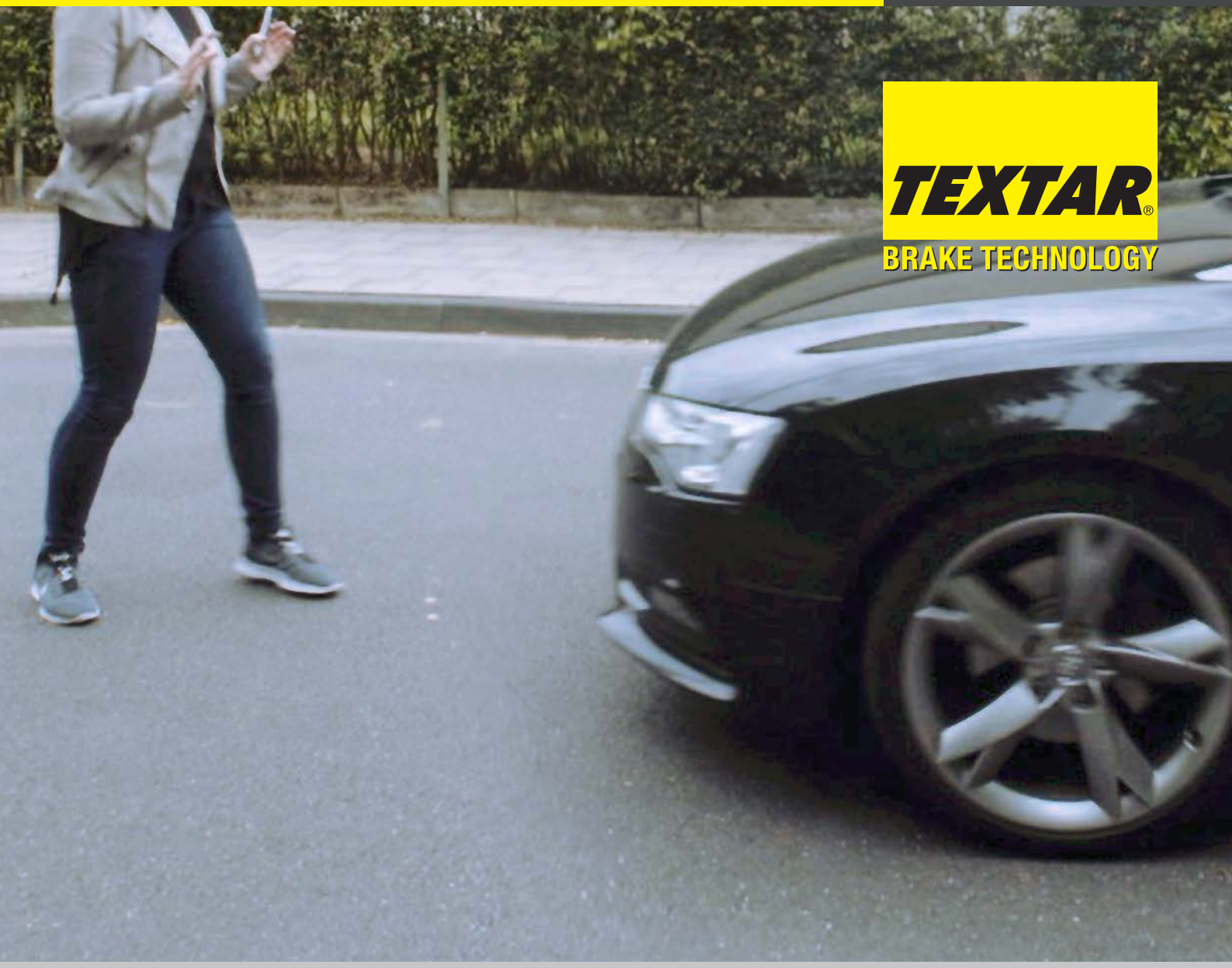


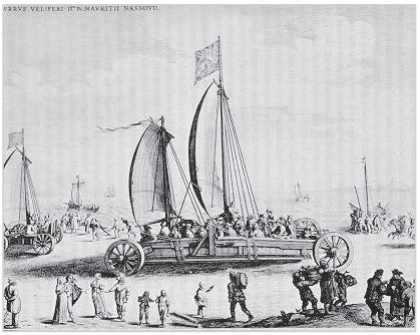
TEXTAR®
BRAKE TECHNOLOGY

EVERY METRE COUNTS

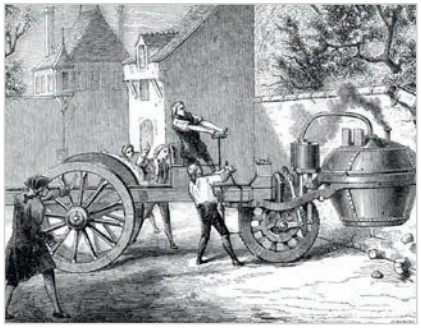
BRAKE PADS TEST

HOW IT ALL BEGAN:
BRAKING DISTANCE TEST YESTERDAY – AMS-TEST TODAY

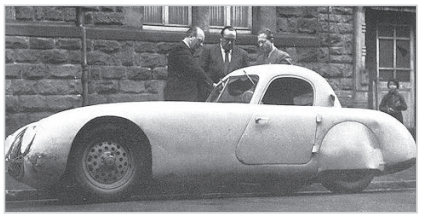
Dare-devil men in their driving boxes. The development of the earliest cars created quite a bit of curiosity in the early days. The **sailing vehicle created by Dutch mathematician, Simon Stevin**,



could transport approximately 30 people using wind energy alone. The demonstration of the **three-wheeled steam-powered car created by Nicholas Cugnot** ended with a bang and a crash in 1771 with the water boiler hanging over the front axle making it almost impossible to steer.



Fortunately for the passengers, the first drivable models were only capable of low speeds. The continued development of the automobile led to an increase in speed, which also increased the need for braking technology. In those early days, it began with a block brake, then developed further to become the drum brakes and the disc brakes we know today. Numerous tests have been devised to assess how brakes work in extreme situations. The first known braking distance test with a measured value was carried out by **Paul Pietsch in 1949 with a Veritas-Coupé**. In 1972 the first braking benchmark test was carried out using two structurally identical Opel Kadett models, one with a drum brake, the other with a disc brake. Today, brakes need to be able to deliver maximum performance at speeds of up to 250 km/h.



