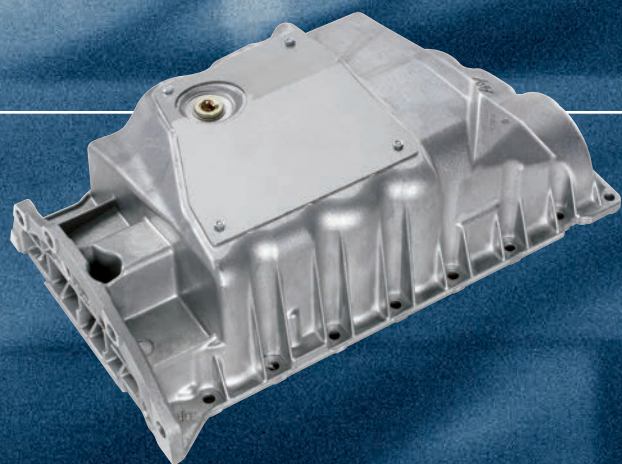


APPLIED DAMPING MATERIAL

TRELLEBORG SEALING SOLUTIONS

ADM

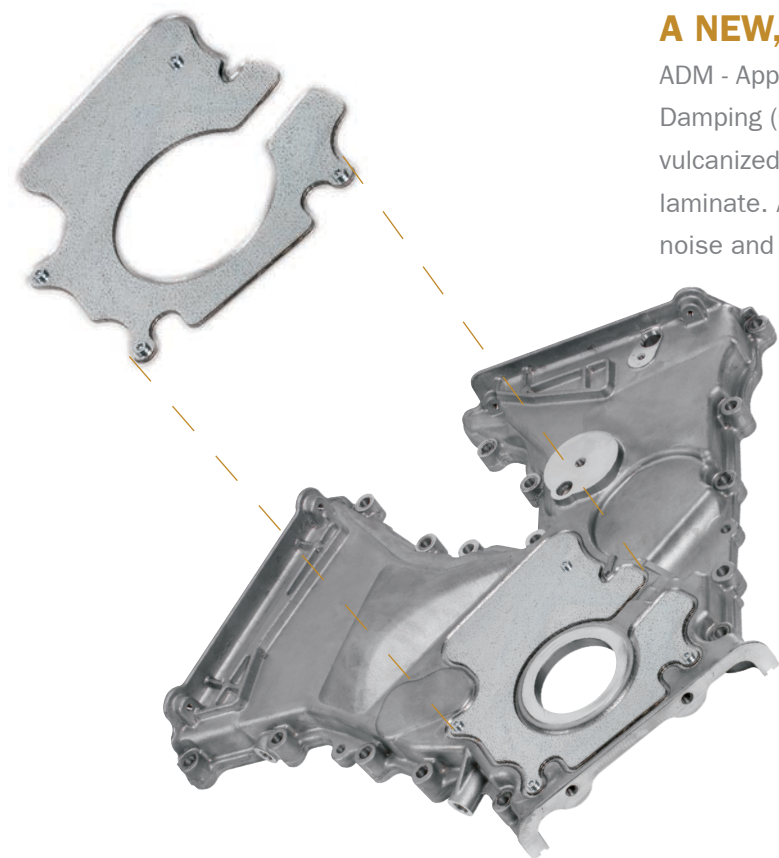


**flexible
innovation**
For a World of Application



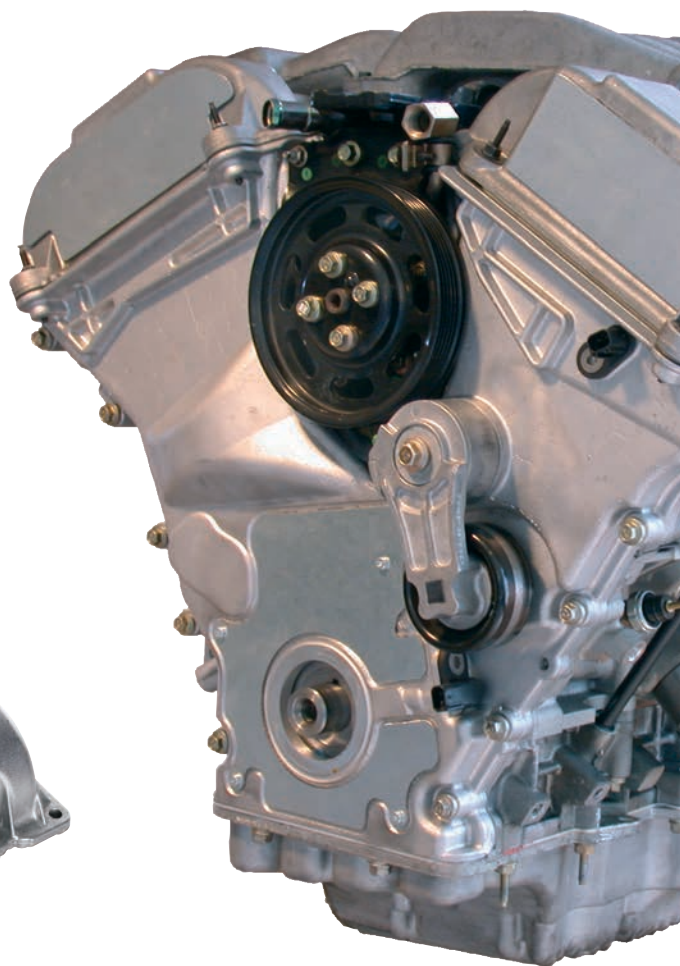
A NEW, ADVANCED CLD MATERIAL

ADM - Applied Damping Material – is a new Constrained Layer Damping (CLD) material consisting of two layers of steel vulcanized together with rubber to produce