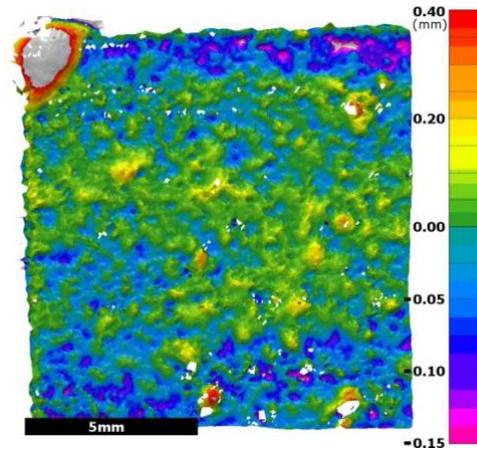


- Simple optical scanning technology delivers rapid, automated 3D surface topography measurements
- Measurement area can be specified to match the build plate of specific Laser Powder Bed Fusion (LPBF) printer systems
- High speed acquisition - 7.5 seconds scan cycle time enables seamless integration of data acquisition with LPBF process
- Designed for additive manufacturing workflow integration; compatible with industry standard data formats and networking protocols
- Utilises Taraz Information-Rich-Metrology (IRM) software to deliver unmatched scanning cycle time and surface coverage
- Available as a turnkey system, integration component or licensable reference design



Taraz Metrology's TXR100 is a fringe projection scanning solution designed to provide in-process surface topography measurements for LPBF additive manufacturing systems. 3D printing of metal components involves high value raw materials and an inherent risk that, if a layer contains a form error or unwanted artefact (eg weld spatter), then the entire print run becomes unusable. The TXR100 system provides in-process feedback on each layer's surface topography, providing early warning of a print failure (triggering the printer control software to abort the build, if process control parameters require it) as well a rich data set characterising a finished component's internal structural properties.

The system uses advanced, camera-based optical metrology and is optimised for the inspection of additively manufactured parts, greatly enhancing speed and versatility. Scan data from the TXR family can be used in industry-standard point cloud processing software, either for analysis, quality control or process development. The TXR100 is a member of the TXR family which offers options on measurement area, minimum feature size and scanning speed. The family is also supported with a bespoke design service, allowing the design to be optimised to a specific requirement, or to be fine-tuned to match a specific printer.

Technology

Taraz Metrology's fringe projection technology consists of two main elements – a high specification digital projector and a number of industrial cameras, each of which are controlled by Taraz IRM Software. Sequential patterns of dark and light fringes are projected onto the component's surface, and the patterns generated are captured by the system cameras. Taraz IRM Software then models the shape of the component surface from the scan data, which is displayed on-screen in the form of a point cloud. This data can then be exported in a range of widely used file formats for analysis, e.g. comparison to CAD data or topography assessment.

Taraz Metrology has taken the traditional capabilities of fringe projection and delivered significant additional user benefits through the use of IRM and related techniques:

- Surface topography, normally a challenge for fringe projection systems, can be better captured using projector/camera pose optimisation
- Measurement cycle time is reduced using high-speed 3D reconstruction algorithms
- Voids within the point cloud are minimised as a result of high-density data acquisition

Applications

Many applications benefit from the TXR100's capability, including:

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| Process Control | The TXR100 system provides a layer-by-layer monitor of build integrity. In the case of an absence or surplus of fused material, or other serious malfunction, a trigger signal can be sent to the printer control software to abort the build, saving time, material and money. |
| Quality Assurance | Critical parameters (eg presence of predefined defects, layer topography, etc) can be captured for each layer of the component build, providing a data source to ensure conformance to the required standard. |
| Printer Test & Calibration | A test build routine (eg to produce a standard artefact) can be employed prior to the start of a print run, allowing validation of both the printer and raw material. Individual layer data sets can also be generated from the printing a standard test artefact - this data can be used in combination with post-process form measurements (available using the Taraz TZF system family) to fully calibrate the printer system performance. |
| Research & Development | In addition to production applications, the TXR100 system is ideally suited for use as a process/material characterisation tool for research and development purposes. |
| Material Characterisation | Surface topography data can be used to check the conformance of raw powder material, as well as to characterise the process attributes of a given set of material specifications and printer settings. |

User Interfaces

The TXR family is intended for use alongside high-capacity printing systems in the industrial environment. IRM software features a user interface designed for the printer operator; when integrated with the printer's build manager software, it offers the user a choice of measurement functionality for the next scheduled build job:

- Full layer inspection
- Key feature identification (e.g. weld spatter)
- Periodic layer inspection (e.g. every 5th or 10th layer)
- Build abort trigger
- Bespoke measurement and analysis routines are available on request

The software has three operating modes:

- User – a simple interface with the ability to select parts, start a scan, and see results
- Developer – adding the ability to store data for offline analysis
- Administrator – with the capability to perform all configuration, set up batch jobs and policies, perform annual calibration or system checks etc.

In addition, remote operation modes are available, providing options for training, application and product support.

Supply Formats

The TXR100 design is capable of full integration with all current LBPf printer systems. In addition, the system can be supplied for use in demountable or bench-top formats, to suit research and development applications. Taraz Metrology can provide the TXR100 as a reference design supported by a bespoke design service – as a component for integration – or as a complete system, ready for use. Contact us for details of licensing plans.

The TXR Family Range

The TXR family was conceived to bring high accuracy in-process surface topography measurement to the additive manufacturing market, enabling quality assurance, process control and printer/raw material monitoring.

Other product formats are available, along with a bespoke capability. Common requests for variants include:

- Measurement area – TXR100 is designed for measurements within a 100mm diameter build plate area. The TXR family can be scaled up to match the largest 3D printers – or down, to match high resolution small-part printers.
- Measurement resolution – TXR100 has been specified to capture the finest details of additive manufactured parts on LBPf processes. The TXR family can be specified to identify only coarse surface artefacts and form errors, e.g. for applications requiring only cosmetic parameter checks.

Please contact us to discuss any specific requirements.

Specifications

Note: TXR100 is one of a family of scanners capable of measuring a broad range of component sizes. The family is also supported by a bespoke design service for specialist requirements – contact us for more details.

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| Metrology Performance | Measurement Area | 100 mm diameter build plate |
| | Feature Size | Recommended minimum of 20 µm |
| | Pixel Resolution | Single 12MP industrial imaging cameras, providing pixel spacing of 2.5 µm |
| | Acquisition Time: | Under 10 s per layer, based on a full area scan |
| | Measurement Cycle: | Under two minutes, based on a single 360° scan (using standard processing option). |
| Accuracy | Target Accuracy | 15 µm |
| | VDI / VDE 2634 Part 2 | To be published |
| Computing & Integration | Communications: | Gigabit Ethernet (10/100/1000Base-T), supporting TCP/IP, DHCP, TLS/SSL |
| | Data formats: | Exports data for use in industry standard GD&T software |
| | Scan Storage: | Limited only by available network storage |
| Physical & Environment | Dimensions (l*w*h): | To suit LBPf printer |
| | Electrical: | Voltage: 90-230 VAC 50-60 Hz Peak Power: Projector dependent Operating Power: Projector dependent |
| | Operating Environment: | Please enquire - to suit LBPf printer |
| | Weight: | 10kg |
| Regulatory | Periodic system certification | Annual calibration and certification to traceable artefacts |
| | Certifications & Standards | VDI/VDE 2634 Part 2 standard for optical measurement systems (to be published). Traceability to NIST metrology standard artefacts |
| | Warranty | One-year limited hardware warranty; extended service plans are available |

Contact Us

For more information, or an informal discussion of your application, contact us at:

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