A BRIEF HISTORY OF FUEL INJECTION

In the seventies, EFI started showing up on more and more passenger cars. In the eyes of the auto companies it was very expensive compared to carbs, as the carbs had been developed for many years to do a reasonable job while being mass produced using die castings. Just a couple of the EFI injectors cost as much as a carburetor. A V8 has as many as eight injectors, a complicated fuel rail, various sensors, and a complex wiring harness and electronic control unit (ECU). So why did they go to the EFI? It was a combination of political pressure due to fleet economy and emission requirements, image, startability, driveability, and the hopes that volume use and further research would lower the cost, which it certainly has.

An early Zytek 'white' ECU.

This ECU uses a EPROM chip that had to be 'burned' out of the ECU with hexidecimal code, then installed in the unit. It did have the luxury of having trim knobs for some fine adjusting.

In the early eighties the first race ECU's appeared in the speed industry. They were quite basic, expensive, and tedious to program. Various sports cars tinkered with the EFI, and a Formula Vee series ran exclusively with it. A lot of this equipment was initially supplied by Bosch, with advancements being made by other companies that produced racing-only boxes.

Because of its ability to handle a very complex engine fuel map with ease, EFI was literally snatched up by the F-1 cars in the mid-eighties for their turbo motors. While the output of these engines at about 750 horsepower from 92 cubic inches on gasoline looked impressive to most of the world in 1983, the developers knew that they were making tremendous compromises to stay safe with the limitations of their mechanical systems. Within just a few years after introducing EFI, some F-1 engines were dynoing at nearly 1,250 horsepower or 13.5 horsepower per cube!! They ran about 1,000 horsepower on the track for qualifying and dropped back further for the actual race. Any skepticism about the ability of EFI to run with massive ignition interference, heat, or vibration was silenced.

By the end of the eighties there were more than a dozen companies making aftermarket and racing electronic control systems; several of them being quite reputable with good solid products. The popular use of the systems was on road race, Indy cars, offshore race boats and high performance street machines, all these having rather complex fuel requirements. Today, drag racing is seeing limited use of EFI, both because of rule restrictions, and the relatively simple fuel requirements (wide open throttle only) for most type of engines operating on the drag strip.

Winner of the 1997 Indy 500, Treadway Racing's car driven by Arie Luyendyk

The control boxes now available for racing range from basic ones at $1,500-$3,000 with programming software, to extremely complex systems that sense everything you can think of at $5,500-$15,000 with programming aids and software that are very user friendly and will run on laptop computers. Add to all this the cost of injectors at $40-100 each for common types, wiring harness at $300 for the street type to $1,500 for a decent race harness, to $4,000 for super quality F-1 type harnesses. Fuel rails are $100 for the basic ones, $300 for high flow aluminum, to $700 for custom built stainless steel. Add a manifold, fuel pump, filter, pressure relief valve, etc. and you go from a complete system for high performance street use at about $4,500, serious on-track system at $7,000 to the most sophisticated at $11,000 to $21,000 including engineering time.

Electronics surround us everywhere we go, and they are in the automotive world to stay. EFI applied to the correct applications in racing can actually save money. A supercharged or turbocharged drag race engine costs from twenty to fifty thousand dollars. It can be destroyed in an instant if it isn't fueled properly. Most of the present mechanical fuel systems are a compromise on these engines. EFI allows complete mapping of the engine, suppling the correct amount of fuel at every possible condition. Programmed meticulously, reliability will be gained using EFI.

Racing has been an innovative and progressive sport. Considering that Buick was 100% EFI in the mid-80s, it only makes sense that there should be at least a couple of competition classes where the creative racer can dabble with the latest technology. There are a lot of systems and components available now and the cost has come down to an affordable range. EFI has arrived to stay!

So where does all this put us? Electronic fuel injection is becoming more advanced and sophisticated. Selecting electronics with the features needed for an application can be very confusing. Kinsler Fuel Injection can help you work through the choices to find the best components for your project.

At Kinsler Fuel Injection, we decided not to make our own electronic control. Both because it is such a specialty, and because there are excellent ones available. We do carry most brands of parts and components, and make complete systems for any application using them. We have technicians for advise on what to use for an application and are glad to assist you no matter what mix of brands you plan on using.

Please feel free to call us.

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