FROST & SULLIVAN

# BEST PRACTICES AWARDS


Waygate Technologies

a Baker Hughes business

## 2020 GLOBAL INDUSTRIAL COMPUTED TOMOGRAPHY SOLUTIONS MARKET LEADERSHIP AWARD

## Contents

# Background and Company Performance

## *Industry Challenges*

Driven by global competition and the need to deliver high-quality products to the market faster, manufacturing companies are looking for product monitoring and validation solutions. Industrial computed tomography (CT) is one of the most promising solutions, leading to the replacement of conventional systems such as coordinate measuring machines (CMM) and other three-dimensional (3D) scanners. Traditional inspection mechanisms, including CMM and optical measurement systems (OMS), are struggling to measure these increasingly intricate products. CT is expected to emerge as the most important and reliable technology, creating exciting new opportunities for the inspection of complex internal and external defects, geometries, and assembly details of 3D-printed components. It is quite difficult to ignore the benefits of adopting CT technology in supporting the most demanding industries and manufacturing environments.

However, scanning speeds and high CT scanner costs hamper their adoption among manufacturers. Speed is crucial in manufacturing processes and will continue to play a critical role in pushing companies to adopt CT scanning systems in inline environments integrating the technology into manufacturing processes. Frost & Sullivan notes that the industry clearly needs CT solutions that can combine a high degree of automation with accuracy, a significant prerequisite for production lines. Conventional solutions involve the costly and time-consuming process of collecting large quantities of geometry measurements and the long process of data gathering and measurement cycle times. It is not unusual for several rounds of analyzing and making design changes to take several days. Tier 1 customers are especially interested in vendors who can address their needs with accurate metrology-grade systems capable of dealing with the large number of data points required for complex surfaces. Frost & Sullivan analysts observe how the analysis of complex parts, detailed analysis of small parts at high density, and the fast analysis of large components are all driving the demand for CT dimensional metrology systems that meet inspection challenges to address measurement uncertainty.

With improvements in market conditions prompting investments, there is an increasing trend of moving machines closer to the manufacturing floor with more inline or near-line applications. Frost & Sullivan expects a scenario where quality assurance will move more into production as well. As such, CT manufacturers who can integrate their CT systems into production lines supporting higher scanning speeds and quality control will gain a major competitive edge in the market.

## *Market Leadership*

Waygate Technologies (WT), formerly GE Inspection Technologies, is a pioneer in the industrial CT solutions market, providing customers with industry-leading technologies for various applications and sectors. Rebranded as Waygate Technologies in February 2020, it is one of the first companies globally to offer high-speed inline CT systems. With a comprehensive portfolio of digital solutions covering industries such as electronics, automotive, oil and gas, power, additive, and aerospace and aviation, the company

provides a complete suite of CT equipment covered by its Phoenix product line. This includes the nanofocus, microfocus, and minifocus product segments. Frost & Sullivan's research indicates that the company has a leading position in the global market, with a 25% market share. Waygate Technologies is an innovator, helping industries achieve new levels of performance, production, and profit.

**Revolutionizing Digital Inspections with Leading Technology Introductions**

In November 2019, Waygate Technologies launched a series of new high power X-ray inspection systems called Phoenix Microme|x Neo 160, Phoenix Microme|x Neo 180, and Phoenix Nanome|x Neo 180. With this launch, the company established a new standard for printed circuit boards (PCBs) and semiconductor inspection across consumer electronics, automotive, medical, and aerospace and defense (A&D) sectors. These are high-resolution, high-power microfocus and nanofocus tubes, capable of detecting details up to 0.2µm and with premium nanofocus inspection. Both Microme|x Neo and Nanome|x Neo are suitable for quality control and R&D, combining a high-resolution 2D X-ray technology and 3D CT in a single system for high-performance failure analysis.

The vendor's Microme|x Neo and Nanome|x Neo combine superior image quality with improved detection speed for dimensional metrology. It has also introduced a proprietary Dynamic Extended Resolution (DXR) flat panel detector enabling effective live inspection and high-resolution even at high outputs. This has resulted in fast data acquisition for 3D CT and high image quality, with 30 frames per second (FPS) live imaging at 1,000x1,000 pixels for detailed live inspection. There are also options for 3D CT scans to be conducted in less than 10 seconds.

