

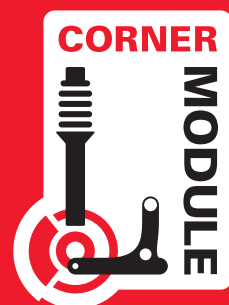


## TRW brake pads

Comfort, Performance, Safety



braking, steering, suspension



A TRW SYSTEM



## Setting the standard

TRW is the braking expert. TRW designs and manufactures the entire brake system in conjunction with all of the world's leading vehicle manufacturers. From discs to calipers, pads to shoes, TRW has proven to be the leader among system providers, no matter how demanding the vehicle manufacturer's requirements are.

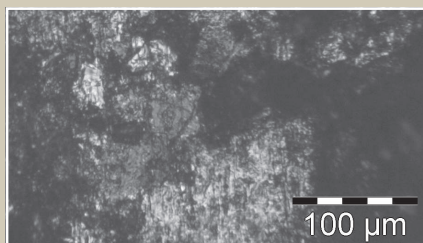
Produced in-house, TRW has complete control over the entire manufacturing process to

ensure that all parts meet our exacting standards.

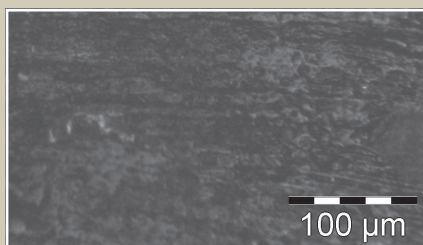
Our relationship with the vehicle manufacturers means that technology developed for them is directly accessible for you.

In the aftermarket, as in OE, we know that the customer matters. That's why in every TRW brake pad box, there's more than just the parts you need – there's also our unique knowledge and expertise.

- With 99% of the European vehicle parc covered, TRW is your preferred partner for brake pads
- Typically more than 100 references for brake pads introduced per year
- Where necessary, accessory kits are included, giving you all you need to perform a safe and quick repair



**Pad surface without coating**



**Pad surface with coating**

## TRW Cotec Brake Pads. Every stop counts.

TRW brake pads are now supplied with Cotec, an innovative silicate coating which is applied to the friction material and improves the brake behaviour of new brake pads:

- It outperforms major competitors and OE during the green behaviour of the pad
- Independent tests show TRW Cotec brake pads stop you at least 3 metres, and up to 7 metres quicker than other premium brake pads in the first 5 stops.



# Manufacturing is at the heart of our business

## Raw material

Friction material is the most important part of a brake pad and all TRW passenger car brake pads are copper free. We use the optimum mix of raw materials from rubber to graphite, ensuring a stable friction coefficient and the safest braking performance in all temperatures and conditions.

## Scorching

Scorching is a vital part of the manufacturing process and involves heating the brake pad material to 600-700°C. Not all aftermarket suppliers carry out scorching procedures to the same level as TRW, with some not undertaking it at all. Scorching significantly improves:

- Bedding behaviour – by eliminating trapped gases and resins, scorching reduces the bedding-in time. Combined with Cotec, our innovative silicate coating, it means that drivers have the optimum performance, from the first stop.
- Reduce initial fading – fading increases the necessary force and pressure required to maintain the deceleration of the vehicle

## Advanced heat plate scorching

TRW recently changed its scorching process from conventional flame scorching to advanced heat plate scorching – which is today an OE standard. During heat plate scorching, the pad is pressed to a heated plate. This means less energy is used during the process, and less energy means less CO<sub>2</sub> production.

