVOLUTION

- 1740** The Perry family established a metalware japanning business in Old Hall Workshops, Wolverhampton. Fifty years later Edward Perry founded Edward Perry & Son.
- 1836** John Marston was born at Ludlow, Shropshire.
- 1871** John Marston acquired control of Edward Perry & Son renaming it John Marston & Co. manufacturers of brassware, steel and japanned goods, trays and kitchen pots.
- 1887** First 'Sunbeam Bicycle' made and experiments carried out with pneumatic tyres.
- 1900** First Sunbeam car - 'The Mabley Sunbeam' and associated radiators.
- 1905** Formation of the 'Sunbeam Motor Car Company' - making John Marston one of the country's biggest vehicle radiator manufactures. (Customers include Rolls Royce, Austin, Standard, Wolsey and Vauxhall).
- 1914-18** Motor cycles, motor cars and aero engines produced for use in the Great War.
- 1938-45** As well as radiators the company manufactures oil coolers, aluminium aircraft fuel tanks and undercarriage legs to support the war effort.
- 1978** Introduction of the vacuum brazing technique to Aircraft Heat Exchangers.
- 1983** Palmer Aero Products acquired from BTR and relocated from London. Products include flexible hoses, ducting, couplings, filters, de-icers and electrical harnesses, all for Aerospace application.
- 1985** Company name changed to IMI Marston.
- 1999** Aerospace business of IMI Marston acquired by Hamilton Sundstrand of the USA. HS Marston Aerospace established.
- 2001** Electronics cooling business acquired from IMI Marston to expand HS Marston heat transfer capabilities.
- Today** HS Marston Aerospace is a leading supplier of heat transfer, fluids management and electronics cooling products. Our products are used internationally in a wide range of industries and a diverse range of applications.

"As an integrated part of the United Technologies Corporation, **HS Marston Aerospace** has access to an **unrivalled network** of manufacturing facilities, technical expertise, logistics support, research and development"



HS Marston Aerospace operates as a business unit within Hamilton Sundstrand's Engine and Control Systems division.

Hamilton Sundstrand

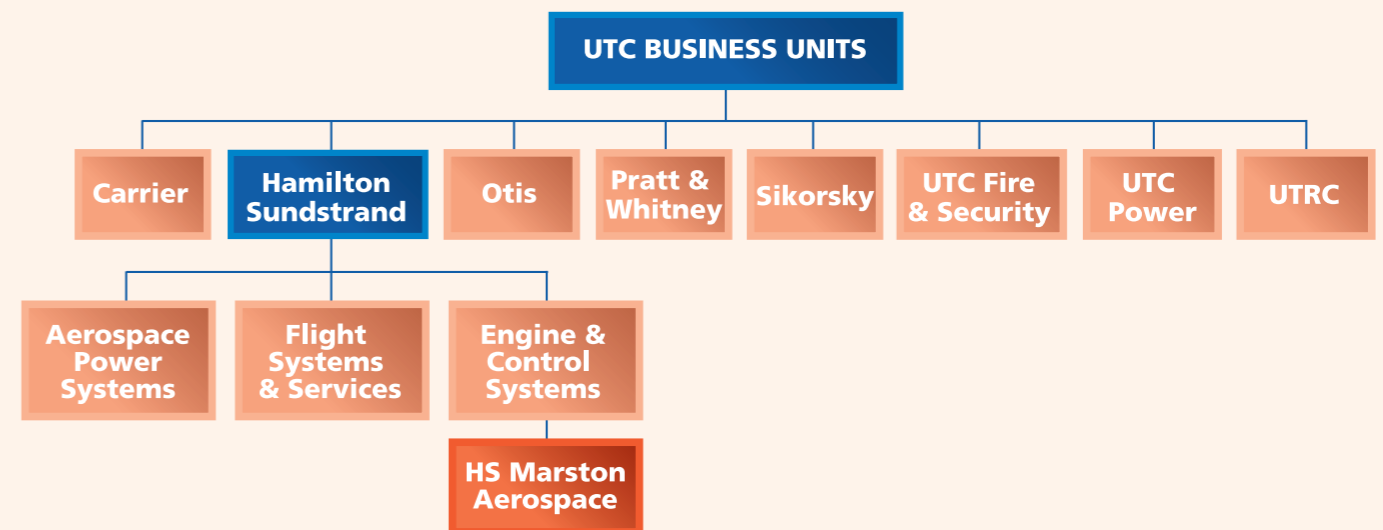
Hamilton Sundstrand is a global supplier of technologically advanced aerospace and industrial products.

