ISG Provider Lens™

Engineering - Service Partners

Aerospace Manufacturing Engineering

Global 2019-20

Quadrant Report

A research report comparing provider strengths, challenges and competitive differentiators

Customized report courtesy of:

L&T Technology Services

January 2020

About this Report

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The research and analysis presented in this report includes research from the ISG Provider Lens™ program, ongoing ISG Research programs, interviews with ISG advisors, briefings with services providers and analysis of publicly available market information from multiple sources. The data collected for this report represents information that ISG believes to be current as of July 9, 2019 – Aug 13, 2019, for providers who actively participated as well as for providers who did not. ISG recognizes that many mergers and acquisitions have taken place since that time, but those changes are not reflected in this report.

All revenue references are in U.S. dollars ($US) unless noted.

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ISG Provider Lens™

ISG Provider Lens™

ISG Provider Lens™ delivers leading-edge and actionable research studies, reports and consulting services focused on technology and service providers' strengths and weaknesses and how they are positioned relative to their peers in the market. These reports provide influential insights accessed by our large pool of advisors who are actively advising outsourcing deals as well as large numbers of ISG enterprise clients who are potential outsourcers.

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EXECUTIVE SUMMARY

Overall Engineering Services Trends

Traditional IT services companies are moving towards offering engineering research and development (ER&D) services to automotive and aerospace OEMs due to the emerging demand for software development and services in those industries. Providers are also involved in end-to-end technology development of software, mechanics and solutions for OEMs.

Overall, the engineering services market is moving towards managed services and outcome-based pricing models for services contracts, mainly to support both embedded and mechanical processes. The collaboration between OEMs and supplier companies is aimed at increasing innovation in the product development and manufacturing processes.

Digital thread is currently being considered as a starting point for developing digital twins in a manufacturing plant. OEMs also are focused on additive manufacturing, augmented reality (AR) and virtual reality (VR) to gain a competitive advantage. Network virtualization, software-defined networking and 5G developments are becoming critical for OEMs to develop connected vehicles.

The engineering services ecosystem is increasingly inclined toward software development to enable faster product rollouts and innovation. As the demand for IoT platforms and applications is growing, the need for vehicle and site diagnostics, mobility services, predictive maintenance, operational technology (OT), data analytics and digital supply chain is undergoing a heavy transformation. IT-OT integration is becoming increasingly important for better business and technology synergies.

Automotive Product Engineering

- Outsourcing engagements are moving towards being more partnership based because labor arbitrage is becoming more elusive for businesses. Traditional OEM clients are moving towards outcome-based and managed services business models with Tier 1 and Tier 2 suppliers. There was also higher growth in per-car contracts during 2018-19.
- Technology suppliers are enhancing their capabilities to deliver end-to-end solutions and services to support various OEM needs and to generate demand in the market. They are focusing on foundation technologies such as software-defined networks (SDN) and 5G to support the future demand for connected mobility.
- Automotive OEMs are increasing their R&D budgets on V2X, including V2G and G2V, to drive the future of connected mobility. ISG has also observed that embedded engineering is moving away slowly, and the entire industry is shifting towards model-based deployment.
- OEMs are increasing their budgets to develop electric infrastructure. However, a large portion of these developments are currently at the proof-of-concept (POC) stage.

- The U.S. is the leading geographic market for automotive product engineering services and the deal volume is increasing in the region. German OEMs were pushing for more contracts in 2018-19 as they were growing by developing captives across geographies.
- German-based automotive suppliers and OEMs are mostly running their service contracts on outcome-based models and per-car pricing. This is expected to be an emerging trend in Europe.
- Advanced driver assistance systems (ADAS) is considered to be a more immediate market opportunity for vehicle OEMs than electric and hybrid mobility. To capitalize on these opportunities, OEMs are pursuing partnerships with long-time suppliers to focus on innovation.

Automotive Manufacturing Engineering

- Around 60 to 70 percent of the demand for outsourcing manufacturing technologies is driven by demand from energy management. Vehicle OEMs are struggling to reduce the noise levels in their vehicles and are using outsourcing to help develop solutions.
- Vehicle OEMs are focusing on IT/OT convergence and 3D printing technologies to achieve optimum technology utilization in plant manufacturing processes.
- IoT platforms and digital threads are gaining more traction in the manufacturing space, driven by the need to develop error-free vehicles.
- OEMs are leveraging product lifecycle management (PLM) for predictive manufacturing, which is expected to reduce unnecessary manufacturing costs.
- Due to the emergence of digital services, automotive OEMs and suppliers are seeking to monetizing their resources and find ways to generate revenue from vehicle services.
- Tier 1 suppliers are enhancing their hardware design capabilities to help OEMs with manufacturing design solutions. This helps OEMs to go to manufacturing directly.