To ensure that drivers and occupants of the vehicle remain safe at all times, Textar brake pads are developed to be of the highest possible quality. As part of an **AMS braking test**, Textar lined up against three direct competitors to compare the performance of brake pad materials used in the aftermarket as well as the factory-fitted OEM product on two of our test vehicles (Audi A5 and VW Passat Variant).

The **AMS braking test** is an internationally recognised test to determine braking distance, developed by the magazine "Auto Motor und Sport" (a leading German car magazine). Even the German car club (the ADAC), and the TÜV (German testing authorities) refer to it.

AMS-TEST – WHAT IS IT?

The car is loaded up to the permissible gross vehicle weight with two people and weights for the test. The car is brought to a standstill by braking from a speed of 100 km/h ten times in a row. The first and the tenth braking application are evaluated to provide information about the characteristics of the brake pads when they are cold and when they are hot.

THE TEST:
DO THE PADS PERFORM WHEN HOT AND COLD?

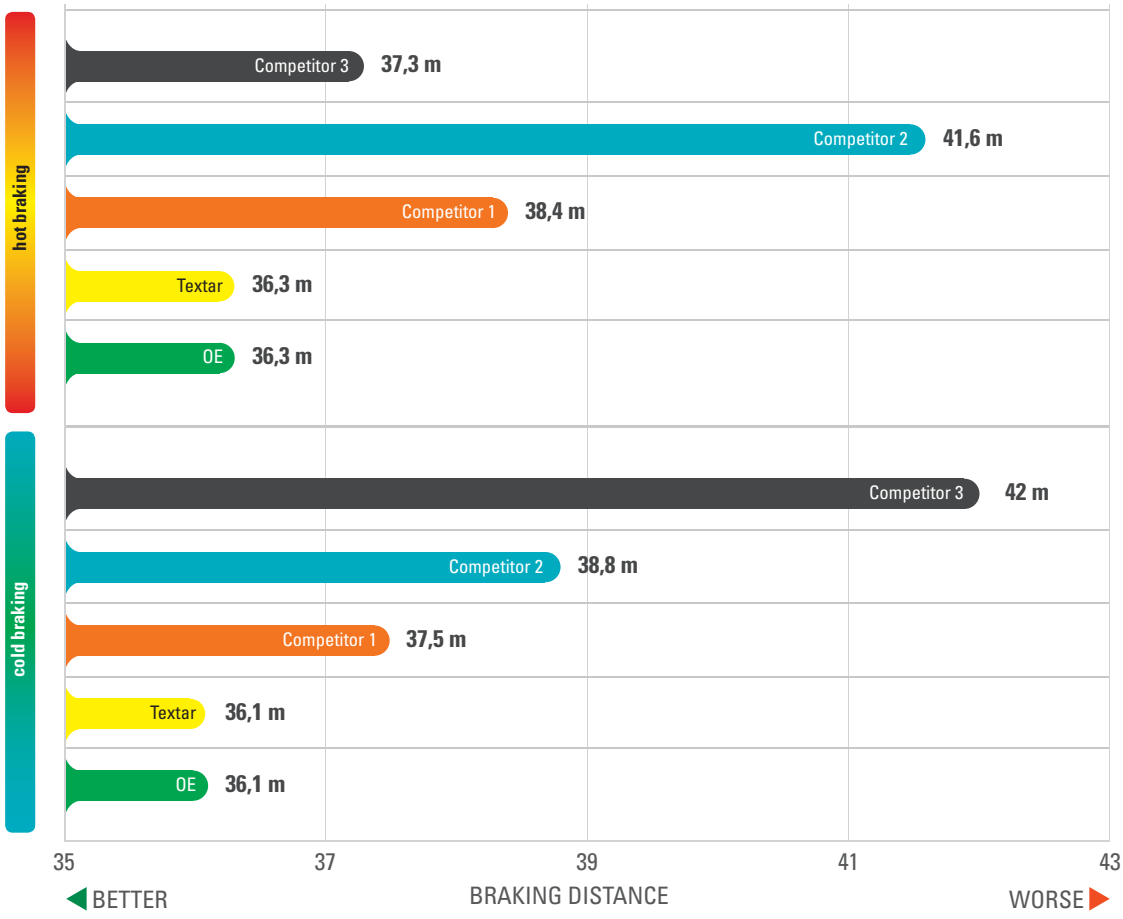
The car is loaded with two people and sacks filled with granulated steel to bring it up to the permissible gross vehicle weight. The car is then brought to a standstill by braking from a speed of 100 km/h ten times in a row. This means an intense cycle of accelerating and braking, in which the brake discs can heat up to temperatures of up to 700 °C. In these conditions, it is also possible to simulate the dreaded fading feeling when driving downhill with a fully laden vehicle on a flat surface. Fading is a term used to describe the reduced impact of braking, which occurs when the vehicle is heavily loaded.