As well as being a major supplier for international space programs, Hamilton Sundstrand designs and manufactures aerospace systems for commercial, regional, corporate and military aircraft. Their innovative designs help make aircraft safer and more comfortable to fly in as well as improving reliability and reducing running and maintenance costs. These systems can be found in over 90 percent of the world's aircraft.

Hamilton Sundstrand is one of the eight operating divisions of:

United Technologies Corporation

United Technologies Corporation (UTC) is a multi-billion dollar company whose products include Carrier heating and cooling (HVAC), UTC Fire & Security systems, incorporating Kidde Graviner and Chubb, Hamilton Sundstrand aerospace systems and industrial products, Otis elevators and escalators, Pratt & Whitney aircraft engines, Sikorsky helicopters and UTC Power fuel cells.



Aerospace and Specialised Markets



Aerospace

We have been providing products for aerospace use for over 90 years from the inception of aircraft and aero-engine manufacture in the UK. Today we supply an integrated range of heat transfer and fluids management products for the commercial and military markets.

Our products are used within airframes and engines and on fixed wing aircraft and helicopters.



Electronics & Avionics

Heat sinks, cold plates and heat exchangers are supplied for a wide range of electronics and avionics applications covering aerospace, maritime and ground based civil and military markets.



“Our breadth of experience means we can provide **tailor-made solutions** to meet the increasing demands of many **diverse markets**”

Defence

Charge coolers, inter-coolers and hoses for armoured fighting vehicles and cooling packs for main battle tanks, are some of our defence-related applications.



Motorsport

Marston Motorsport Cooling designs and manufactures innovative, lightweight, high performance oil coolers and radiators for the world's premier race teams.



Traction

Heat sinks for mass transit passenger heating systems and heat exchangers for inter-city express passenger carriage environmental control systems.



Power Generation

Frame and aero-derivative gas turbines, fuel cells and co-generation plants are some of the areas where our heat exchangers and recuperators are used in the field of Power Generation.



Heat Transfer

A long history of technical innovation has resulted in HS Marston Aerospace becoming a world leading supplier of heat transfer solutions.

Our breadth of experience means that we can provide tailor-made design and build solutions. We are constantly refining the technologies needed to meet the increasing demands of diverse markets.

We manufacture many different types of heat exchangers including:

- Plate and fin
- Shell and tube
- Cold walls, cold plates and cooling panels.

We can also supply heat exchangers in various materials including copper, aluminium, stainless steels, inconel, nickel alloys and titanium.

Typical applications for our heat exchangers include:

- Air cooled fuel coolers
- Air cooled oil coolers
- Air cooled air coolers
- Fuel heaters
- Fuel cooled oil coolers
- Pre-coolers
- Environmental Control System (ECS) air to air units
- Vapour cycle reheaters and condensers
- Avionics fluid coolers.



“We are constantly refining the technologies needed to meet the increasing demands of diverse markets”

As well as the design and manufacture of products for airframe, engine and avionics our capabilities also include gas turbine generators, armoured fighting vehicles, military land and naval electronics and high performance racing cars.

Together with the support of our parent company Hamilton Sundstrand, one of the largest international systems groups in the aerospace industry, we are in an exceptional position to offer integrated heat transfer products within full systems and sub systems.



Fluids Management

HS Marston Aerospace has the total capability to design, integrate, manufacture and certify a comprehensive range of fluids management systems.

