



EXHAUST SYSTEM DESIGN FOR PASSENGER CARS

About Our Client

The client is a prominent market leader in Europe, specializing in the design and provision of high-quality emission control systems for passenger cars, including fabricated insulated manifolds and catalytic converters. With an extensive workforce comprising over 6500 skilled employees, the client operates more than 30 manufacturing companies and 16 distribution centers across the globe, catering to the needs of major car manufacturers worldwide. The company has garnered a formidable reputation for its top-of-the-line products and services and continues to remain at the forefront of the automotive industry, thanks to its unwavering commitment to quality and innovation.

Scope / Challenge

The program entails designing and developing a new exhaust system for the customer's modular car platform. One of the key challenges was to ensure that the exhaust systems could be uniformly positioned across different car models to minimize engineering costs, weight, and complexity during the porting process. The team also aimed to develop a standardized, interchangeable set of parts that could be used to build a range of cars, resulting in a 30% reduction in the time taken to build a car.

In addition to the exhaust system design, the team was tasked with creating a modular welding fixture to ensure consistent and accurate welding of the exhaust system components. The fixture was designed to enable quick and easy assembly and disassembly, thereby reducing downtime, and increasing production efficiency.





Solution

TAAL Tech's onsite and offsite engineers, in close collaboration with the client, initiated the project by delving into various engineering aspects such as design, materials science, acoustics, process technology, and analysis & simulation. The engineering team was fully involved in the prototype design, stress analysis using FE methodology, and extensive use of hand calculations to generate comprehensive reports that meet the acoustic and emission requirements.

The designed prototypes were subjected to thorough testing for thermal and fatigue analysis, road impact durability, weight spreading, static deflection, modal analysis of hangers, and hanger durability, which was validated by the client's design and manufacturing team. The team then proceeded with forward integration activities such as designing inspection fixtures, testing fixtures, tools, and SPM, as well as designing a KBE (Knowledge Based Engineering) tool for muffler acoustic samples.

The main challenge was to achieve uniform positioning of the exhaust systems for different cars, reducing engineering costs, weight, and complexity when porting the car over to other models. To overcome this challenge, the project involved creating a standardized, interchangeable set of parts that could be used to build a range of cars, reducing the time taken to build a car by 30%. The team also designed a modular welding fixture for the exhaust system, which helped in improving the manufacturing process.

Results Delivered

TAAL Tech's interventions enabled the client in implementing weight reduction and alternative materials initiatives, thus resulting in an overall reduction in manufacturing costs for the exhaust system. The use of a modular concept design and standardization across customers' car platforms further contributed to cost-effectiveness. The modular design of the welding fixture also significantly reduced the changeover time by 40% when welding two different modular exhaust systems, resulting in improved efficiency.

The mathematical validation of the exhaust system played a crucial role in passing the prototype evaluation for acoustic testing and backpressure testing, ensuring compliance with regulatory standards. Overall, the project outcomes led to improved performance, reduced costs, and streamlined manufacturing processes, thereby creating a competitive advantage for the client in the automotive industry.



About TAAL Tech

TAAL Tech is a niche Engineering and Technology solutions provider serving global corporations in their pursuit for faster innovation. Our vision is to be a leader in providing innovative, high value engineering & technology services to global corporations. Meet our team and learn more about us.