The resulting high temperatures in this test release binding agents from the brake pad which forms a lubricating film between the brake pad and the disc, reducing the friction coefficient and the braking performance. In an AMS Test, only the first and tenth braking applications are evaluated to provide information about the characteristics of the brake pads when they are cold and when they are hot. The question is: Do the brake pads perform as reliably at high temperatures as they do when cold?

THE RESULTS:
DIFFERENCES THAT CAN MEAN LIFE OR DEATH

Audi A5: Textar performed identical to the OEM material for **cold and hot braking** and was the most stable performer in comparison with its competitors. **The difference between the first and tenth braking application was only 0.2 m.** This is exactly the same as the amount achieved by the brake pad fitted as part of the original equipment from the manufacturer. The biggest deviation by a competitor is 2.8 m, which is approximately three quarters of a car length: a measurement that could have devastating consequences

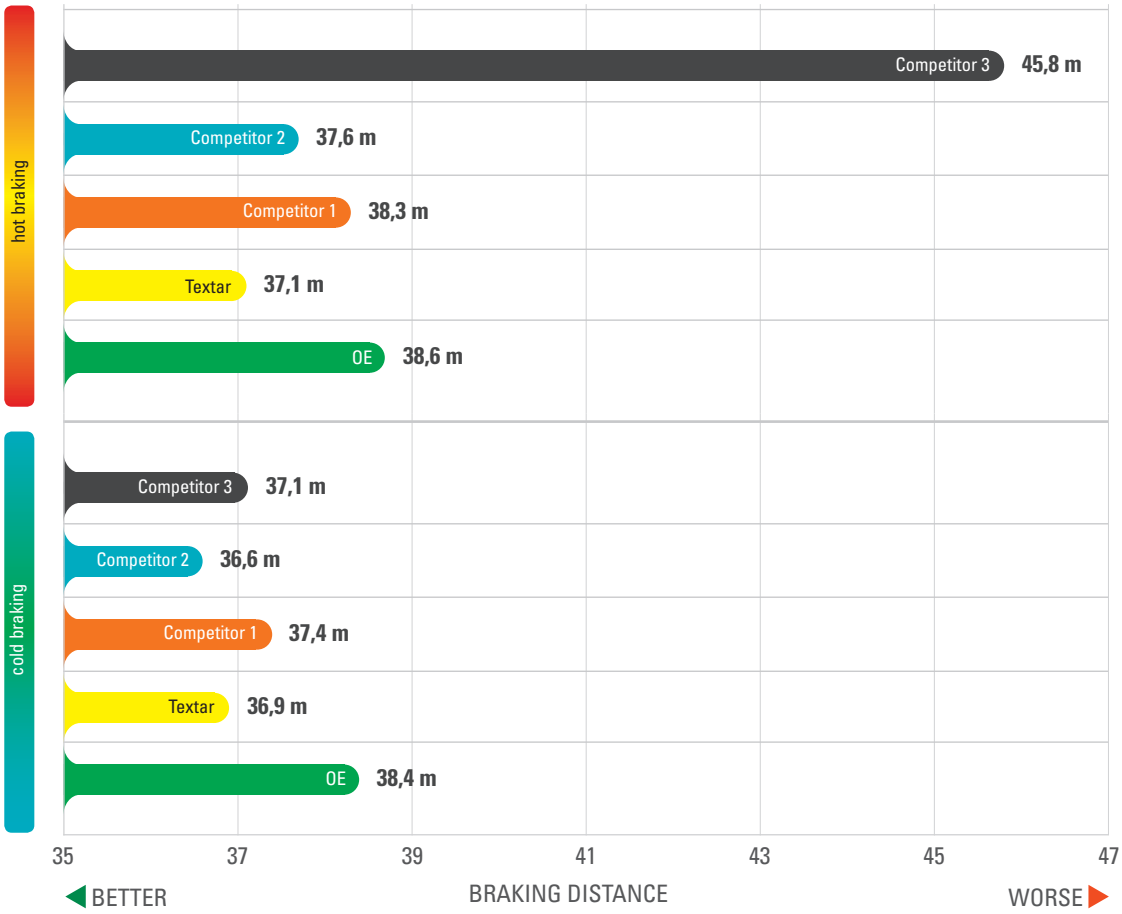
Audi A5 results



▶ TEXTAR – OE QUALITY FOR THE AFTERMARKET

VW Passat Variant: Textar brake pads and the competitor products performed better than the OEM materials when the **brakes were cold**. Even when the **brakes were hot**, all but one of the brake pads were able to undercut the OEM pad in terms of braking distance. Textar is the safest provider in this field: **The difference between the first and tenth braking application was only 0.2 m. This is the same exact measurement achieved by the OEM material.** The biggest difference between distances by a competitor was 8.7 m – that is approximately two car lengths: a distance that could mean the difference between life and death.

VW Passat Variant results



CONCLUSION:
TEXTAR PERFORMS BETTER THAN ALL OF ITS COMPETITORS

Textar performed better than all of its competitors during hot and cold braking and even achieved better results than the OEM brake pad on the VW Passat Variant. This result illustrates just how highly Textar rates the issue of safety. It also shows that brake pads from the aftermarket can be even better than the products originally fitted by the vehicle manufacturer. Provided that a quality product, such as Textar, is chosen.

▶ Textar is the safest competitor in the field

