



Ford SmartGauge: Designing an Extra 9 MPG?

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Working with Ford to develop an all-new instrument cluster for their 2010 hybrids, we suggested that the instrument cluster can increase mileage through design.

bad mileage behavior. Working closely with Ford, we looked for opportunities to provide meaningful, timely feedback, both informing and subtly rewarding drivers as they go.

When Ford's hybrid team approached Smart Design and IDEO to develop an LCD screen-based instrument cluster for their 2010 vehicles, we had a big idea. An instrument cluster can do more than provide information – it can improve mileage. Crazy? We didn't think so. We can use design to influence driver behavior.

Many hybrid owners have been disappointed by their actual driving mileage, which can be less than the manufacturer's promise. Driving style makes a significant difference. Quick starts and stops are less efficient. Even open windows can require additional power, affecting drag coefficient. While drivers are often willing to drive efficiently, vehicles provide little assistance.

For instance, with regenerative braking, slow, steady braking will add more charge to the battery than braking quickly. In current vehicles however, the sudden rise of the battery gauge's needle into the "high" zone when braking quickly would lead drivers to think that it's good for efficiency. This type of response can actually reinforce

Consider Driver Behavior

An instrument panel presents a great deal of information about the vehicle – speed, fuel level, miles travelled, and more. The vehicle's computer, however, also knows what the driver is doing. Focusing simply on the car's performance is only half the story. What if we also reported back to drivers on their performance? Rather than think in terms of a one-way flow of information, consider a continuous flow between vehicle performance and driver response. Think of it as a cycle of information.

Acting on this idea was a safe bet since our audience of hybrid drivers would be receptive and even enthused about optimizing mileage. At the very least they would be tolerant and forgiving, since we're trying to help them. Hybrid owners purchase their vehicles to conserve fuel. Their motivations may be monetary, environmental, political, or a combination, but it is a decision based on purpose. Assisting them in these efforts by encouraging more efficient driving behavior would be a positive act – especially if it involves their personal participation.

Our internal catch phrase was “influencing driving behavior.” In a reality check, we realize that hybrid drivers, no matter what their motivation, will at times be rushing to an airport, be late for work, or for whatever other reason, be driving on the aggressive side. We also realize that some drivers, after purchasing their hybrid, will be less interested than others in optimizing mileage – their responsibility ended with the fact that they purchased a hybrid. Others may care more about their hybrid’s performance on long trips or weekend outings, and less so during their hectic daily commute. It was important that the instrument cluster design would accommodate all mindsets, and adapt to an individual’s situation at any given moment. “Coaching” drivers to be more fuel efficient, a term being used in Ford’s recent press releases, is a good descriptor.

9 MPG by Design?

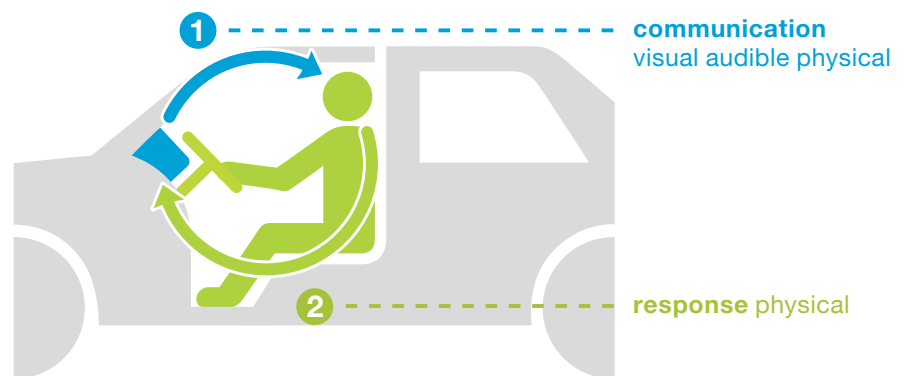
From early in this project, the 2010 SmartGauge was developed with the goal of helping drivers save gas. Did that approach work, and how much fuel is it saving? It’s too early to tell for sure – as of this writing, the 2010 hybrids are not even in the showrooms yet. But here’s an early read. The EPA rated the new 2010 Ford Fusion hybrid at 41MPG highway. Journalists test-driving the Fusion, and learning from the SmartGauge, have reported getting

50+ MPG. So does this mean that, through the design of the instrument cluster alone, we provided an extra nine miles per gallon?

We don’t expect everyone to obtain that level of performance. But we believe that the SmartGauge will help each driver understand how to get the most from his or her vehicle. We’re not talking about continuous monitoring of the engine’s performance by hypermiling fanatics – but through gentle coaching SmartGauge will increase awareness and improve fuel efficiency over long term use.

Visual Demand

SmartGauge has four settings displaying various levels of information: Inform, Enlighten, Engage and Empower. The most discussed element, appearing in selected modes, is the “efficiency leaves.” Located on the right side of the cluster, the leaves flourish when driving is efficient and disappears when it isn’t. As we expected, the leaves are eliciting a lot of comments. We anticipated initial skepticism but suspected this would subside. That seems to be the case. Car and Driver, for example, went from being unsure about the display (prior to driving one) to going “gaga” afterwards. Motor Trend called it a “brilliant interactive creation.” Reviews from other test-drive journalists have been equally as positive.



[Figure 1] While the driver needs to know what the car is doing, the car’s computer is also well aware of what the driver is doing. The SmartGauge is designed to save fuel, by taking the approach that design can influence behavior.

Incorporating an LCD display into a vehicle would, of course, cause immediate concerns about visual demand. However, it is also a very adaptable medium. While a YouTube demo video of the SmartGauge can give the impression that it demands visual attention, the interfaces are designed to reduce visual demand.

The SmartGauge has been developed to reduce look-away times – the time eyes are diverted from forward view. Glances to an instrument panel are typically on the order of 0.5 to 1.0 second, with the latter carrying rapidly increasing risk. Within this time drivers must look away, light adapt, focus, read the display, possibly adjust a control, return to forward view, light adapt and refocus.

Because glance times are short, reading a standard speedometer will typically take more than one glance. Adjusting temperature, more than three. Tuning a radio can average more than six glances.

Proper design can reduce these times. For instance, an LCD can display areas of contrasting color, as opposed to a single needle indicator. This can be seen in the SmartGauge's fuel indicator, where the level is indicated by an amber colored area. As opposed to a needle indicator, an area of color does not depend on accurate focus – and can even be seen in peripheral vision. Furthermore, it changes color, turning

more yellow as fuel gets low, and red when almost empty. The same holds true for the efficiency leaves – they are designed to be read in a single glance or peripheral vision.

A good deal of the current graphic work was finalized by Ford's design group, while Smart Design developed menu structure and future concepts. In the SmartGauge we successfully infused the idea that design can do more than typically expected. In this case we shared a vision that design is about people, not things. Historically instrument clusters have been about the vehicle's performance. Here for the first time, it's also about the driver.

The Road Ahead

The announcement of Ford's 2010 Fusion and Milan models, with SmartGauge, coincided with the plea in November and December of 2008 for government bailouts of the auto industry. Ford, in somewhat better financial shape than others, stated that their mandate for the future is, in fact, to go green. In the past weeks we've seen SmartGauge press releases from Ford, and newspaper, television and internet articles, that voice back many of the thoughts discussed in our early presentations to Ford. Approaching behavior as a design goal, in this context, is an innovation for the auto industry – an industry that without question needs to think differently in the next decade. And in that regard, the auto industry may not be alone.

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[Figure 2] SmartGauge, in its minimal setting, displays engine temperature, battery charge, speed and fuel level.