

The Power and the Glory

■ Ford Powertrain President Dave Szczupak meets the challenges of building cleaner more powerful engines.

by Gary Witzenburg

Dave Szczupak sees a lot of challenges these days as vice president of powertrain operations and the guy responsible for all North American powertrain operations.

He is dealing with emissions, performance, cost, NVH and an onslaught of other issues cropping up as engines get larger and more technologically advanced.

Szczupak recently sat down with *Automotive Industries* to talk about those challenges and Ford's solution for them.

Q: How difficult is the emissions challenge these days?

A: It requires a lot of attention to detail, a really full understanding of the chemistry, combustion, electronics and software optimization techniques, so we can look at every millisecond in the cycle and make sure we've optimized the temperature, air, spark, fuel, transients and the way we control them. If I look back even five years, I'd never have dreamed that we'd be announcing a PZEV Focus, with relatively simple technology. There's some sophistication in controls and the way we've optimized every element. But at one time I thought we'd have to have electrically heated catalysts and hugely expensive new technologies.

Q: How much tougher for higher displacement and higher-performance SVT versions?

A: The bigger engines can be better because you tend to use them a little less hard. But as power goes up, we need more attention to detail. We still have to apply all those optimization techniques and use the same methodology. In some ways it can get



Dave Szczupak says virtual powertrain analysis will save Ford both time and money.

easier, because if you add technologies such as variable cam timing, you get more power by changing valve overlap, but it also gives you improvements in economy and emissions. There are ways in which these things can compliment each other.

Q: How do you improve performance, emissions and economy without costs getting out of control?

A: You have to look at the total cost, not just incremental costs. Yes, we've added some features on the 3V, but we've got very, very good economies of scale with that engine family. At the Windsor plant, we'll make a 5.4 2V, the 5.4 3V, and the 6.8 V-10 on the same high-volume assembly line.

Q: What about QRD?

A: The way we have done power improvements in our modular engine family, we can go into production with very, very high confidence in reliability and durability because we're going from a known base. And we use some very advanced techniques – finite element modeling and computer simulation – to make sure we understand where weaknesses are and fix them.

Q: Is NVH more of a challenge with higher performance engines?

A: That's probably the biggest one. There's bound to be more sound when there's more power being generated. If you increase power and do nothing to structural stiffness and damping, it's going to get noisier. So you have to get back into the detail and make it more rigid or better damped or change the frequency response.

Q: All this should take more people, time and money, yet you are going in the opposite directions.

A: We've gotten to the point with analytical tools where we can get much closer to right the first time. We're using more intelligence and the most sophisticated tools in the design phase to reduce cost and waste in the development process. We can do better quality products quicker with fewer people. ★

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