HISTORY OF THE TEXTAR BRAKE TESTS

1965:	In the early stages, braking distance was still measured manually. An emergency stop would take place at a defined point. Alternatively the starting point was marked with a dab of paint. A device which shot out paint was also attached to either the wheel arch or the bumper, which was electronically connected to the brake pedal. By pressing the brake pedal a blank cartridge was fired, shooting out paint onto the asphalt. The braking distance was measured from that point with a measuring tape.
1970 to 1980:	By means of electric data recording, the braking distances were calculated from the speed and the braking time (braking distance = speed x braking time / 2).
1980 to 2010:	Braking distances were recorded using special measuring devices like the Peiseler wheel or optical sensor heads.
Since 2010:	Data is logged via GPS.

▶ WE GO TO THE LIMIT.
SO THAT YOU DON'T HAVE TO!

Experience our test drive live on video!

TEXTAR®
BRAKE TECHNOLOGY

TMD IS ALL ABOUT BRAKE TECHNOLOGY

As the global leader in brake friction solutions, we are trusted by the biggest brands in the automotive and industrial sectors to deliver effective, reliable and safe braking applications. TMD Friction is the preferred supplier for global-leading car brands and commercial vehicle manufacturers. Our pioneering products are also chosen to provide effective, safe braking for cars in many of the world's most prestigious racing series; including The Le Mans 24 hours.

Yesterday. Today. Tomorrow.

Over one hundred years in the friction business have seen us grow and prosper to become the world's leading supplier of brake friction. Our continued success is based on providing technical excellence, consistent quality, and constant innovation through intensive R&D investment.

Tomorrow's solutions developed today.

Developing and refining products to improve performance for more efficient, quieter, smoother, and environmentally responsible braking is a continuous process. We invest more than €25 million each year to ensure that we not only meet the demands of today, but pioneer the technology that will be required for tomorrow.

TMDFRICTION
A NISSHINBO GROUP COMPANY

TMD Friction Services GmbH
Schlebuscher Str. 99, 51381 Leverkusen
Germany
Tel.: +49 (0) 2171 - 703-0
Fax: +49 (0) 2171 - 23 88
E-Mail: info@tmdfriction.com
www.tmdfriction.com

E9905900346 4/17 ENG