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**High-Definition Metrology and Vision Application Note #09-02**

**Speeding Up Transmission Manufacturing Process Launches**

**The Powertrain Challenge**



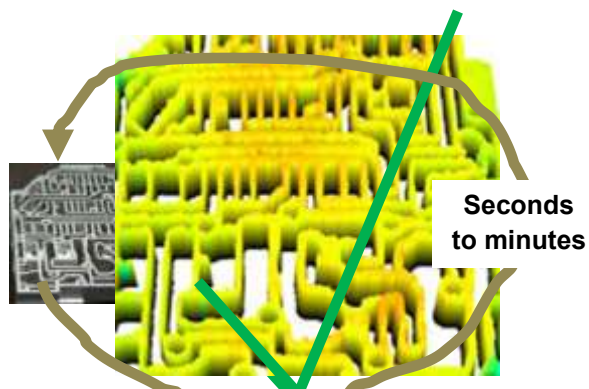
The launch of a new process and its machines can be costly. Every extra day can cost the system integrator and the vehicle manufacturer a million dollars or more, if trial-and-error adjustments have to be repeatedly made searching for why parts are not being produced to specifications. Sparse measurements that require hours to produce, slow down the entire launch project. This delays the start-up of production, generates useless scrap, leaves production workers idle, and inefficiently uses expensive engineering manpower.

**The Metrology Need**

To speed up the launch process, measurement capability is needed that eliminates the trial-and-error search for correct machine settings. The measurements must be obtained in minutes after a sample part is produced. It must ideally make immediately obvious to a knowledgeable manufacturing engineer or a set-up operator which machine or machines need to be adjusted and what is the specific way in which they should be tuned. Long lists of obscure numbers are not adequate to meet this requirement. Visually obvious 3D pictures of the situation are needed.



**Traditional:** Slow, Costly, Wasteful, Obscure



**ShaPix:** Quick, Economical, Efficient, Clear

**The Measurement Requirements**

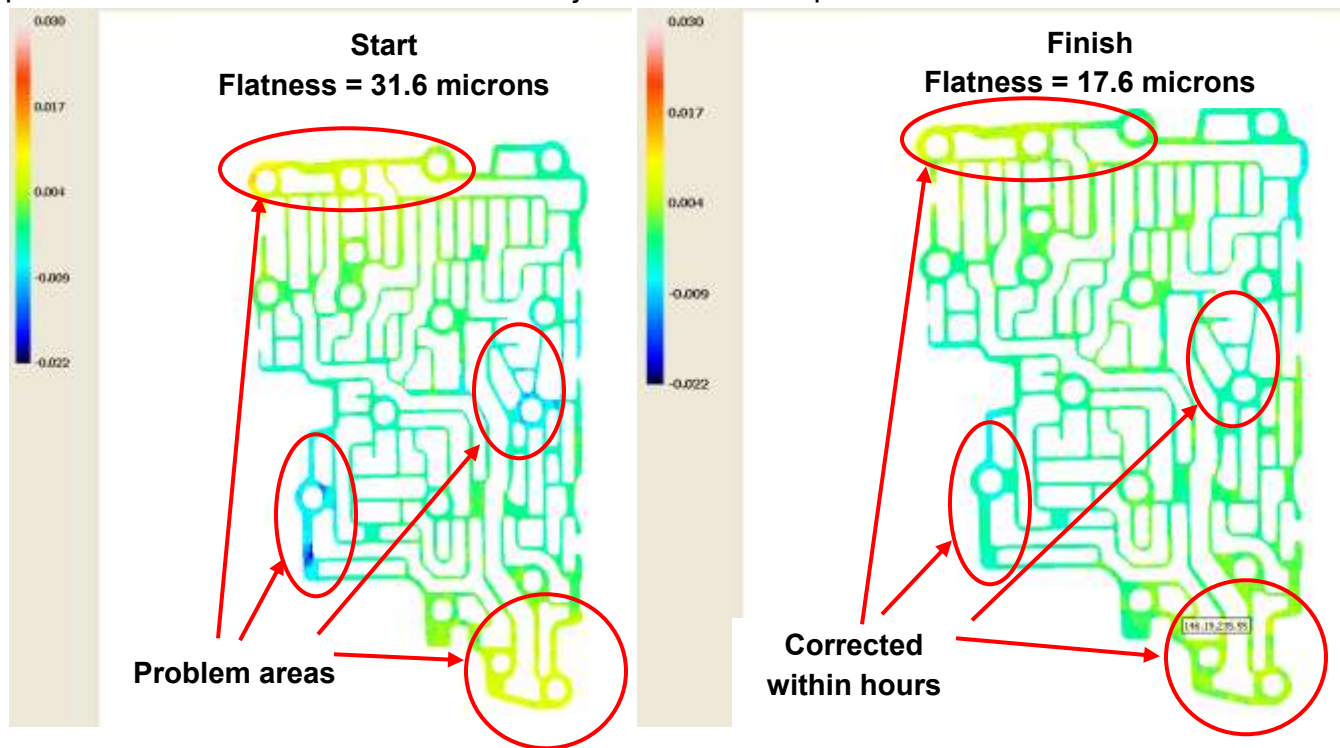
High-definition measurement of the entire surface is required to an accuracy of 1 micron. The measurements must produce information regarding over-all surface flatness, local flatness in critical zones, detect misplaced edges or layouts of valve body channels, and measure waviness that affects leakage. Height difference or parallelism of multi-level milled surfaces may also need to be measured on some transmission parts. The measurement result must clearly and accurately indicate where on the part surface any of these measurements violates specified tolerances. Three-dimensional color-coded visualization is required to make obvious the nature and amount of any deviations from correct local or global flatness or waviness specifications. Reports must be provided for immediate use and as a data record for the plant manufacturing database systems.

## The Coherix Solution

The **Coherix ShaPix Surface Detective™** produces a height map with a resolution of 44 surface samples per square millimeter throughout the surface area of interest in 30 to 60 seconds. Large surface areas are combined accurately via a software 3D “stitching” process to provide a complete 3D view of the complete part that can be manipulated to be seen from any perspective. 2D and 3D visual renderings of surface shape, flatness and waviness are produced and reports are supplied as formatted by the responsible set-up operator.

## The ShaPix Results

The **ShaPix Surface Detective™** shows, in an immediate and intuitively obvious visual form, the part surface areas for which machine adjustments are required.



In addition to these easily-manipulated displays, **ShaPix** provides any desired detailed multipage reports of all operator-specified measurements and metrics that will accelerate the launch process.

## The Powertrain Value Delivered

In a single launch program phase, the **ShaPix Surface Detective™** holographic interferometry system saves many times its cost for the system integrator, as well as the powertrain manufacturer whose ability to rapidly optimize and control his process. This translates directly into shorter time to market and lowered over-all cost of launch. The same timely and complete measurements are required for on-going agile post-launch process control and problem solving. The minimal one-time interval needed to set-up **ShaPix** to measure a new part type – typically 20 minutes with no programming required whatsoever - allows **ShaPix** to be used repeatedly to speed the launch of every mating part and surface in a transmission or engine system. These include valve bodies, transmission cases, cylinder heads, engine blocks, pump housings and other critical parts.