Waygate Technologies' Phoenix Microme|x Neo 160, Phoenix Microme|x Neo 180, and Phoenix Nanome|x Neo 180 transform CT solutions with optimized user experience and ergonomics. With an intuitive graphical user interface and the generation of fully automated inspection, Microme|x Neo and Nanome|x Neo are suitable for in-field use. All of the systems are equipped with automated computer-aided design (CAD) programming and require minimal setup time.

**Differentiating through Superior Inline Quality Control**

Frost & Sullivan recognizes that as one of the first companies worldwide to offer high-speed inline systems, Waygate Technologies has clearly revolutionized 3D inspection and dimensional control with fully automated inline systems. Its CT line provides greater speed and precision with powerful X-ray microfocus CT systems for non-destructive testing (NDT) and 3D metrology. This brings 3D inspection to the production floor by enabling increased scanning speeds (without sacrificing image quality). Its 3D inspection is several hundred times faster than conventional industrial fan-beam CT, positioning the company to capitalize on inline opportunities. Waygate Technologies is developing its product that combines low artifact, high-precision performance of fan-beam CT with the increased speed of cone-beam CT to improve the precision of failure analysis and 3D metrology inspection tasks up to 100 times higher.

Waygate Technologies has been working toward refining the inspection of manufactured parts with up to 100% control and 3D quality data for zero-defect production. It continues to revolutionize 3D inspection and dimensional control with the upcoming launch of its fully automated inline Phoenix Speed|scan HD in the second half of 2020, designed for 24/7 operations in industrial manufacturing. It is a high-speed micro CT inspection solution with automated defect recognition for making pass decision to determine whether the product meets specifications. With its Phoenix Speed|scan HD high definition, the company is targeting enterprises with the biggest production budgets in electronic devices manufacturing and the automotive sector. Some of the typical inline inspection applications for Phoenix Speed|scan HD include injection moldings and complex assemblies. Phoenix Speed|scan HD has many unique proprietary technologies, including AI-based software, the microfocus X-ray tube (240kV/100W), and X-ray security gates. With the 240kV/100W microfocus X-ray tube, the company can provide optimum reliability on the production floor with high-resolution images and short cycle times.

Waygate Technologies' microfocus CT offering can inspect 30–120 pieces per hour at up to 20µm resolution. There are significant operational benefits from adopting its Speed|scan HD solution, automated part handling, and defect-recognition, including 90%–98% reduction in operator time and 5–10 times increase in throughput compared to using traditional CT solutions.

**Supporting the Growing Additive Manufacturing Market**

As an industry leader, Waygate Technologies properly leverages its knowledge and experience to produce digital solutions to support applications in the growing additive manufacturing market. The company has a prominent position in additive manufacturing across key end markets, including automotive, A&D, and electronics.

The automotive industry continues to be one of the most significant contributors to the industrial CT revenue. The company is focusing on high-end electric vehicles, with some projects related to lithium-ion battery inspection. Waygate Technologies' Phoenix Speed|scan HD microCT is an ideal solution for inline inspection in the automotive sector, with cycle times of less than 60 seconds.

As the A&D sector moves from prototyping to production, WT is focusing on increasing applications for complex castings and electronics in the aviation industry. It also finds several emerging applications in the electronics segment, such as for mobile phones and smartwatches. Waygate Technologies is targeting the medical sector after discovering major growth opportunities in the production of bone screws, dental implants, including crowns and bridges, surgical tools, and customized implants. The company has also been focusing on oil and gas downstream applications, including drill bits, metals, and gas turbine components in power generation.

**Anticipating Customer Needs with Precise CT Results**

By focusing on offering the most comprehensive software solutions, Waygate Technologies anticipates nicely customer needs with the development and expansion of its industrial CT line. The company continues introducing new software updates, including the multi-beam

hardening correction (Multi|BHC), adaptive scatter correct filter (asc|filter), and datos|x 2.8.0.

Multi|BHC is an exclusive filter technology available for all Phoenix V|tome|x systems, enabling users to reduce artifacts covering multi-material parts. The asc|filter is a unique filter technology to reduce artifacts suitable for analysis of scanned medium- to high-absorbing samples.

The company has introduced a new version of its intelligent imaging processing software Flash! to have a clear image of diverse densities and materials in a single image without needing manual alterations. Flash! allows a smoother workflow to enhance throughput and automatically optimizes the image quality and processing reliably. Flash! filters are an integral part of the datos|x 2.8.0 software.

## *Conclusion*

Industrial CT is in a unique position as manufacturing evolves to produce more and more complex components, emerging as the single most empowering solution for the increasingly complex product designs and compositions.