Providing a complete service to engine nacelle and airframe manufactures, our unique product range encompasses fluid transfer systems parts, packages and individual bespoke components.

Metallic Hoses

Standard and custom designed assemblies are supplied in stainless steel and also titanium for extreme environment fluid systems demanding high integrity.



PTFE Hoses

We have been supplying PTFE hoses for commercial and military aerospace applications since 1958 when Palmer Aero Products first introduced them into the European aerospace industry.



Lightning Insulators

Lightning Insulators are typically used in conventional metal fuel lines and conduits and consist of a non-metallic insulator. These help to route lightning strikes through safe areas of the aircraft structure.



Flexible Joints

Our wide range of flexible joints for incorporation into ducting systems includes ball joints, bellows and gimbals.

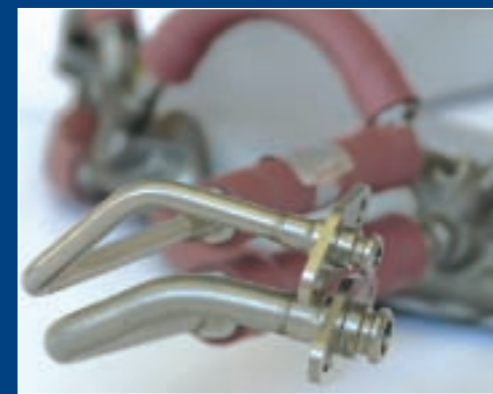


These are available in stainless steel, titanium, nickel and high-temperature alloys.

“Our **unique product range** encompasses fluid transfer systems parts, packages and individual bespoke components”

Fuel Manifolds

HS Marston Aerospace is a leading supplier of flexible fuel manifolds for aero gas turbines. We supply manifolds for use on numerous turbo-fan, turbo-prop and turbo-shaft engines as well as auxiliary power units (APUs).



Ozone Converters

For increased passenger and crew member comfort we manufacture Ozone Converters. These are installed in engine bleed air systems, generally close to and upstream of the ECS packs. They remove ozone from the bleed air by a catalytic process that converts ozone (O₃) to oxygen (O₂).



Tube Assemblies and Ductings

We manufacture tube and duct assemblies for a wide range of airframe, engine and powerplant systems, from hydraulic and fuel lines through to ECS and bleed-air system ducts.



In addition to supplying Ozone Converters we also offer ozone converter efficiency testing and cleaning services to airlines and operators.

Motorsport



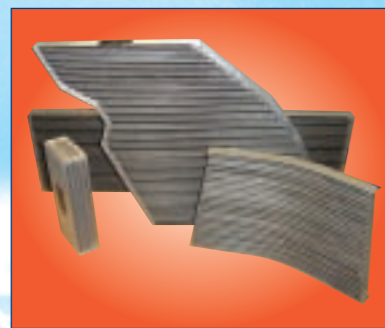
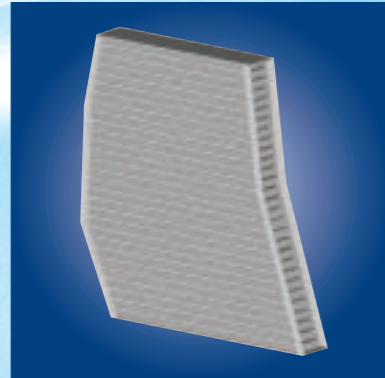
HS Marston Motorsport is one of the worlds leading suppliers of high performance heat management solutions.

The range of cooling solutions has been targeted at selected market areas including:

- F1
- Indy Car
- Le Mans Prototype
- Rally
- Sportscar
- High Spec Production Cars.

