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Why Choose a Converter by Application?

Part II

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Last month we talked about choosing a converter by application. The discussion centered on both the legislative and technical reasons for the industry to make the move from a "one size fits all" mentality to… let's get the "CORRECT" converter on the vehicle. Moving forward, we would like to continue the discussion by learning what causes one converter to be different from another.

Each component of the catalytic converter has a specific function. The ribbed body along with the cushioning mat work to keep the ceramic catalyst in proper alignment. The heat shield functions not only as protection against external heat related problems but also helps to keep the catalyst at operating temperature. Using proper neck sizes and a half inch lap joint assures good flow and a sturdy structure. All of these components are important and necessary to provide a fully functional converter. As far as getting the job done, the duty falls on the washcoat applied to the catalyst brick.

The guts of most catalytic converters on the market today are either ceramic or metallic monoliths coated with a solution consisting of precious metals and an oxygen storage compound on an alumina base. The precious metals we refer to here are Platinum (Pt), Palladium (Pd) and Rhodium (Rh). The oxygen storage component is typically Ceria, not a precious metal. Within this general washcoat formula you will find many variations and since the technology is proprietary, we will not get into specifics in this discussion. The most important information for us to grasp here is the relationship between the gases exiting the combustion chamber and the specific washcoat on the catalyst. The content of the exhaust gases, Oxygen, Nitrogen, Carbon Monoxide, Hydrocarbons and Oxides of Nitrogen, is directly related to air fuel ratio, heat and carbon. By controlling these variables we can create a situation wherein the converter is only left with clean-up duties.

So how does this clean-up take place? Of the list above, Carbon Monoxide (CO), Hydrocarbons (HC) and Oxides of Nitrogen (NOx) are the bad guys. As they flow through the converter a chemical reaction takes place that reduces these harmful gases to water and carbon dioxide. The overall efficiency of this reaction is determined by many factors… heat, air/fuel ratio and most importantly the washcoat itself. The concentration, ratio and application of the components of a washcoat vary greatly and are now directly related to "vehicle specific application" including year, make, model, engine size and Engine Family Number (EFN). Today more than ever these factors must be considered when replacing a converter. The design of the engine, the Engine Management system and placement and flow characteristics of the converter(s) all play an important role in how well the system functions.

During the past 20 years we have progressed through all the various stages of On Board Diagnostics. Changes in gasoline and the ever increasing demands of constantly lowering the emission cut points brings a new challenge to the converter manufacturer to develop a converter that is both functional and cost effective. A slight variation in the weight of Pt, Pd or Rh (in grams) can affect the conversion efficiency of a converter. Many believe that more is better and although that may be partially true, all manufactures of converters both OEM and Aftermarket, must operate in the real world. The cost of the metals that are used can get very high, $2000/ounce at one time. Consequently, you can load all the metal you want in to a unit but who is going to buy a $1000 universal converter?

In this industry, as in most, compromise and searching for alternatives to achieve the same results is more the rule than exception. We strive to bring the best product to market at the greatest savings to our customers. As the industry continues to evolve, we are dedicated to be on the cutting edge and providing the most efficient and cost effective product on the market.

Cleaning up the environment…one converter at a time

Gary