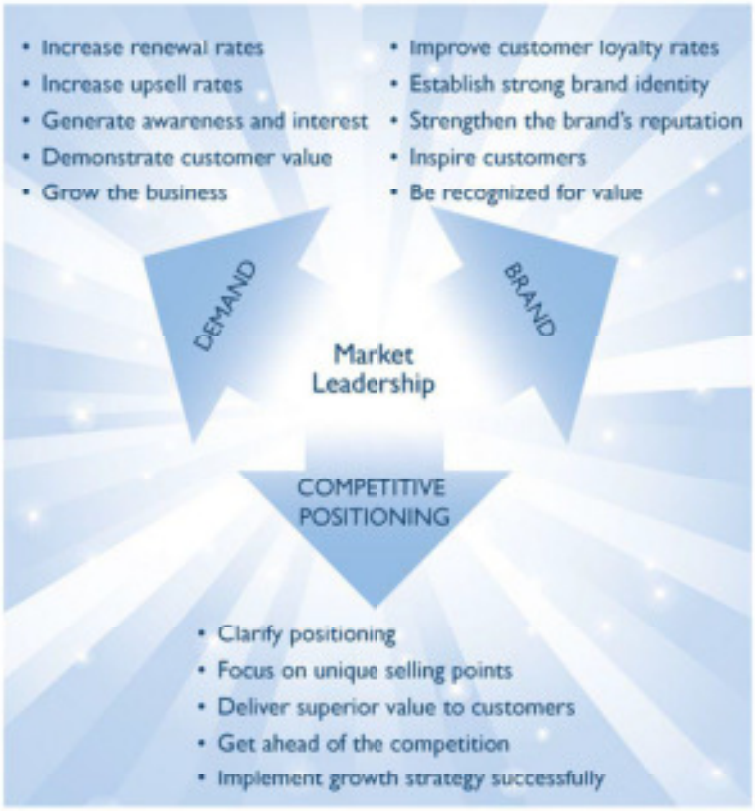
Waygate Technologies, a Baker Hughes business, is leading the industry's future, establishing market leadership with the most comprehensive product suite in industrial CT. Its dedication to innovation has resulted in significant progress in reducing scatter artifacts and scanning periods, all while maintaining the highest quality.

The company is well-positioned to capitalize on inline opportunities. Waygate Technologies continues to revolutionize the market, bringing 3D inspection to the production floor by enabling increased scanning speeds without sacrificing image quality. These developments enabled the company to capture a 25% share and achieve a leadership position in the industrial CT market.

With its strong overall performance, Waygate Technologies has earned the 2020 Frost & Sullivan Global Market Leadership Award.

## Significance of Market Leadership

Ultimately, growth in any organization depends on customers purchasing from a company, and then making the decision to return time and again. Loyal customers become brand advocates, brand advocates recruit new customers, and the company grows, and then attains market leadership. To achieve and maintain market leadership, an organization must strive to be best in class in 3 key areas: understanding demand, nurturing the brand, and differentiating from the competition.




## Understanding Market Leadership

Driving demand, strengthening the brand, and differentiating from the competition all play critical roles in a company's path to market leadership. This three-fold focus, however, is only the beginning of the journey and must be complemented by an equally rigorous focus on the customer experience. Organizations that demonstrate best practices, therefore, commit to the customer at each stage of the buying cycle and continue to nurture the relationship once the customer has made a purchase. In this way, they build a loyal, ever-growing customer base and methodically add to their market share.

## Key Performance Criteria

For the Market Leadership Award, Frost & Sullivan Analysts focused on specific criteria to determine the areas of performance excellence.

| Criterion | Requirement |
|---|---|
| Growth Strategy Excellence | There is a demonstrated ability to consistently identify, prioritize, and pursue emerging growth opportunities. |
| Implementation Excellence | Processes support the efficient and consistent implementation of tactics designed to support the strategy. |
| Brand Strength | The brand is respected, recognized, and remembered. |
| Product Quality | The product or service receives high marks for performance, functionality, and reliability at every stage of the life cycle. |
| Product Differentiation | The product or service has carved out a market niche, whether based on price, quality, or uniqueness of offering (or some combination of the three) that another company cannot easily duplicate. |
| Technology Leverage | There is a commitment to incorporating leading-edge technologies into product offerings for greater product performance and value. |
| Price/Performance Value | Products or services offer the best value for the price, compared to similar offerings in the market. |
| Customer Purchase Experience | Customers feel they are buying the optimal solution that addresses both their unique needs and their unique constraints. |
| Customer Ownership Experience | Customers are proud to own the company's product or service, and have a positive experience throughout the life of the product or service. |
| Customer Service Experience | Customer service is accessible, fast, stress-free, and of high quality. |

