

## Exhaust materials are changing, here's how...

According to Doug Bentley, head of R&D at Europe's largest manufacturer of replacement exhaust systems Klarius, there is a lot to consider when choosing materials to manufacture exhausts...

There is a commonly held belief that stainless steel is the best solution for an exhausts system, but it can be expensive and brittle, which in many automotive applications isn't ideal. As with many engineering challenges the best solution requires extensive research, testing and above all experience, here are the relative pros and cons in the real world.

Stainless steel comes in a huge array of grades depending on the additional chromium, nickel and manganese content. They vary from extremely hard aerospace and medical materials that are highly resistant to corrosion and can be highly polished, through to mixtures that do corrode but are more suited to less demanding applications such as non-critical fixtures and fittings.

Exhausts are manufactured from tubes and sheet material made into silencer boxes, because the shape and diameter of the two essential components are completely different they have to be joined, using a weld. The weld is only as strong as the join between the two items and for a very hard material with little or no inherent flex, this puts pressure on the weak part of the design. Welds are also highly susceptible to corrosion even on stainless steel as the compound for the weld is different.

The different grades of stainless steel also have greatly varying hardness characteristics, and this is where the downsides start to appear; stainless grades are inherently brittle and so when subjected to the constant vibration and occasional shock impacts from flying road debris and the plague of speed calming solutions we face on today's roads, the joints in stainless steel exhausts can crack and fail very easily.

The other downside is the cost, stainless grades vary in price, but are commonly several scales more expensive than other options, so unless the manufacturing process is extremely good then problems occur.

Some aftermarket 'performance' exhausts are highly polished, which is just for looks; polishing only works on internal surfaces and even then is completely unnecessary once the exhaust gasses exit the manifold. Gas flow within the head and manifolds can be improved by polishing, but this is usually only done on blueprinted race engines to gain that extra few tenths. In a normal production car it makes no difference, it is the backpressure and noise which are critical. So polished exhausts may seem 'shiny' which is great if that is the look you are going for, but often do not actually improve engine performance and can actively damage engines and fuel efficiency over the long term.

The alternative is to look at mild steel which is easy to weld and has the flexibility to survive general wear and tear, the problem here is that it does corrode, which is a particular problem for petrol vehicles that tend to produce water during combustion and this sits in the recesses of the system causing corrosion.

The problem of internal corrosion isn't as bad for diesel powered vehicles as the fuel has certain lubricating / anti-corrosive properties. The problem then is from external corrosion, due to the constant heating and cooling cycle of using a car the metal tends to attract condensation and is completely exposed to road salt and other pollutants, which are seasonal, but very damaging all the same.

Most replacement exhausts used to be made from mild steel and car owners expected to replace an exhaust every three years; a typical family car twenty years ago would have six or seven replacement exhausts during its lifetime (depending on use). The average now is just two and that is thanks to advances in material technology and manufacturing expertise.

Klarius uses what we believe is the best of both worlds, we buy our own grade of aluminised steel direct from the UK's largest producer TATA, which provides strength and flexibility thanks to its ferrous steel core and great corrosion protection provided by a thin layer of aluminium that is applied to both sides of the tubes and sheets as they are manufactured. We also use a specially developed welding material that provides the strong bond we need between each

component, but also protects the join from corrosion both inside and out.

Aluminised steel is less expensive than the higher grades of stainless and due to the vast volumes we purchase it in (Klarius makes over 2 million exhausts per year), it is cost competitive with mild steel. Controlling cost is essential for the automotive aftermarket in particular, when a hand built stainless steel exhaust system may cost as much as the car is worth and not fit correctly, then a fully type-approved standard exhaust from a large manufacturer can offer a huge saving in purchase cost, as well as lasting longer thanks to clever materials technology and a guaranteed perfect fit every time, so much so that every Klarius exhaust comes with a full 2 year warranty.

## About the KLARIUS Group

Klarius Group is the largest European manufacturer of aftermarket car parts today. The Klarius Group operates five high-volume Manufacturing Plants, a Research & Development Centre, four European Technical Centres, eight International Logistics & Distribution Hubs, and eighteen national and regional Stock Warehouses based across Europe. Klarius Group Headquarters are located in Manchester (UK).

The Klarius Group employs 1,200 personnel across Europe, and has an annual turnover of 350 million Euros.

The two current major market brands within the Klarius Group are Klarius Emission Control Products and QH Automotive parts. Both the QH and Klarius product brands represent a range of OE quality replacement automotive products. Klarius Group companies now offer over 100,000 parts, covering the majority of the European Car Parc, supplying over 80,000 parts every day, to over 5,600 delivery points in more than 136 countries.

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## Editor Contact

DMA Europa Ltd. : Roland Renshaw

Tel: +44 (0)1299 405454

Fax: +44 (0)1299 403092

Web: [www.dmaeuropa.com](http://www.dmaeuropa.com)

Email: [roland@dmaeuropa.com](mailto:roland@dmaeuropa.com)

## Company Contact

Klarius Group Ltd. : Veronique Auger

Tel: +44(0)161 489 6616

Web: [www.klarius.eu](http://www.klarius.eu)

Email: [Veronique.Auger@Klarius.EU](mailto:Veronique.Auger@Klarius.EU)