a strong, durable laminate. ADM provides superior damping of structure-borne noise and can be cut and formed to fit most surfaces.



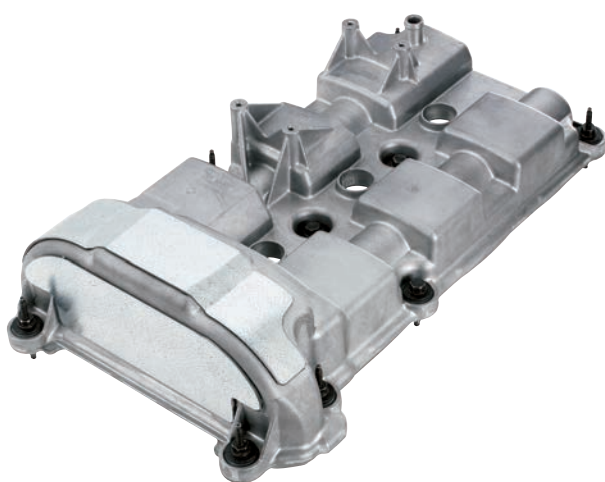
DURABILITY: A SOLUTION THAT STICKS

Original damping and adhesion properties are maintained. This has been shown in extensive testing of ADM concerning thermal aging, fluid compatibility, salt spray corrosion, T-peel, T-pull and shear in thermal cycling.

