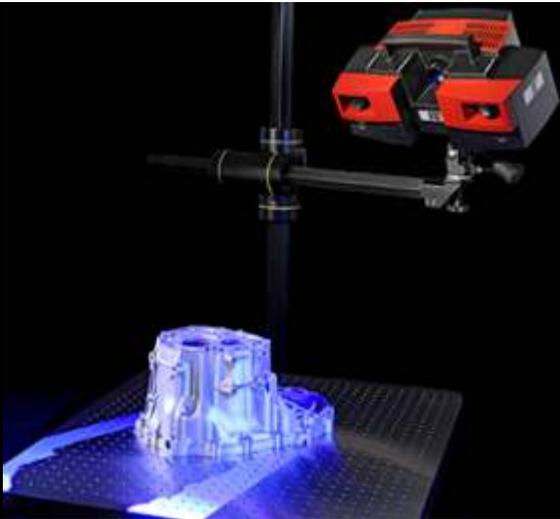


Optical 3D Metrology for Dimensional Inspection of Castings

- Kuldeep Singh, APM Technologies

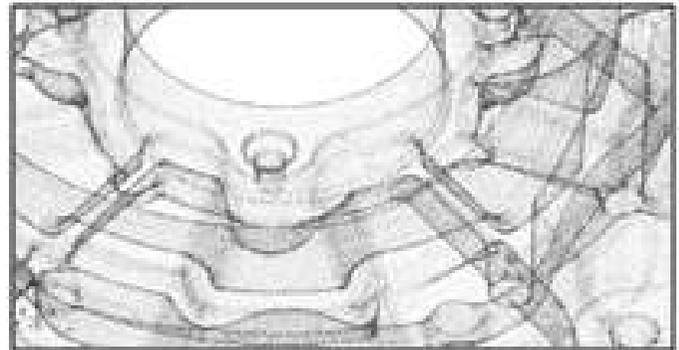


Complexity in components design are setting new benchmarks day by day which further generates the need of smart inspection methods to ensure high level of quality, a need of today.

Digital methods of inspection introduced by APM Technologies in India, have become an essential part of the process of component development, from designing to product & process development & optimization as well as complete inspections. The use of optical blue light technology speeds up the process of inspection and product development by pin-pointing part errors in early stages of process, sometimes even at tooling stage.

Blue Light 3D Scanning Technology

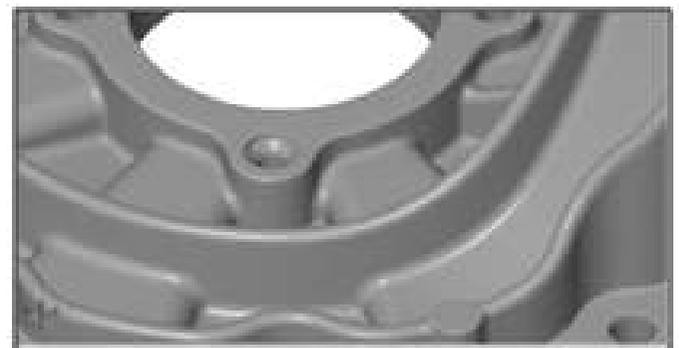
ATOS 3D Scanning technology works on triangulation principle and uses a Blue LED source of light. A parallel fringe pattern is projected on the object to be scan in 3D and is recorded by two cameras under calibration at an angle. Merging of images recorded by the two cameras using image correlation process and by taking reference from unique marker it provides very high value of accuracy in scanning real world objects.



Point Cloud Model



Mesh Structure



Rendered Scan

Optical Vs Conventional Inspection Methods

Current technological trends demand effective, efficient and efficacious tools for inspection. Point based inspection which includes fundamental to high-end tools i.e. vernier caliper and height gauge to CMMs, inspect predefined points and it's a possibility that the problematic areas are not taken into consideration.

