TMD FRICTION

Pure Friction

The past, present and future of friction technology.

The vehicle & brake manufacturers that TMD Friction works with reads like a who's who of the motor industry:

- Alfa Romeo
- Aston Martin
- Audi
- Bentley
- BMW
- Bugatti
- Cadillac
- Chevrolet
- Chrysler
- Citroën
- Dacia
- Daewoo
- Dodge
- Ferrari
- Fiat
- Ford
- Honda
- Hyundai
- Jaguar
- Jeep
- Kia
- Lamborghini
- Lancia
- Land Rover
- Lexus
- Lincoln
- Lotus
- Maserati
- Maybach
- Mazda
- Mercedes-Benz
- Mitsubishi
- Nissan
- Opel / Vauxhall
- Peugeot
- Porsche
- Proton
- Renault
- Rolls-Royce
- Rover
- Saab
- Seat
- Škoda
- Smart
- SsangYong
- Suzuki
- Toyota
- Volkswagen
- Volvo

Pure Passion

...for performance, quality and global excellence.

"TMD Friction is one of the world's leading manufacturers of brake friction for passenger cars and commercial vehicles, supplying the original equipment and aftermarket sectors of the global automotive industry.

A bold statement, for sure, but let me explain why: We produce over 1 million friction products per day globally. 1 in every 3 cars and 1 in every 2 commercial vehicles on Europe's roads are fitted with friction components that have originated from TMD Friction. We have 15 production sites worldwide and support these activities with research and development facilities in not only Europe, but in North and South America, as well as Asia.

We haven't achieved this through pure luck, but through a clear, or 'pure', vision. This, in turn, is what drives our strategy as we look to the future, a strategy that we define as 'Pure Friction'.

Pure Friction is twofold: A commitment to remaining focused on our core strength – the development of friction materials technology – and it is also a reflection of our ambition to continue to lead the industry through the development of cleaner and more sustainable solutions.

Research and development is paramount to our business and we have been instrumental in many of the key innovations in friction technology in recent years. We quite literally go to the ends of the earth to ensure that our friction products are as good as they can possibly be and, in the development of each and every new brake pad, we clock up more than 300,000 km in vehicle and dyno' testing – that's almost 8 times around the world!

We also search the far corners of the globe to source new and more environmentally-friendly raw materials. At any one time our laboratories are evaluating more than 200 different 'ingredients' to see if they possess properties that will result in the creation of new and advanced friction formulations.

As well as taking great care over the materials we choose, we are also improving how we utilise energy to convert them into a finished product. In this respect, we are working towards achieving our ambition to reduce the amount of energy required to produce a brake pad by up to 50 percent.

So what does all this mean for our customers? The answer is that by remaining focused, TMD Friction will continue to develop exceptional products in line with our customers' needs today, as well as being one step ahead when it comes to facing the challenges of tomorrow."

Andrew Dilnot
Senior Vice President of Engineering

Pure Progress

Throughout our past we have always been looking to the future.

TMD Friction is one of the world's largest manufacturers of brake friction materials, employing 4,500 people, at 15 sites in 11 countries, who are dedicated to producing 1 million brake friction products per day.

However to become the biggest and the best takes time and TMD Friction's pedigree stretches back over more than a century, right to the very beginnings of the automotive industry.
It is a story that is full of important milestones, many of which have changed the face of friction forever. Take the journey with us through our past to see why we have become the leading name in friction today.

1879

William Fenton begins production of woven belting in Scotland under the name of Scandinavian Belting Ltd, which later becomes Mintex.

1881

Small & Parkers Ltd. is established in Manchester, UK. They will eventually become known as Don International Ltd.

1910

Mintex supplies brake linings for the first production car, the Ford Model T with 20.2 horsepower.

1913

BBA Ltd founds Textar as a distribution company.

1925

Mintex becomes part of BBA Ltd.

1934

Production of Textar brake friction materials starts in Leverkusen, Germany.

1953

Disc brake technology is developed by Dunlop and successfully introduced on the Jaguar C-Type racing car, which would ultimately achieve successive wins at Le Mans using Mintex racing brake pads.