Service features include:

- Shape development to optimise duct performance
- Lightweight development to reduce weight and lower centre of gravity
- Airside pressure drop balance of oil and water cores
- Design facility to support customer development of new cars
- Fast turn around time from development to production
- World Class quality program
- Total commitment to customer support



Electronics Cooling

Electronics Cooling

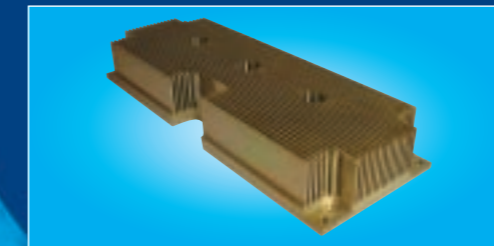
Utilising innovation and development combined with extensive in-house capabilities we have become a leading supplier of Thermal Management Solutions to a global market.

The range has evolved from standard extruded products through to brazed cold-plates keeping pace with the challenges of semi-conductor development.

Efficient cooling of electronics equipment is essential to prolong component life and improve system reliability. To facilitate this, we offer a wide range of cooling solutions.

Extrusion

A comprehensive range of high performance extruded aluminium heat sinks suitable for board-mounting and use with a wide variety of power devices.



Force Cooled Design

Our design department is available to assist in the design and manufacture of a range of high performance heat sinks utilising a moving airstream to meet your specific requirements. Our products include Coldfin® and Coldcube®.



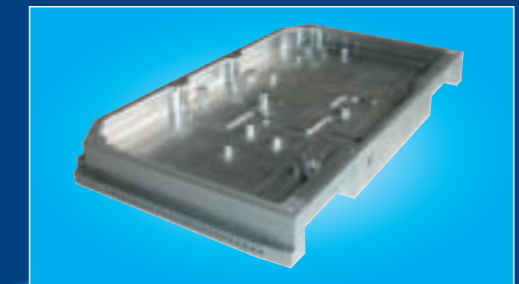
Heat Exchangers

The high density heat exchanger assembly is designed to provide maximum performance from minimum volume, giving greater flexibility for configuration and space management.



Cold plates

Coolant paths are machined into the base plate before vacuum brazing and are optimised for the magnitude and positioning of the various heat loads to ensure an even temperature distribution across the entire assembly.



A varied range of industries are catered for from consumer applications to space research programs.

Typical markets include:

- Avionics
- Consumer and industrial electronics
- Defence
- Drives and controls
- Lasers
- Medical
- Stage and screen lighting
- Telecommunications
- Traction.

Manufacturing Operations



HS Marston Aerospace has a modern facility in the UK utilising many lean manufacturing techniques.

Extensive use is being made of various operations transformation tools such as:

- Achieving Competitive Excellence (ACE)
- Production Preparation Process (3P)
- Market Rate of Demand (MRD)
- Value Stream Mapping (VSM).

These enable us to eliminate waste and focus on our core activities. In addition we are using these tools to help the development of our supply chain. Our goal is to add value in everything we do for our customers, to reduce lead times and constantly improve quality.

The site area covers approximately 18,500 m² (200,000 ft²) with a workforce of over 300 people and is situated at the centre of the UK's manufacturing heartland with good air, rail and road transport links.

Our manufacturing capabilities include:

- Corrugated fin manufacture
- Component manufacture
- Vacuum brazing
- CNC and 5-axis machining
- MIG and TIG welding
- Heat treatments
- Chemical processing
- Comprehensive in-house test facility
- Tube bending.



Engineering and Testing



Engineering

Our teams of highly experienced thermal and mechanical engineers lead the field in innovative design as we continually strive for improved product performance and value enhancement. Extensive use is made of computer aided design systems including Unigraphics, I-DEAS, Master FEM and CFD.

On-line technical databases, which access the latest materials and process technologies and specialist computer programmes, many of them bespoke, constitute our 'tools of the trade'.

Effective control is key to our success and our project management teams have a proven record of delivering systems on time and within budget.



Qualification Testing

Our on-site test facility is among the best in the industry enabling development and qualification testing to be carried out under our full control.