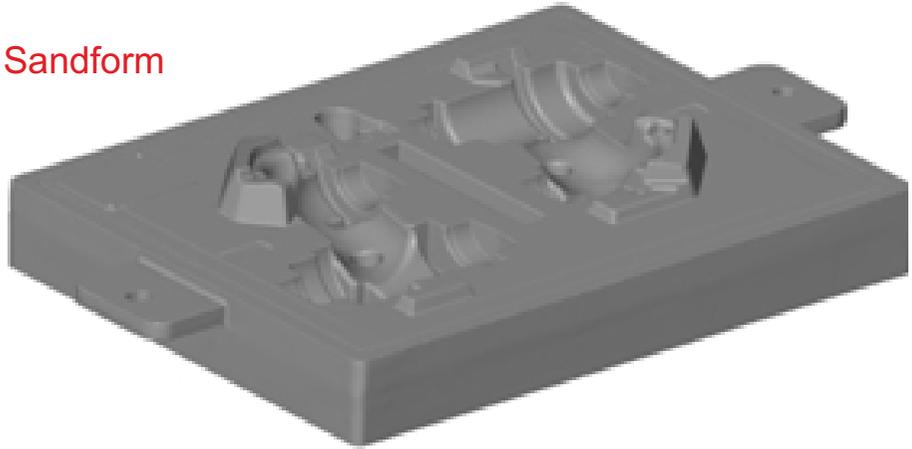
Line based laser scanner fail to meet the quality needs of today's components. Optical based 3D Scanners are surface based scanning tool which compares complete surface and provides the benefit of full-fledged surface analysis instead of taking predefined points, hence it is not required to predict or presume the problematic areas and only checking dimensions doesn't give actual idea of deviation in all respects, whereas Optical means of inspection not only inspects the deviation but also the extent and probable cause which in-turn results in significant time saving and notable quality enhancement. No physical part is required once it is scanned and this makes the task of analysis a lot easier.

Advantages of ATOS 3D Scanner for Casting Industry

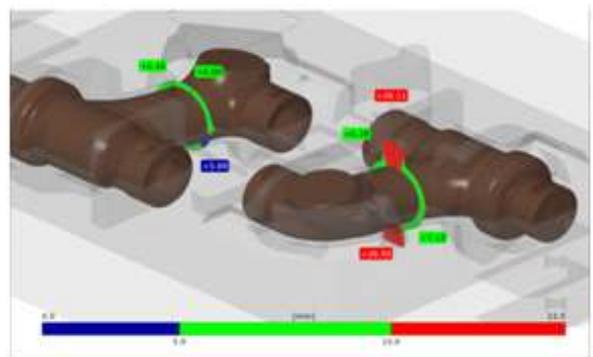
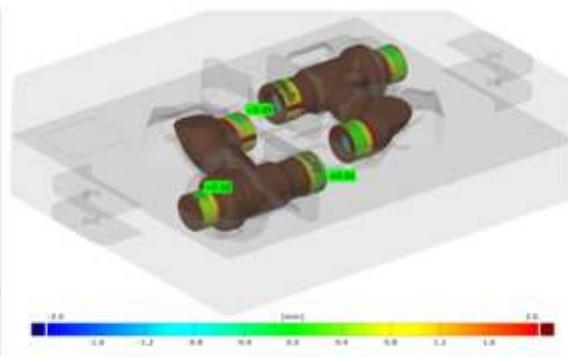
Casting industry where quality, weight and process all matters, this cutting edge technology can be a boon. A solution for all geometrical inspection needs and allows freedom of process optimization by using features like trend analysis.

The system is able to analyze surface variation with CAD, study of sectional deviation scenario, wall thickness analysis, machining allowance optimization, multiple alignment tools and respective comparison, analysis of volume and surface area, complete GD&T Analysis viz. flatness, parallelism, circularity, perpendicularity etc. and many more. One very special feature about this software is virtual assembly where one can inspect the result that will form after actual assembly of sub parts. So its good to have a look at the results before actual pouring activity so that it can be prevented before actual error occurs, an example of same is given below.

Sandform



Sandform + Sandcore 2



The above pictures showing the virtual assembly of cores and cavity and its analysis for material thickness even before the casting process starts.

Future Challenges

ATOS 3D Scanner is a necessity of today and tomorrow, as the complication and intricacy of the parts are increasing. Yesterday's tools may not be suitable for tomorrow's challenges. In recent times the product development cycle has shortened significantly which attracts methodology which is fast, reliable and accurate and all above conditions indicating need of adoption of optical 3D Scanner. Today country's elite companies like, Bajaj, Ford India, General Motors, Honda, Mahindra & Mahindra, Maruti Suzuki, TATA Motors, TVS, Volkswagen and many more are using GOM's ATOS 3D Scanner and are highly dependent on this technology for making components better, faster and superior in first attempt.