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INTERVIEW

"We need to minimize back-pressure to the filter but we're now getting a much better understanding of how we can integrate the three-way performance and the filtration characteristics on a brick and have the minimum impact on back-pressure possible"

In this two-part interview, Automotive IQ spoke with Dr. David Greenwell, Senior Development Chemist at Johnson Matthey Catalysts, UK to discuss the challenges facing filter technology in gasoline engines in light of EURO 6 legislation.

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What are you currently working on at Johnson Matthey Catalysts?

David Greenwell: Currently I'm a senior chemist. I work in the gasoline development group and I'm responsible for a number of different things. One of my primary roles at the moment is looking after the gasoline filter development program for Euro 6 legislation. So I'm running the development program with a team of chemists and we're testing these concepts in our vehicle labs to try and prove the different sorts of concepts that our customers are asking us to investigate.

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W.H.: What future potential do you see for filter technology for gas engines and where do the challenges lie?

D.G.: It's very much driven by the customer as to what architecture they're looking for - so whether it's twin-brick systems with a gasoline filter in the second position or a single brick in the first position for example. A lot of that is driven by customer requirements and there are challenges associated with both of those: the temperature of the filter, the operating temperature and then all sorts of operating conditions, how that deactivates the catalyst depending on its location as well. Also how does the effect of poisons change the activity of filters compared to a traditional three-way catalyst that we are used to making and with which we have a lot of years of experience. The gasoline filters are relatively new to us and we've been working on them for four years now. We started working on them in 2009. So, it's just understanding all of the challenges and the differences between our understanding of flow-through catalysts, how filters behave differently and how we can optimize those products to give the customers exactly what we need.

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W.H.: So some of these are classified as packaging challenges, perhaps others as actual chemical challenges?

D.G.: Exactly, yes. What size have we got available to us and are the locations available to us and how can we optimize the products to give the minimum impact to the customer in terms of the way in which car will operate when we fit a filter? The idea is we get total transparency. If they want a fully-active, three-way product, we give them something which behaves in exactly the same way as a three-way flow-through catalyst would but with the added characteristic that is does the filtration to meet the legislation requirements.

Automotive IQ

W.H.: Speaking of legislation, I understand you're going to be presenting about this. Can you briefly discuss how Euro 6 is challenging you and challenging the industry in general?

D.G.: It's a combination. The two main characteristics are the on-board diagnostic requirements, the legislation for NO_X is becoming very tight in terms of the differences between what we call the durability-aged catalyst, a real world-age catalyst and the OBD failure points, the point at which you have to diagnose a bad system. The separation between those two is narrowing and therefore we require better understanding and better control of our systems to be able to do that diagnosis. We need to be able to work closely again with the vehicle manufacturers to make sure we are giving them the products that have the characteristics that they can diagnose between a good and a bad catalyst. So that's one of the primary focuses we have, meeting that OBD target and the second thing is particle number - the 2017 legislation bringing in the equal level we see in diesel, 6×10^{11} #/km target in terms of particle number. So, that's the other challenge for us, meeting that target and making sure we are giving the customers exactly the right products for their requirements. So, pitching it at the right level based on the specific engines that they're looking at because we can do a lot of work in tuning our systems to get different levels of filtration efficiency. But, of course, we want to make sure they've got the right level of three-way activity as well. There are a number of ways we can achieve that.

This is part 1 of a 2 part interview with Dr. Greenwell.