speed|scan CT 64

Fully automated high-speed computed tomography for production process control and optimization

Key features and benefits

- Productivity and quality gain due to quantitative 3D automated defect recognition and dimensional control
- Cost savings due to faster product ramp up times and minimized rejects
- Optional Robot-handled mixed part inspection
- Up to 100% 3D production control of large castings
- 64-channel data acquisition and patented quick-slide manipulator for rapid sample throughput rate
- Scan speed down to 15 sec. for a cylinder head allows several hundred times faster 3D inspection compared to conventional industrial fan beam CT
- Max. sample size ~600 mm diameter x 900 mm length (23.6” x 35.4”); max. scan diameter ~500 mm (19.6”)
- Optimized ease of use and cost of ownership due to high grade of automatization

Healthcare for the industry

Over 40 years of CT know-how – now ready for inlineCT

With Waygate’s industrial speed|scan CT system, proven medical gantry based CT technology is available for revolutionary high-speed attine or inline process control in industry. The sample is being transported through the tomograph and even cylinder heads can be scanned within down to 15 seconds. This 4x faster than the first speed|scan generation and several hundred times faster than conventional industrial fan beam CT. While the next part is loaded, the reconstructed CT data is automatically evaluated. By fast scanning of dozens of parts, quantitative production quality data is now available allowing immediate adjustment of the production process parameters, which have in the past been out of reach of conventional industrial fan beam CT.

Waygate Technologies
a Baker Hughes business
Fast gantry based helix CT
Since CT of large castings with conventional industrial fan beam CT typically takes hours, it is not suitable for inspection parallel to the production cycle time. With helix multi-line technology, the work pieces are continuously scanned and automatically inspected with Waygate’s own 3D speed|ADR evaluation algorithms. To ensure the required image quality with short measuring times and low scattering artifacts, the system is equipped with a high performance X-ray tube and a highly sensitive multiline detector acquiring up to 64 detector rows of scanning data during every gantry rotation.

Fully automatic non-destructive 3D testing and measuring
Especially for quality assurance of functional and safety relevant automotive and aviation composite parts or aluminum castings, speed|scan makes it first time possible to perform a 100 % 3D inspection. The 3 key game changers in industrial quality assurance with GE’s advanced speed|scan CT system are:
• Exact 3D defect location & classification
• Dimensional control e.g. analysis of the wall thickness
• Actual to CAD data comparison

Waygate’s speed|scan CT – a new workflow concept for up to 100% 3D production process control

Waygate’s speed|scan CT system
3D evaluation parallel to the scanning process
Three-dimensional analysis and process monitoring using volumetric data offer several advantages compared with conventional radioscopic 2D inspection. Depending on the sample size and X-ray penetration length, an immediate response to processing parameters may directly lead to increased productivity:
• Reducing the reject rate by analyzing the 3D position, form and size of the defects taking into account the subsequent processes the products must undergo

3D evaluation parallel to the scanning process
Leading Volume Graphics industrial batch CT software exclusively combined with GE’s powerful speed|ADR algorithms providing highly precise quantitative 3D information for industrial mass production process control and optimization.
• Production oriented workflow approach optimized for throughput and part diversity
• Proprietary speed optimized 3D volume analysis and defect detection
• Customizable user interface and visualization including 3D defect result table

speed|scan CT – your advantages
• Robot loaded inline CT with up to 100 % 3D production process control (e.g. in production or safety critical components)
• Central fast CT surveilling unit controlling the output of many production lines
• Proven, gantry based 64 channel CT acquisition offers several hundred times faster inspection compared to conventional industrial fan beam CT

• Much faster CT scanning (better statistics) substituting other NDT inspection and metrology processes
• Fast 3D inspection and dimensional control of complex parts and complete feedback for improved reaction on process fluctuations
• Early scrap detection before any further processing steps
• Optimization of plant equipment and tool maintenance intervals

Waygate’s speed|scan CT – a new workflow concept for up to 100% 3D production process control
### Inspection Concept
From manual loading & operator based inspection up to robot based fully automated inspection with automated 3D failure detection speed|ADR and 3D dimensional control for statistical process control.

<table>
<thead>
<tr>
<th>max. sample size</th>
<th>~ Ø 600 mm x 900 mm (23.6” x 35”); max scan diameter ~ Ø 500 mm x ~ 888–979 mm (19.6” x 35–38.5”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>penetration length</td>
<td>Allowing inspection of Al gear cases and engine blocks depending on part geometry</td>
</tr>
<tr>
<td>min. detectable defect size</td>
<td>≥ 0.5 mm³, depending on part size</td>
</tr>
<tr>
<td>detail detectability</td>
<td>≥ 300 µm</td>
</tr>
<tr>
<td>sample weight</td>
<td>Up to 50 kg (110 lbs)</td>
</tr>
<tr>
<td>3D Metrology</td>
<td>Fast automated CAD nominal/actual analysis and measurement tasks for process control</td>
</tr>
<tr>
<td>Scan / reconstruction / cycle speed</td>
<td>10,62 – 61,25 mm/s / reconstruction speed up to 16 layers/s inspection / typical cycle time ~1 min. per part</td>
</tr>
<tr>
<td>High dynamic multi-line detector</td>
<td>64-layer parallel acquisition. The detector embodies the patented HiLight™ material from GE, a ceramic scintillator specially developed for CT applications</td>
</tr>
<tr>
<td>High performance rotating anode X-ray tube</td>
<td>Max. 140 kV, 515 mA current, typical inspection parameters: 140 kV, 100 mA. The duty cycle of the X-ray tube (ratio between X-ray on and cooling time) depends on the selected parameters. Generator output of max. 72 kW with 515 mA</td>
</tr>
<tr>
<td>CT gantry</td>
<td>Advanced GE Healthcare continually rotating generator, X-ray tube, detector and data acquisition system around the test specimen. The rotation speed can be adapted within the range of 0.5 – 1 revolutions per second, depending on the required data quality and specimen throughput rate</td>
</tr>
<tr>
<td>production</td>
<td>edition</td>
</tr>
<tr>
<td>Dimensions basic cabinet</td>
<td>2,500 mm (W) x 4,000 mm (T) X 2,500 mm (H) (98” x 157” x 98”) / weight ca. 13,000 kg (28,660 lbs)</td>
</tr>
<tr>
<td>design</td>
<td>Suitable for industrial environment with dust and foreign body protection</td>
</tr>
<tr>
<td>Air condition</td>
<td>Active air conditioning system to safely remove the heat created during the test procedure</td>
</tr>
<tr>
<td>Patented quick-slide</td>
<td>manipulator</td>
</tr>
<tr>
<td>Control unit</td>
<td>The radiation safety cabinet is a full protective installation without type approval according to the German RöV. It complies with French NFC 74 100 and the US Performance Standard 21 CFR Subchapter J. For operation, other official licenses may be necessary</td>
</tr>
</tbody>
</table>
| Radiation protection | Automated DICOM image transfer to analysis station. CT visualization and evaluation:  
- 3D detection and classification of pores and inclusions (GE speed|ADR) combined with Volume Graphics InLine CT software is exclusively available for VG customers using GE CT systems  
- Dimensional control tasks like wall thickness determination and  
- Actual/nominal CAD comparison (VG StudioMAX) |
| Software user level | Designer for creating and modifying 3D inspection programs on- or offline  
- Inspector for semi- or fully automated CT data analysis based on inspection programs  
- Reviewer for interactive software for visualization and review of automated inspection results |