

# Engineering & Manufacturing Pain Relief by ShaPix®

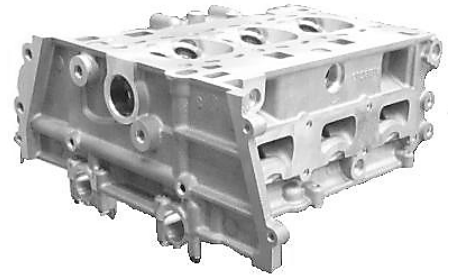
## Ensuring Joint Sealing:

During the production of powertrains a painful amount of effort, time and money are expended to ensure that the critical mating machined surfaces function properly and that leakage does not occur. In order to meet today's consumer and governmental requirements for vehicle performance and emissions, powertrains need to be more efficient, more powerful and weigh less - all for a lower cost to manufacture. Powertrain components now operate at higher pressures, use new materials, and are produced with enhanced manufacturing methods - each of which impacts the function or the seal of a joint between surfaces. Manufacturers spend costly resources ensuring these new designs and processes produce robust joints leading to superior solutions.

For the large number of variables in the production process, manufacturers need to better understand and control the machining process and the structural strength of every part when machining surfaces. This, combined with an understanding of the fixturing, is needed to ensure the surfaces produced create joints that are functional and have the least amount of distortion within the system when fully assembled. Verification and functionality is further complicated when mating parts are produced by multiple suppliers. When joints are not robust in a powertrain, the pain can be significant and long lasting including:

- Lost plant throughput
- Excessive production line downtime
- Scrapped parts
- Extended launch periods
- Leaks/ failed engine tests
- Expensive rework of engines or transmissions
- Warranty repair costs
- Serious customer dissatisfaction, "A walk home"

The labor intensive processes that are conducted to mitigate these potential joint sealing issues can be streamlined and improved by using the high-definition, high-speed ShaPix metrology tools.



The ShaPix Solution >>>



## The ShaPix Solution:

The ShaPix® family of solutions is based on a state-of-the-art, non-contact sensor which is used to capture full 3D data on planar surfaces. The combination of the ShaPix sensor and the ShaPix Analyzer Software provides a complete surface topography solution delivering a powerful understanding of the process that produced a surface, the relationship with the surface it will mate with, and the overall quality of the joint. This solution involves full surface metrology and visualization:

- In minutes
- With sub-micron uncertainty in Z
- Using non-contact metrology
- With high lateral resolution for waviness analysis over the entire surface

## How ShaPix Does the Job:

ShaPix employs unique multi-wavelength optical interferometry to simultaneously capture, in full 3D, hundreds of points per square millimeter and millions of points across a typical surface, with sub-micron accuracy. The older metrology practices of relying on a few traces across a part are no longer adequate. With the ShaPix metrology system there is no surface contact that can damage a surface and no reliance on mechanical probes. Part surface brightness variations are well handled and surfaces of any size can be measured using accurate 3D stitching algorithms. By simultaneously measuring the individual optical phases of the signals returned from every sampled point on the part surface, a micron-accurate complete topographic map of the surface is created.

The high-definition surface analysis is displayed in easy to understand, 3D images and provides actionable information about any deviations from the required shape and design intent. The 3D visualization and the quantitative comparisons to tolerances and design specifications provide for an in-depth understanding of the part and the production process. This leads to a clear identification of the source of error in minutes. This fast and flexible solution can be found in a system that sits next to the production line or in a metrology lab.

With this technology, any pain-causing issues on the production line, machine tool dial-in challenges during launch, or even design factors that need to be corrected during new product engineering, are made obvious as soon as they arise. The engineering design and launch processes are sped up and plant production efficiency is continuously optimized.

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