1954-1956

Disc brakes appear on European production cars for the first time with the Austin Healey 100S, Citroën DS and Triumph TR3.

1970-1980

New generation of friction formulations widely introduced using a range of more advanced materials, including metallic reinforcing fibres that offer better thermal characteristics for reduced brake fade.

1990

Pagid develops a relationship with Porsche that has lasted to this day, initially developing friction materials for endurance racing.

2001

Acquisition of Rütgers Automotive and the Pagid, Cobreq and Cosid brands by TMD Friction Group. Global expansion sees new plants opened in Brazil, China and Mexico.

The GM Racing Chevrolet Corvette team wins the Daytona 24 hour race using TMD Friction racing brake pads.

2005

The cars that finished 1st, 2nd, 3rd and 4th in the Le Mans 24 hour race all have one thing in common… Pagid racing brake pads.

TMD Friction develops brake friction for the world's most powerful production car, the Bugatti Veyron, with 1001 hp, fitted with Textar brake pads.

2007

TMD Friction invests 35 million Euros in upgrading production facilities in Germany, Romania, Brazil, Mexico, China and the USA.

2000

TMD Friction is founded, with the brands Textar, Mintex and Don, by management buyout.

TMD Friction develops the revolutionary, patented, carbon ceramic disc brake.

2004

Opening of the R&D centre in Troy, Michigan, and foundation of TMD Friction KK in Japan.

2008 & beyond

As the pioneer, and today's leading supplier, of Carbon Ceramic braking, TMD Friction will be at the forefront of the industry by delivering this advanced technology to a much wider market. Second-generation NAO friction formulations, known as NAO2+, are currently in development and will provide even higher levels of performance in comparison to current NAO materials, superior stability and comfort, as well as being kinder to the environment.

eco-brake

Pure Process

Join us on the journey of brake pad development.

The process of developing and manufacturing a brake pad usually begins several years before the vehicle it will be fitted to is unveiled to the press and public at one of the world's motor shows.

And with every TMD Friction brake pad, more than 100 years of priceless knowledge and expertise is invested in the development process in order to deliver friction of exceptional quality.

TMD Friction is continually evaluating new raw materials, often several hundred at any one time, in order to identify suitable ingredients for the development of new O.E. friction material formulations.

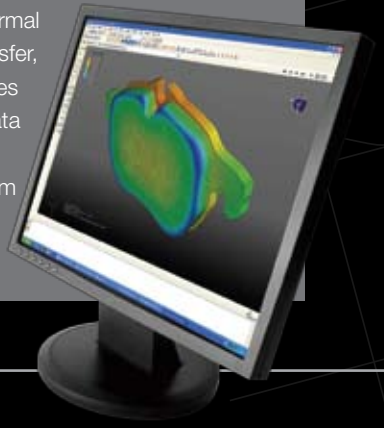
These raw materials are categorised into the 5 key elements found within friction materials: abrasives, lubricants, fibres, fillers and binding resins.

These raw materials are converted into unique friction formulations, each of which is rigorously tested to identify whether its characteristics make it suitable for inclusion within the TMD Friction material formulation portfolio, which currently comprises more than 200 different formulations.

PHASE 1

Finite Element Analysis

A key testing innovation used extensively by TMD Friction is FEA - Finite Element Analysis - a three-dimensional computer simulation tool that predicts how friction materials, brake pads, discs and other components will react under varying levels of temperature and pressure. These detailed simulation models are used during the development of new friction formulations to analyse thermal characteristics, including heat transfer, as well as the mechanical properties of the friction material. This vital data enables us to understand exactly how the friction material will perform under varying loads and across the temperature range.



PHASE 2

Testing

TMD Friction is one of the few friction manufacturers to boast its own dedicated test facilities in Europe, North America and South America, staffed by more than 300 highly-qualified test engineers and technicians worldwide, dedicated to the development of friction materials. Regarded within the automotive industry as world-class, our European testing centres are also regularly used by TÜV.

At our disposal we have more than 30 passenger car dynamometers, capable of testing for performance, NVH (Noise, Vibration and Harshness) and endurance, plus an extensive fleet of test vehicles.

During the development of a new brake pad it undergoes rigorous testing including more than 300,000 km on a vehicle under real-life driving conditions, plus around 1,000 hours on a dynamometer.