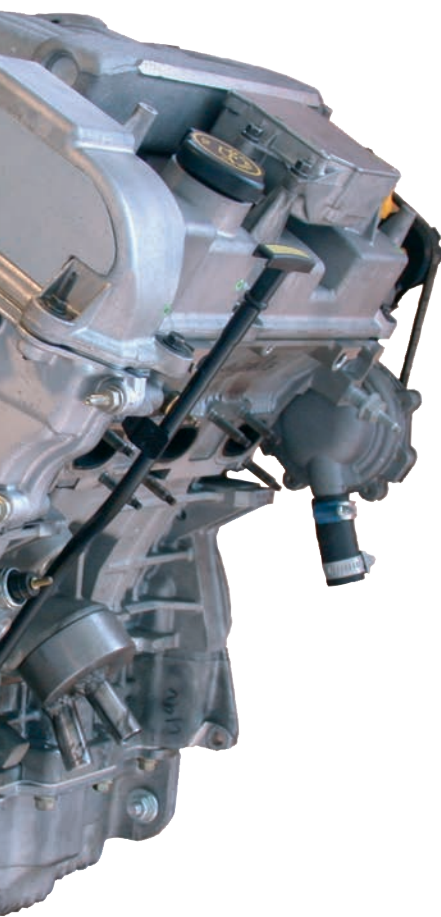


APPLICATIONS: CAST ENGINE COVERS

ADM can be applied to any structure to reduce structureborne noise. Typical applications are cast covers such as valve covers, chain covers and oil pans.



Your engineering partner in reducing engine noise



ADM (Applied Damping Material) is a new, high-precision sound damping solution that answers today's increasing demands for lower noise levels in cars and trucks. It is especially applicable to cast engine covers. Applying ADM, selected and tailored to a specific housing, will eliminate noise problems.

This advanced laminate is from Trelleborg Sealing Solutions Kalmar, the world leader in the production and development of brake noise and vibration damping materials for automotive and industrial applications.

Multilayer technology

ADM is a sandwich material that draws on Trelleborg Sealing Solutions Kalmar's expertise in steel and rubber laminates gained from its global leading position in the brake shims market and its development of Duru-LAM.

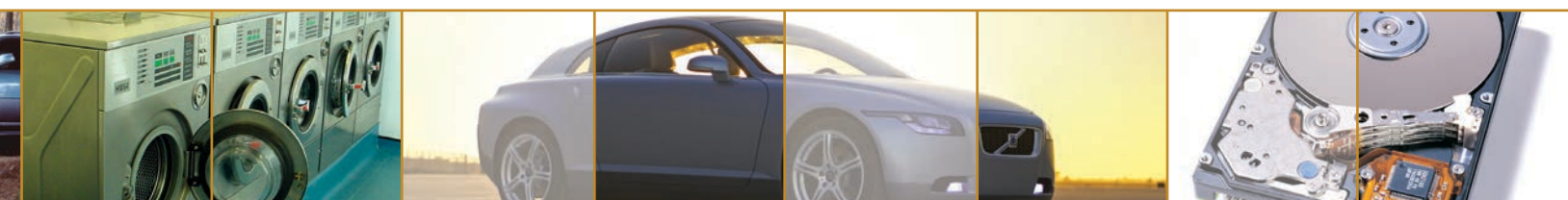
The composition of ADM consists typically of two metal layers vulcanised with an intervening rubber layer, a steel layer

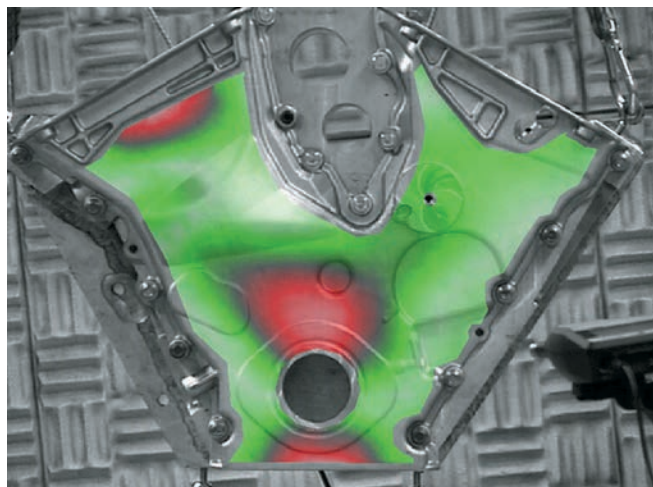
and adhesive.

Vulcanisation creates a homogenous, acoustically dead material. Separating the layers is virtually impossible. This strength, plus superior bonding to the structure, eliminates the risk of delamination during forming and in operation. ADM performance can be adapted to specific requirements by adjusting material quality and the thickness of the steel and rubber layers.