## Deep Moulding Technology

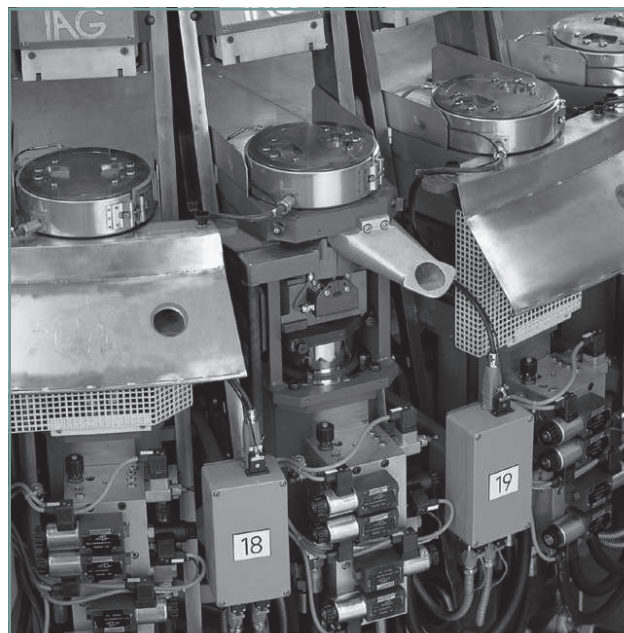
The majority of TRW brake pads are manufactured using deep moulding technology – a process undertaken by automatic moulding presses. The main benefit of this process is that the density and porosity of the material are more consistent, resulting in a significant reduction in the occurrence of squealing and juddering, thus improving driver comfort.

## Environmentally-Friendly

A decade ago, ahead of ECE R90 legislation, TRW introduced the first environmentally-friendly brake pad programme for passenger cars in Europe. No: copper, lead; mercury; cadmium; antimony; brass or molybdenum.



Heat plate scorching



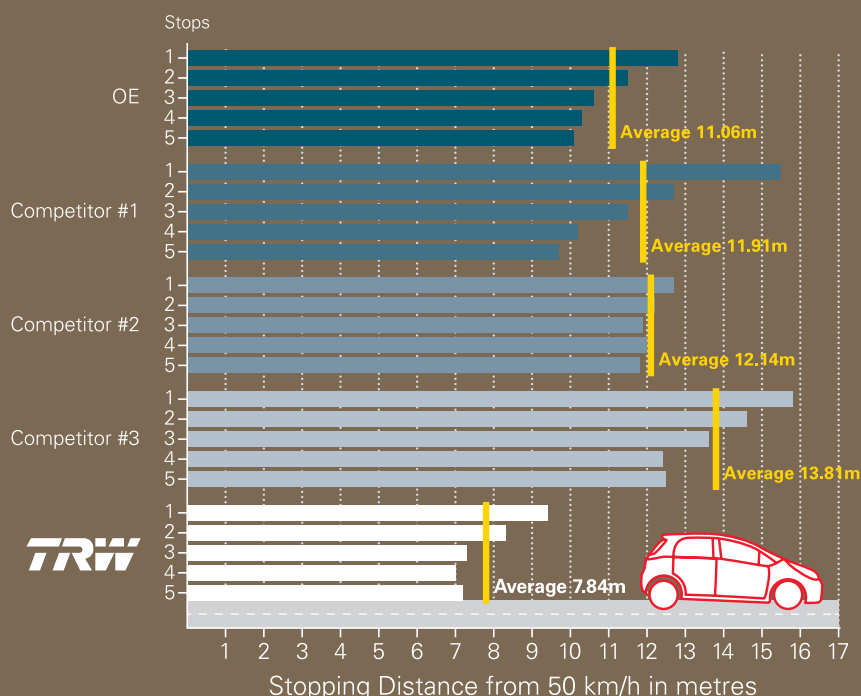
Deep moulding rotating machine



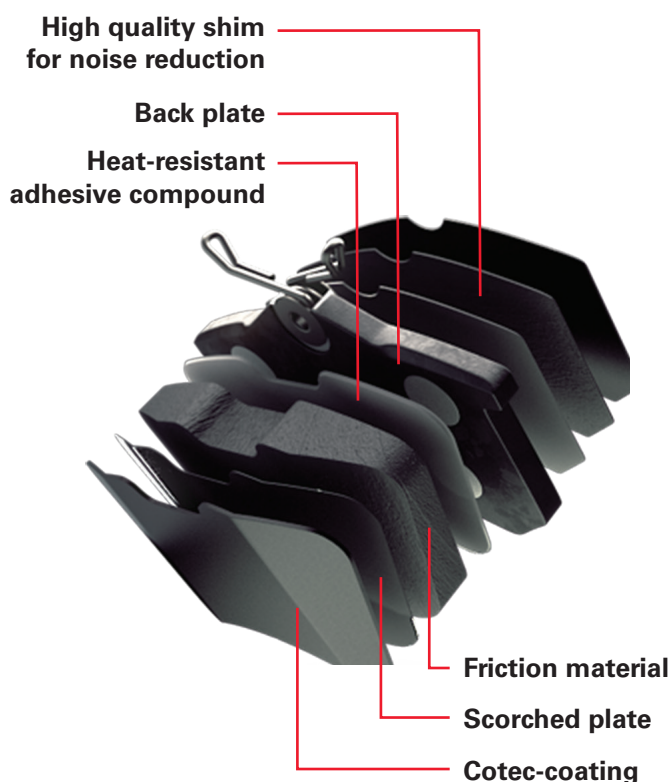
# Optimum performance from the first stop