TMD Friction supports each vehicle project with its industry-leading testing facilities, providing brake system and vehicle manufacturers with the full extent of its resources to ensure that the selected friction material formulation meets the needs of both brake system and vehicle platform.

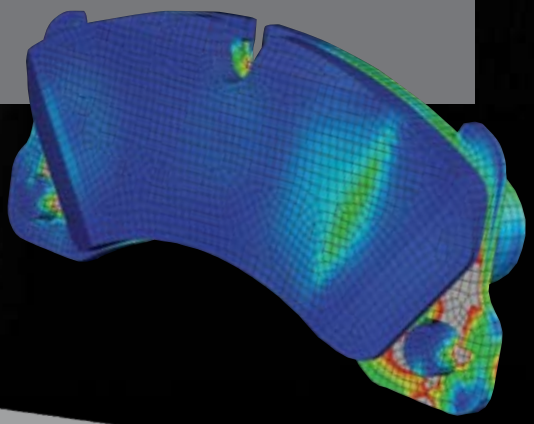
At any one time TMD Friction can be involved in more than 180 individual vehicle projects, far more than the majority of other friction manufacturers. This reflects the strength of our reputation within the automotive industry for offering leading friction solutions for virtually every conceivable vehicle requirement.

As a leading O.E. friction supplier, TMD Friction works in close partnership with the world's major brake system and vehicle manufacturers. This process begins at the very outset of a new vehicle development programme, which can often be up to 3 years in advance of the vehicle's launch.

PHASE 3

Pre-Production Simulation

Finite Element Analysis can also be used to analyse how friction materials will react during the different stages of the production process, such as pressing, in order to help us to optimise the amount of pressure and energy required. In a number of cases, FEA simulations have already helped us to reduce the amount of waste energy within our production processes by more than 65%.



Following the material development and testing to evaluate the friction properties of the chosen formulation, initial low-volume production trials can begin to ensure that consistent quality can be achieved and delivery schedules easily met.

For each new friction material formulation, its production requirements are continually analysed to identify the optimal requirements in both production time and energy. This important aspect of the development process has so far enabled TMD Friction to significantly reduce its carbon footprint without compromise to quality and friction performance.

Once initial production trials have successfully concluded, production and quality standards are documented and implemented to ensure that consistently high standards of finish quality can be achieved across all TMD Friction's global manufacturing facilities. This means that, no matter where in the world it is produced, each brake pad will meet a consistently high level of product quality.

PHASE 4

The TMD Friction aftermarket development and manufacturing process follows an identical path to the O.E. product, using the same materials and formulations from the same friction formulation portfolio, as well as the valuable experience gained from initial development of the O.E. product. The result is superior quality replacement products for the aftermarket in a much quicker time and with the confidence that the products will deliver high levels of quality and performance.

Pure Solutions

Developing new materials that meet the needs of modern vehicles is one of the many challenges facing the friction industry. TMD Friction continues to drive material technology to produce the friction of the future.

Today, friction materials fall typically into three categories: NAO (Non-Asbestos Organic), Low Steel and Semi-Met, each with their own individual characteristics.

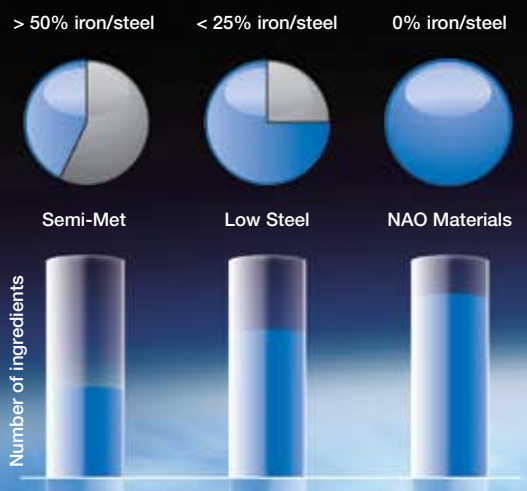
NAO materials usually offer lower friction levels than Low Steel or Semi-Met materials and are more popular in the US and Asian markets, where lower vehicle speeds mean that more importance is attached to comfort and low-noise rather than performance.