Damping where it matters

ADM offers an entirely new nonencapsulation method for solving engine noise problems. What makes ADM unique is its pinpoint use on noise problem areas. Accurate analysis of the problem using the latest laser technology means that exactly the right thickness of ADM is always used in exactly the right places. In some cases noise elimination can be achieved by ADM-damping just 10-30% of a component's surface area.





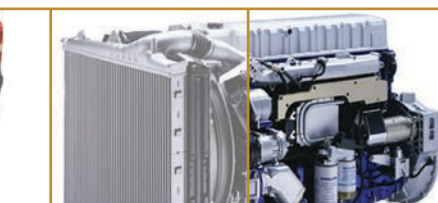
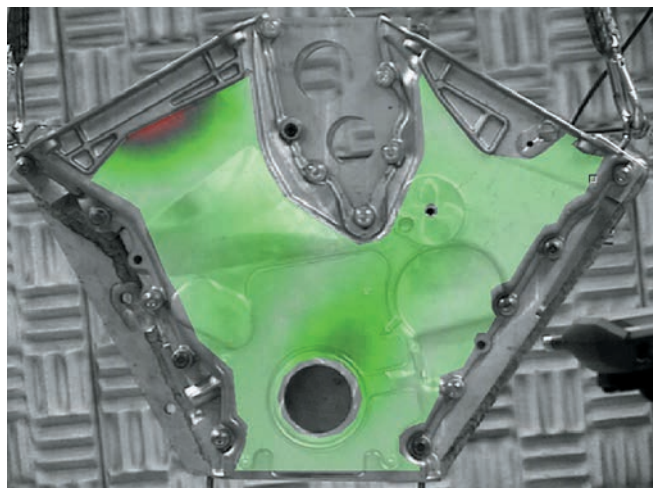
BEFORE

Identifying areas of high resonance is the first step to a customer-specific noise-damping solution. Laser scanning equipment (pictured below) reveals the source of the noise problem in a few moments. An area of high resonance, shown here in red, is clearly picked up by the laser scan. Just as importantly for ADM placement, the laser scan identifies areas that are problem-free.



AFTER

Following noise source analysis and material design, the part is retested with ADM bonded in place. This laser scan reveals the damping quality of the precision-placed material. ADM application in the right place has eliminated high resonance problems. Identified problem-free areas are not damped, leading to optimum, economical use of ADM.



Rapid solutions *tailored* to specific noise problems

Using ADM, Trelleborg Sealing Solutions Kalmar finds and produces customer-specific solutions to engine noise problems.

Our prototype process can in most cases provide the customer with an optimised ADM-damped component for evaluation within a week.

Prototypes for approval in a week

We prototype and produce an ADM part stamped or formed specifically for a customers' component following these stages:

- Vibration baseline analysis of the component structure and identification

of noise sources using laser scanning equipment.

- Identification of the right ADM material and sandwich composition
- Laser-cut ADM parts are formed and bonded to the structure.
- The structure is retested to ensure noise has been eliminated and is then sent back to the customer for approval.

Production in Kalmar

Production of approved ADM designs is carried out in Kalmar, Sweden.

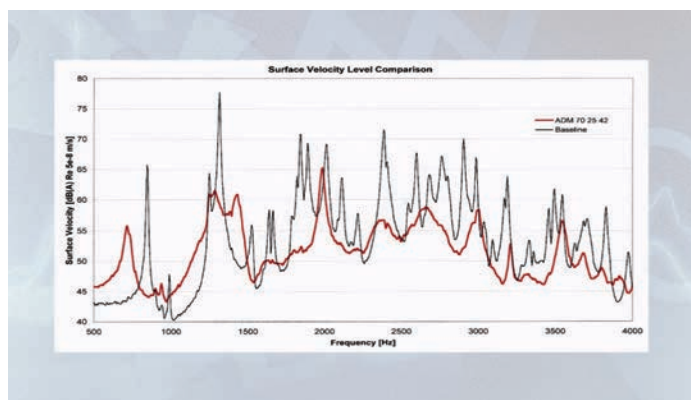
- Steel and rubber material are brought together with the adhesive and made into a composite-

material on our laminating line.