Aerospace Product Engineering

- The level of outsourcing of aircraft component design is sometimes a concern for OEM or PMA companies due to the concomitant IP, and because the outsourcing partner often serves multiple competing OEMs.
- Several OEMs and primes have focused on creating processes as a part of product engineering. It is not exactly the design by definition but a process where once the design model is completed, manufacturing engineers turn the model into a market vision model and process model. This bridges the gap between design and manufacturing.
- Most of the aerospace primes are seeking a consultative direction towards product R&D, i.e. the feasibility of conducting it in-house vs. working with a supplier. Prototyping and validation of a product, all the way from product introduction and delivering assurance that the manufacturing facilities are aligned with, along with a competent supply chain can ramp up the volume of development and production hardware.
- Most of the OEMs in a particular segment are fundamentally in a similar space, and they should create a value proposition through continuous improvement or process excellence. Thus, once the production environment is improving, service providers would need to develop ways to create value, reduce waste and optimize cost.

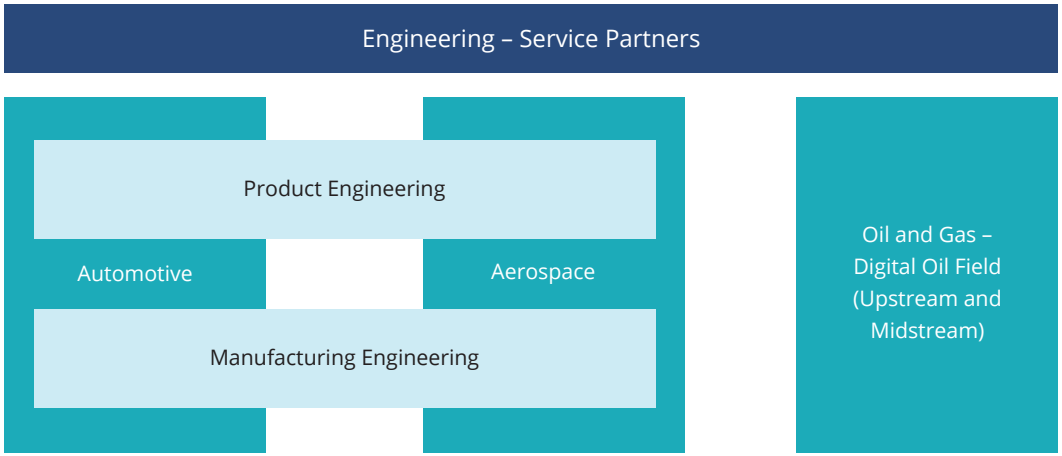
Aerospace Manufacturing Engineering

- OEMs usually try to avoid genuine technology development within the main body of a new engine program because they want to fast-forward the concept-to-commercialization phase, i.e. get the engine to production as fast as possible. New technology development and implementation tends to increase the cost and time required by multiple factors.
- Most of the disruptive innovations (3D printing, product technologies such as composite fan blades, gearboxes, electrification techniques, etc.) are being looked at centrally within the company. The foundational work in these is sometimes carried out by several university technology centers and manufacturing technology centers, which may be leveraged through a government contract.
- While several OEMs and primes are moving away from PMAs, engine MRO PMAs tend to be available on the older engines. However, the situation varies from program to program. For big volume programs like CF6, there are PMAs that account for a significant market share. Consistently, when aircraft are retired, operators take parts off the engines and sell them.
- OEMs and primes have entered the MRO market by offering few manufacturing engineering support services. While there are significant levels of process planning, intensive inspection and assessment where the engineers need to accept what they find, operators are usually avoiding this. They prefer taking it to the OEM shop and replacing old and outdated components with new ones. This accelerated repair process is making MRO a fast, responsive and profitable business.

Oil & Gas (Digital Oil Field)