Our tests show that within the first 5 stops drivers using Cotec pads will notice a significant difference in their stopping times:

In fact – compared to a brake pad which does not have our unique silicate coating, Cotec pads have optimum friction co-efficient right from the first stop – meaning that drivers have a better pedal feeling and can stop quicker during the 'green behaviour' of the pad, when it is first fitted.



## TRW Cotec Brake Pads. Safety in every layer.



**Very silent:** TRW places great emphasis on noise reduction. Its brake pads are fitted with high quality shims which act as a damper between the friction material and the brake caliper.

**Very robust:** Made from high quality steel, the back plates carry the friction material required for the braking function. They are covered with a powder coating to protect them from rust.

**Very stable:** Unique adhesive compound which can withstand high temperatures and resists extremely high shear strengths.

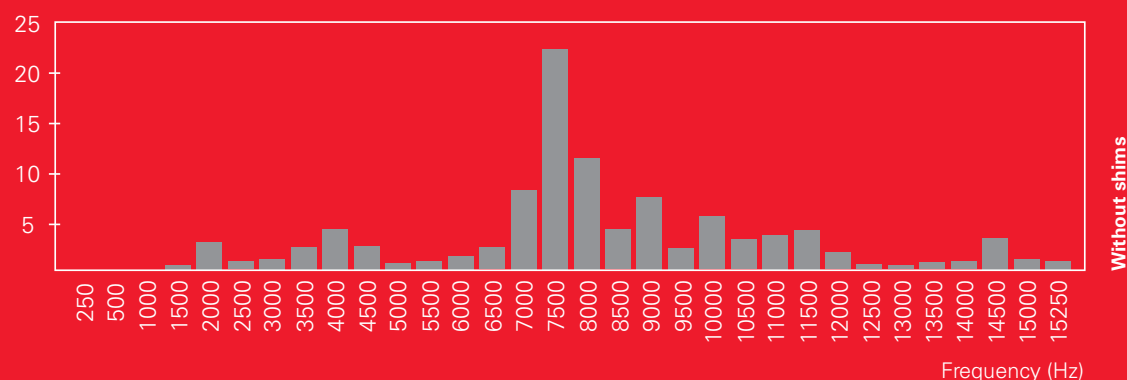
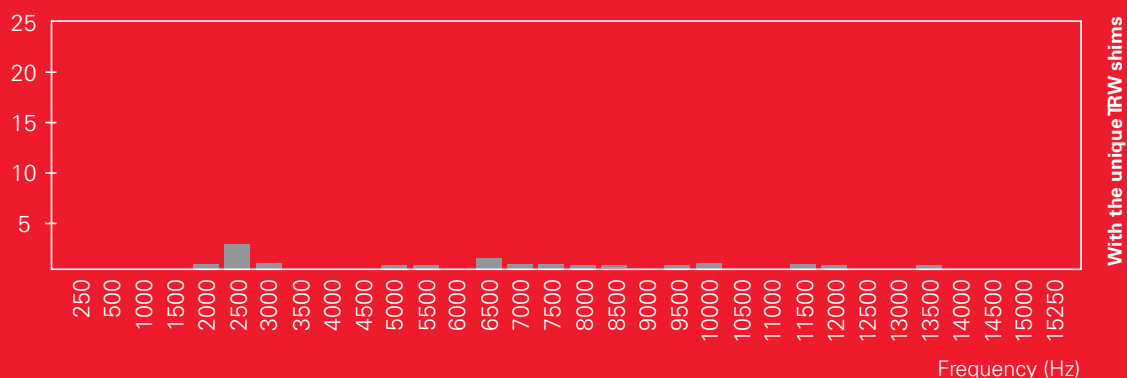
**Very well mixed:** The ingredients ensure a stable friction coefficient and the safest braking performance in all temperatures, at all speeds and under all conditions throughout the lifetime of the pad.

