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Selective Catalytic Reduction is currently a hot topic as manufacturers look for cost-effective ways to reduce emissions in order to meet increasingly stringent environmental regulations. Rick Breunesse of TASS International discussed the topic with *Automotive IQ* in an in-depth three part interview. Compact SCR is the focus of part one.

Automotive IQ

What are your specific functions and interests at TASS International? Where have you been throughout the company in terms of dealing with industry as opposed to regulators?

Rick Breunesse: We are basically looking at it from an industry perspective. We talk to engine and vehicle manufacturers but not that much with government and legislators. Although, we closely follow the regulations and we know what direction they're heading.

Automotive IQ

It's definitely an interesting area.

R.B.: Yes, I still enjoy it after several years. Once you start digging into it, there is no end to it.

Automotive IQ

And you've been at TNO and TASS for the last several years?

R.B.: Yes, I've been working for TNO for five years and the last two years for TASS International. TASS International is a private company wholly owned by TNO. Through TASS International TNO has worldwide presence with local offices in all regions of the world. I moved to TASS International because a growing number of our customers are in this region, the United States and Brazil.

Automotive IQ

One of the topics currently of interest is compact SCR where you combine the particulate filter and the catalyst. I understand there are some challenges with this. Could you go into what some of these challenges are? What are some of the advantages?

R.B.: The background of this technology consists of cost and packaging reasons. A more compact system is easier to integrate and less substrate is attractive from a cost perspective. Secondly it can be attractive to reach quick conversions of NO_x at cold start as the filter substrate is located closer to the engine. In that case, a larger SCR catalyst is applied downstream. In light-duty applications, passenger cars or smaller vehicles, the packaging benefit is complemented by a slight weight reduction as well. There's limited space in those vehicles, so they have to move to more compact systems and in the efforts to do so the idea was born to take the DPF, the diesel particular filter substrate and coat it with the SCR coating, so combining those two. The challenges they are facing are firstly, the poor SCR performance at low temperatures compared to the traditional SCR "flow through" systems. Secondly, there is also durability. Perhaps, you know, the DPF has to be regenerated once it's full of soot and that happens at extremely high temperatures, around 650 or 700° C. This is a very hostile environment for an SCR catalyst or catalyst coating so it's causing the catalyst to age and deteriorate very quickly and those are the two biggest concerns with this technology.

Automotive IQ

So, in order to solve that, do they try to shield the catalyst or the particular filter off from the catalyst within the unit or do they come up with a different material that withstands the much higher temperatures?

R.B.: The strategy is trying to avoid the active regenerations as much as possible and if required to control the temperature increase avoiding peaks. So, that's the goal. It is unavoidable to shield it off because the coating will be on the same material, the same substrate so it's unavoidable that it will see high temperatures if you do active regenerations.

Automotive IQ

Are there any consequences for the sensors that are measuring in stream when you have a combined system? Is there a need to have either different sensors or sensors made of a different material etc.?

R.B.: Not necessarily. The principle is more or less the same; it's just that you put the two bricks together in one unit. That's more or less the idea. In case combined with a larger SCR catalyst downstream another virtual or physical NO_x sensor might be required based on the design of the controls.

Automotive IQ

With regard to diagnostics, is there anything that you need to change or anything related to that?

R.B.: From a diagnostic point of view, it can be a little bit more challenging especially when combined with a second SCR substrate downstream. The legislation demands that you detect any failure of components or loss of efficiency. Implementing more technology and combining components can potentially be harder to diagnose. Our organization is therefore looking at new model based approaches to ease calibration efforts and increase robustness.

This is Part 1 of a 3 Part Interview with Rick Breunese.