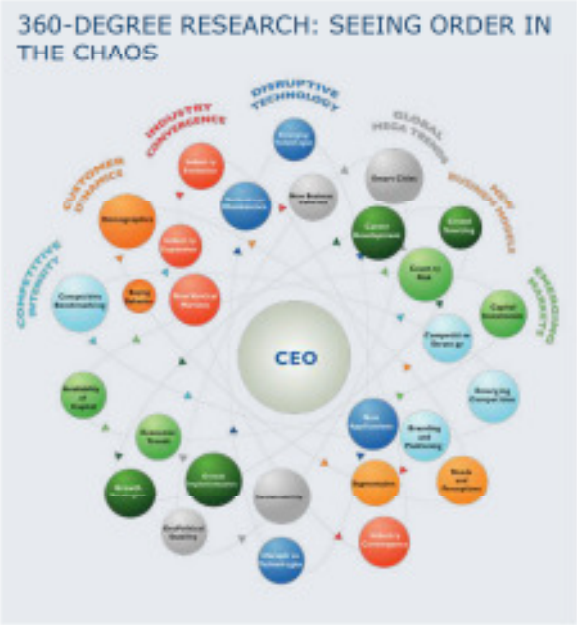
# Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate award candidates and assess their fit with best practices criteria. The reputation and integrity of the awards are based on close adherence to this process.

| | STEP | OBJECTIVE | KEY ACTIVITIES | OUTPUT |
|---|---|---|---|---|
| 1 | **Monitor, target, and screen** | Identify award recipient candidates from around the world | • Conduct in-depth industry research<br>• Identify emerging industries<br>• Scan multiple regions | Pipeline of candidates that potentially meet all best practices criteria |
| 2 | **Perform 360-degree research** | Perform comprehensive, 360-degree research on all candidates in the pipeline | • Interview thought leaders and industry practitioners<br>• Assess candidates' fit with best practices criteria<br>• Rank all candidates | Matrix positioning of all candidates' performance relative to one another |
| 3 | **Invite thought leadership in best practices** | Perform in-depth examination of all candidates | • Confirm best practices criteria<br>• Examine eligibility of all candidates<br>• Identify any information gaps | Detailed profiles of all ranked candidates |
| 4 | **Initiate research director review** | Conduct an unbiased evaluation of all candidate profiles | • Brainstorm ranking options<br>• Invite multiple perspectives on candidates' performance<br>• Update candidate profiles | Final prioritization of all eligible candidates and companion best practices positioning paper |
| 5 | **Assemble panel of industry experts** | Present findings to an expert panel of industry thought leaders | • Share findings<br>• Strengthen cases for candidate eligibility<br>• Prioritize candidates | Refined list of prioritized award candidates |
| 6 | **Conduct global industry review** | Build consensus on award candidates' eligibility | • Hold global team meeting to review all candidates<br>• Pressure-test fit with criteria<br>• Confirm inclusion of all eligible candidates | Final list of eligible award candidates, representing success stories worldwide |
| 7 | **Perform quality check** | Develop official award consideration materials | • Perform final performance benchmarking activities<br>• Write nominations<br>• Perform quality review | High-quality, accurate, and creative presentation of nominees' successes |
| 8 | **Reconnect with panel of industry experts** | Finalize the selection of the best practices award recipient | • Review analysis with panel<br>• Build consensus<br>• Select recipient | Decision on which company performs best against all best practices criteria |
| 9 | **Communicate recognition** | Inform award recipient of award recognition | • Announce award to the CEO<br>• Inspire the organization for continued success<br>• Celebrate the recipient's performance | Announcement of award and plan for how recipient can use the award to enhance the brand |
| 10 | **Take strategic action** | Upon licensing, company is able to share award news with stakeholders and customers | • Coordinate media outreach<br>• Design a marketing plan<br>• Assess award's role in strategic planning | Widespread awareness of recipient's award status among investors, media personnel, and employees |

## The Intersection between 360-Degree Research and Best Practices Awards

### *Research Methodology*




Frost & Sullivan's 360-degree research methodology represents the analytical rigor of the research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, resulting in errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

## About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, helps clients accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's growth team with disciplined research and best practices models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages nearly 60 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on 6 continents. To join Frost & Sullivan's Growth Partnership, visit http://www.frost.com.