Low Steel materials are more widely used in Europe and South America, where their typically higher performance better suits the faster driving style. Semi-Met materials are primarily used in North America. They offer an unsurpassed mix of longevity and comfort when used on cars with moderate weights and limited speed.

At TMD Friction, for many years our portfolio of friction formulations has been widely regarded as amongst the very best available within the automotive industry. We have also developed an enviable reputation for high-performance friction materials which, in recent years, has seen TMD Friction become the chosen friction material supplier across a broad spectrum of the vehicle parc – from city cars, like the Ford Fiesta, to some of the world's most exotic supercars, including the Bugatti Veyron.

In order to benefit from the desirable characteristics of NAO friction technology, such as superior comfort, our research and development programmes have recently been focused on developing a range of NAO-based friction formulations. However concerns over some of the raw materials used within NAO traditional technology, particularly with regard to human health, has meant that our concentration has been on developing NAO formulations that substitute these harmful raw materials for safer and more environmentally-friendly alternatives.

Our NAO products have already become widely respected with many of the vehicle manufacturers and, because of our success in this area and our commitment to ongoing improvement, we are now in the advanced stages of developing a new NAO2+ range of formulations. They aim to offer a revolutionary step towards even greater levels of performance and comfort, low dust and, consequently, they will be much kinder to the environment than any friction formulation currently available.



Pure Future

Our vision is to ensure our eco credentials match our friction ones.

With global vehicle manufacturers under pressure to meet increasingly stiff environmental regulations, choosing suppliers that deliver innovative solutions and take their environmental responsibilities seriously is of paramount importance.

At TMD Friction we have been at the forefront of enviromental innovation within the friction industry for a number of years. Almost a decade ago the company was instrumental in the development of the Eco-Table – a set of ecological/environmental classification standards for friction materials. It ranges from ECO I to ECO IV and today it is a universally recognised standard. At TMD Friction, today's product portfolio has been constructed with these environmental requirements in mind and it is being further developed in line with the future needs of the industry.

Energy reduction

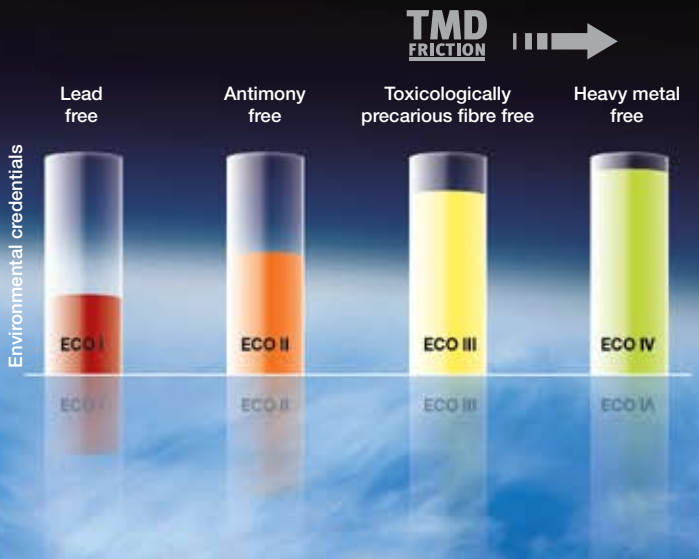
We believe that we have a responsibility to conserve the planet's precious resources wherever possible therefore we have set ourselves ambitious energy reduction targets.

By utilising computer simulation technologies to optimise the process parameters, we are able to more accurately specify the raw materials for the product. By doing this we can also fine-tune the production process to minimise any waste energy in the formation stages. These measures are a key part of achieving our long term aim of reducing our carbon footprint by as much as 50%.

Recycling

At TMD Friction we appreciate the need to take great care of the earth's natural resources and so recycling is also at the forefront of our activities. We are focused on reducing waste during our production processes and consequently we have developed a patented solution for reclaiming used friction material and re-using it in some of our friction formulations.

Such innovative techniques are enabling us to ensure that we remain true to our values and that both our processes, as well as our products, are as pure as they can possibly be.



TMD FRICTION

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