- Fire testing
- Cold start testing
- Fuel and oil contamination testing
- Hailstone impact testing
- Thermal performance
- Thermal cycling
- Pressure cycling
- Vibration testing
- 3-Axis fatigue testing
- Fluids: air, aviation fuels and oils, hydraulic fluids, electronic coolants
- Ozone efficiency testing
- Dynamic hose testing.

Excellence in Quality and EH&S



Our goal is to provide our customers with products and services that exceed their expectations.

We aim to provide products that fulfil the agreed quality standards, are reliable, easy to operate and maintain and represent fair value for money.

Our procedures and processes have been audited by regulatory authorities and our customers.

EH&S ACCREDITATIONS

- **ISO 14001:** Environmental Management Systems.
- **OHSAS 18001:** Occupational Health and Safety Management Systems.
- **UTC EH&S,** Management System.

EH&S Policy

We are committed to ensuring that our workplace is safe from hazards, our employees are injury free, our products and services are safe and the natural environment is protected.

Manufacturing processes are constantly under review to reduce pollutants to the lowest achievable levels and to ensure that the workplace is free from hazards and unsafe actions.

Conservation of natural resources is a prime consideration in the design, manufacture, use and disposal of products and delivery of services. Safety and Environment considerations are priorities in new product development and investment decisions and in our dealings with contractors and suppliers.

QUALITY ACCREDITATIONS

BSI Registered Firm

Aerospace

- Compliance with **BS EN ISO 9001, AS9100 and AS9110** Approval Number: **FM32216.**

Motorsport and Electronics Cooling

- Compliance with **BS EN ISO 9001,** Approval Number: **FM34759.**

Civil Aviation Authority

- Approved Certificate: **AD/1925/05,** Non EASA Aircraft.

Ministry of Defence

- Design Approval, against DEF. Stan. **05-123.**

EASA Part 21

- Subpart G. Production Organisation, Approval Number: **UK.21G.2204.**

EASA Part 145

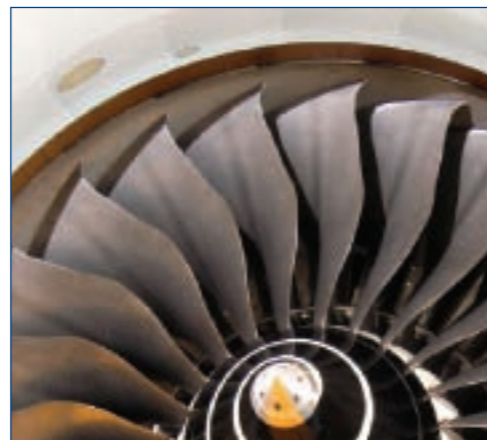
- Approved Maintenance Organisation, Approval Number: **UK.145.00683.**

Federal Aviation Administration

- Approved Repair Station, Approval Number: **IM 7Y581J.**

NADCAP

- **AC7114, AC7114/1 & AC7114/4** for Non Destructive Testing. (Liquid Penetrant and Radiography).
- **AC7108 & AC7108/1** Chemical Processing (Chemical Cleaning and Painting).
- **AC7110, AC7110/1 & AC7110/5** Welding/Brazing (Fusion Welding and Torch Brazing).
- **AC7102 & AC 7102/1** Heat Treating (Vacuum Heat Treating and Vacuum Furnace Brazing).



World-Wide Customer Support



Supporting our customers throughout the life of our products is something we take very seriously.

As an integral part of the global Hamilton Sundstrand customer support network we are able to offer technical advice, spare parts or repair and overhaul (R&O) services where and when they are needed.

From our base in Wolverhampton, England we provide direct R&O Services for the IATA 2 region. Backed up by an in-house design team, we offer every level of R&O service which extends to third party manufactured heat exchangers. Our facilities are FAA and EASA approved. Services in the IATA 1 and IATA 3 regions are also available.

Other services include:

- Responsive technical support in the field
- AOG support 24 hrs a day, every day of the year
- Technical publications compilation
- The generation of logistics data using the very latest integrated logistics support methodologies
- Reliability monitoring and prediction using our considerable experience as an OEM.