**Very hot:** We practice the OE standard of advanced heat plate scorching and heat the friction material to 600-700°C to eliminate trapped gases and resins; reducing the bedding-in time. This process simulates the first brake application.

**Very good:** Cotec pads outperform major competitors and OE during the first stops after a brake pad change, also known as the green behaviour.

# Quietly confident

Noise occurrence (%)



When it comes to ensuring minimal noise from the braking system, all TRW pads are fitted with the unique TRW shims, which are manufactured with a special layer that reduces noise and increases comfort, again exceeding many OE specifications.

The shim acts as a damper between the friction part and the brake caliper. Without this, braking noise can occur, varying from groaning to a high frequency squeal depending on the driving speed and temperature.

## Updated box design

This new box design with its corner module imagery highlights TRW's commitment to being a global supplier of corner module components to the aftermarket.

The two icons show that these brake pads are copper free and that the box will contain all of the accessories needed to fit the new pads, as supplied at OE.





# Safety first

All TRW brake pads undergo a rigorous set of tests, both during the production process and on the road. TRW aftermarket mirrors the testing procedures used by the OE area of the business. TRW Automotive Aftermarket also carries out a wide range of additional testing to ensure the complete safety of our parts.

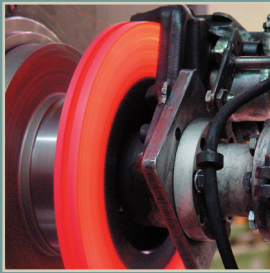
Many aftermarket suppliers in Europe consider their adherence to ECE R90 specifications as a mark of excellence, but for TRW, this is a minimum.

***As a key safety component of the braking system, TRW brake pads are produced to ensure the highest level of performance, driver comfort and safety.***





# Test bed: Physical and chemical property tests



**Dyno testing**



**Alpine test, Austria**



**Downhill test drive  
"Brakes ok?"**



**Großglockner  
"Edelweißspitze"**

- Krauss test and AK Master – friction level check. This industry wide test was developed by a TRW employee and tests the friction level to ensure optimum braking performance
- Compressibility test – Measures pad wear and disc thickness variation (DTV). The pad is measured to 160 bars during 6 cycles to measure compressibility. This test determines the comfort level, If the brake pad is too hard it leads to DTV and noise, if it is too soft it will lead to a drop in performance and wear more quickly
- Heat transfer test – Alpine Test. This checks the influence of the brake fluid boiling point by measuring stable performance
- Swelling – hill hold test. This checks that the friction material does not expand too much when hot, which can cause the car to roll when the handbrake has been applied and the pads have cooled
- Shear strength test during production control – this ensures the pad material will not separate from the backing plate
- Dynamometer test – car test simulation for development and process control

## Extensive road tests

Road testing complements the laboratory tests to provide comprehensive results before the pads are released into the market.

### 1 Performance test

- High speed fade test (6 stops from 90 per cent maximum speed to 80 km/h)
- Auto Motor Sport (AMS) test. The stopping distance of ten consecutive braking tests from 100 km/h to 0 km/h is measured. This is taken under maximum pressure for each stop

### 2 Comfort test

- Judder test – motorway stops are carried out from high speeds to 80 km/h measuring the disc thickness variation (DTV)
- Squealing/wear check until endurance run (Mojacar, Spain)
- For accurate measurements; pedal travel, brake pressure and deceleration have to be strictly controlled

### 3 Alpine test

- This takes place on the Großglockner Mountain, Austria. Vehicles travel down a 14.5 km section of steep winding mountain roads, undertaking a continuous braking test for about 25 minutes. Solid discs can reach 850°C and each vehicle performs an emergency stop at the end of the section. The temperatures are measured over the entire braking system, including the brake fluid. The vehicles then return to the top of the grueling mountain pass and do the test all over again with the same set of pads

### 4 Hill hold

- Tested at a defined gradient to check the hand brake function of the car

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Publication Number XFB266AP