- The metal and rubber layers are bonded strongly on a double belt press in the separate vulcanisation line at our new, purpose-built plant.
- ADM is cut into uniform strips before final stamping and cutting at our stamping house.
- It is also possible to deliver ADM as sheets or on slit coils or full coils.

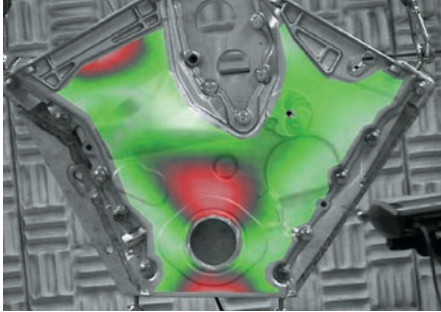
Trelleborg Sealing Solutions continues to provide excellent customer support when required even after the stamped ADM solution is delivered to customers for bonding to their component in full-scale production.

The graph below shows a comparative vibration behaviour analysis. Retest results show that high-resonance peaks have been eliminated by the tailored ADM material.



Your partner *from*
start to finish

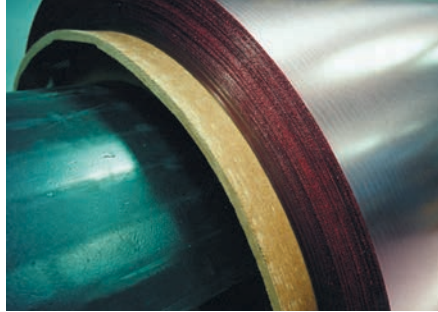




1. IDENTIFYING THE NVH PROBLEM

Finding an optimum solution to a customer's noise problem begins with pinpointing the source of the noise.

To do this, we investigate the structure's dynamic behaviour (mode shape) through Finite Element Analysis or vibration measurements. Using the latest Polytech Laser Vibrometer gives us a clear picture of vibration problem areas within minutes.



2. MATERIAL SELECTION

Selecting the right material is critical in diagnosing the optimum damping solution for a specific noise problem.

The best solution may be a combination of materials such as steel, aluminium, adhesive and rubber. Material qualities can be adapted to specific requirements. Different surface treatments – aluminised, zinc-coated and oil-coated – are also available.



3. MATERIAL OPTIMISATION

Our Laser Vibrometer Scanner shows us exactly where ADM should be applied on the structure. The material is then designed according to the structure's surface and optimised in terms of acoustical damping using Loss Factor Measurement equipment. We also look at the sandwich composition to find the ideal material combinations and layer thicknesses.



4. PROPOSAL VALIDATION

Prototypes are produced from the finalised design. A prototype tool to stamp and form application-specific parts can also be produced.

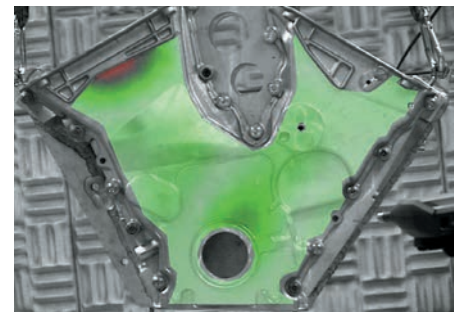
The prototype parts are applied to the structure and sent to the customer or for external acoustical and durability testing. The in-house testing equipment includes a roller dyno and motor bench test.



5. GLOBAL SUPPORT

Trelleborg Sealing Solutions Kalmar is part of Trelleborg Group and the world leader in NVH solutions for the automotive industry. We are represented in all important regions of automotive production, such as North and South America, Europe and Asia.

Our mission is to secure and close, long-term partnerships with our customers.



6. THE TRELLEBORG SOLUTION

Our ambition is to be a leader in technical solutions for noise and vibration elimination.

Trelleborg Sealing Solutions Kalmar wants to be your partner in solving NVH problems from start to finish; we engineer, prototype and finally produce a solution that is optimised for customers' needs in terms of design, cost and weight.



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