



Automotive Case Study 11/2011

Company: Delphi Automotive

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With a global Headquarters in Troy, Michigan, at the heart of America's largest automotive manufacturing area, in addition to being involved in a multitude of other industrial sectors, [Delphi](#) is one of the world's largest automotive parts manufacturers. Reflecting the global nature of its business, the company operates 138 wholly owned manufacturing sites, 36 joint ventures, and 28 technical centres located in 34 countries.

Delphi boasts extensive experience in high-pressure fuel injection technology and has developed several innovative design and control strategies to meet customer's requirements for cost competitive, low noise systems that provide accurate injection over the life of an engine. The company is the world's second largest supplier of diesel technologies and has a strong position in the light duty, medium duty and heavy duty segments, covering everything from low-cost light vehicles for developing markets, up to high-technology common rail and Electronic Unit Injector (EUI) systems for the world's most sophisticated passenger cars, trucks and off-highway vehicles. One of several company manufacturing plants situated in the UK, Delphi's Stonehouse, Gloucestershire, facility specialises in the high-precision manufacture of EUIs for heavy duty applications, helping vehicle and engine manufacturers around the world to meet increasingly demanding emissions legislation.

Delphi's advanced EUI comprises an individual camshaft-plunger pump for each cylinder, that is capable of delivering fuel at very high pressures (up to 2500 bar). These high injection pressures are absolutely essential to enable engines to meet current and future emissions legislation, but require incredible manufacturing tolerances – often in the sub-micron region. Delphi's ingenious EUI systems incorporate full electronic control, with pilot injection being employed to reduce noise. Ensuring optimum operation efficiency, sensors located around the engine feed a continuous stream of data to the Engine Control Unit (ECU) which calculates the exact amount fuel to be injected and the timing of its delivery.

In accordance with the company's philosophy of continuous improvement, an international truck manufacturer recently challenged Delphi Stonehouse to tighten the geometric tolerances on the interface between the EUIs from 100 µm to 30 µm.

Exceeding drawing requirements, and beyond the inherent capability of the processes involved, the new increased tolerance demanded a reevaluation of the manufacturing and inspection methods involved. The urgency of the request called for a rapid reaction from the customer-focused Stonehouse team. Mindful of the required quick response, a manufacturing and inspection strategy was embarked upon for the high-volume injectors. As an inspection bottle-neck was quickly identified as a major potential difficulty, in consultation with [Chris Gay](#), one of the Delphi Stonehouse's preferred inspection equipment suppliers; several potential gauging solutions were explored. Having deemed dedicated fixtures as being too inflexible, an ideal solution was found in the best selling, [Axiom too Coordinate Measuring Machine](#) from the largest UK owned Coordinate Measuring Machine manufacturer, Aberlink.

Will Johnson, Delphi Stonehouse Quality Manager, takes up the story. "Having rejected several other measurement strategies, the in-depth understanding of our complex and tight-tolerance measuring problem, shown by Aberlink, on our initial approach to them, gave us the confidence to explore their suggested solution. Within a two week period, working closely with Delphi personnel, Aberlink ran injector measurement trials, made minor modifications to their software, successfully completed arduous R&R trials and installed two Axiom too CNC CMMs within the Stonehouse facility. Mindful of the urgency of our requirements and to further expedite the procurement process, we took advantage of [Aberlink's Rental Scheme](#). As the Aberlink operator interface is relatively simple, we have enjoyed the benefits of a reduced training time, whilst the high speed of our new Aberlink CMMs will enable us to keep up with the current, unit inspection volume of 2000 units per week, and also our projected throughput of 3000 units. It was enlightening to compare the Axiom too with our existing CMM, that cost 5 times more. We were astonished that our new, less expensive machines delivered similar levels of accuracy, whilst considerably out-performing the more expensive CMM when it came to the speed of inspection routines."

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Despite the prevailing economic conditions, Aberlink has continued to enjoy excellent global sales within the small and medium CMM market. Dave Robinson, Business Development Manager at Aberlink, points out “our strategy of providing high quality products, that are affordable, accurate and above all easy to use, has enabled Aberlink to grow organically to become the largest UK owned CMM manufacture. New initiatives, such as our generous Machine Rental Scheme, have enabled customers to continue to obtain our CMMs at a time of restricted liquidity”.

Always at the forefront of CMM innovation, Aberlink has recently completed installation of several specialist machining centres at its worldwide headquarters in Gloucester. In-house manufacturing is an investment Aberlink has always believed in, not only to control cost but more importantly to ensure the most appropriate equipment and process are used to manufacture the key components it uses to build machines. Every Aberlink CMM's boast a high-grade aluminium bridge incorporating premium quality air bearings ensuring optimum performance across a range of environments, including less than perfect shop-floor conditions. Whilst ingenious integration of the machine electronics into the CMM frame, rather than a separate desk unit, has resulted in Aberlink machines boasting the smallest footprint of any equivalent size machine.

Popular throughout the world, [Aberlink's revolutionary 3D measurement software](#) provides the user with a powerful, yet easy to use interface, substantially increasing new users' component through-put, whilst greatly shortening their software learning period. Aberlink's flexible 3D metrology software package has been developed as a multi-platform solution, in addition to supporting both manual and CNC CMM's, it can also be used on portable arms, vision systems, video machines and profile projectors.

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