- Companies are leveraging economies of scale to drive digital transformation. Cost reductions for sensors, bandwidth and processing have led technology stakeholders to adopt IoT-¬specific services, which span from small sensors and chip sets to platforms and software systems. The evolution of IoT-enabled analytics has influenced exploration and production (E&P) stakeholders to drive performance with an effectual value chain. The major focus areas for R&D have consistently involved utilizing cloud-based storage and enabling effective data transmission and high-speed computing to improve financial viability and operational efficiency.
- E&P companies are becoming open to adapting disruptive innovations such as the full waveform inversion technology to align seismic simulations with existing seismic data for depicting subsurface images of considerable quality. This imaging technique is being employed to drill deeper wells with higher precision, resulting in the identification of additional resources.
- Automation is enhancing safety, as humans are being replaced by robots and drones to take up assignments in semi-permissive areas with higher safety standards such as for pipeline and flare stack inspections. An elevated cyber resilience armor will protect oil and gas companies against malware and phishing, which in the past were identified as the two most common cyberattacks against O&G companies and will protect against other vulnerabilities.
- In the initial days of the shale boom, shale rigs drove the overall oil production for the U.S., and the upstream E&P companies were firing all pistons to produce oil from challenging shale reservoirs in a financially viable way. However, recent bans on fracking in Europe (France, Germany, Denmark, Bulgaria and Romania) may restrict the shale economy.
- There is an industry-wide shift from preventative to predictive maintenance. The service provider fraternity has been trying to address exploration, production and HSEQ (health safety, environment and quality) shortcomings before they result in a failure that causes cost-intensive downtime for rigs. Thus, digital systems are being engaged to monitor production on a well-by-well basis and generate an alert when a well does not meet its expected production target. The service providers, in turn, are analyzing multiple points of data analysis on the volumes of information captured at the well head, and converting the analysis into actionable insights for surveillance, operational accounting and HSEQ compliance.

Introduction



Source: ISG 2019

Definition

Engineering and R&D (ER&D) services are one of the fastest growing segments in the outsourcing market. The segment has been gaining traction with the digitization adoption wave, and heritage IT services firms have been strengthening their product and manufacturing engineering wings to offer end-to-end product development services and after-sale maintenance services through manufacturing processes. Apart from typical legacy engineering service providers, the ISG Provider Lens™ study is also focused on the multinational company (MNC) captive centers in emerging economies, which carry out similar work for their parent organizations.

Definition (cont.)

Scope of the Report

This study captures up-to-the-minute developments in the engineering sections of commercial aerospace, automotive and upstream and midstream oil and gas industries. The report is divided into several subsegments that track and analyze the market landscape of product engineering and manufacturing engineering services offered by providers across several regions. It gives an assessment of the providers acting in these segments regarding the strength of their portfolios and their market competitiveness.

The ISG Provider Lens™study offers IT-decision makers:

- Transparency of strengths and weaknesses of relevant providers
- Differentiated positioning of providers by segments
- Focus on different regional markets including the U.S. and Germany

Our study serves as an important decision-making basis for positioning, key relationships and go-to-market considerations. ISG advisors and enterprise clients also leverage information from these reports for evaluating their current vendor relationships and potential new engagements.

Provider Classifications

The ISG Provider Lens™ quadrants were created using an evaluation matrix containing four segments, where the providers are positioned accordingly.

Leader

The "leaders" among the vendors/providers have a highly attractive product and service offering and a very strong market and competitive position; they fulfill all requirements for successful market cultivation. They can be regarded as opinion leaders, providing strategic impulses to the market. They also ensure innovative strength and stability.

Product Challenger

The "product challengers" offer a product and service portfolio that provides an above-average coverage of corporate requirements, but are not able to provide the same resources and strengths as the leaders regarding the individual market cultivation categories. Often, this is due to the respective vendor's size or their weak footprint within the respective target segment.

Market Challenger

"Market challengers" are also very competitive, but there is still significant portfolio potential and they clearly lag behind the "leaders." Often, the market challengers are established vendors that are somewhat slow to address new trends, due to their size and company structure, and have therefore still some potential to optimize their portfolio and increase their attractiveness.

Contender

"Contenders" are still lacking mature products and services or sufficient depth and breadth of their offering, while also showing some strengths and improvement potentials in their market cultivation efforts. These vendors are often generalists or niche players.

Provider Classifications (cont.)

Each ISG Provider Lens™ quadrant may include a service provider(s) who ISG believes has a strong potential to move into the leader's quadrant.

Rising Star

Rising stars are mostly product challengers with high future potential. When receiving the "rising stars" award, such companies have a promising portfolio, including the required roadmap and an adequate focus on key market trends and customer requirements. Also, the "rising stars" has an excellent management and understanding of the local market. This award is only given to vendors or service providers that have made extreme progress towards their goals within the last 12 months and are on a good way to reach the leader quadrant within the next 12-24 months, due to their above-average impact and innovative strength.

Not In

This service provider or vendor was not included in this quadrant as ISG could not obtain enough information to position them. This omission does not imply that the service provider or vendor does not provide this service.

Engineering - Service Partners Cross-Quadrant Provider Listing 1 of 3

	Automotive – Product (Design, Development and Pilot) Engineering	Automotive – Manufacturing Engineering	Aerospace – Product Engineering	Aerospace – Manufacturing Engineering	Oil and Gas – Digital Oil Field (Upstream and Midstream)
Aernnova	Not In	Not In	Product Challenger	Product Challenger	Not In
AKKA Technologies	Leader	Product Challenger	Product Challenger	Product Challenger	Product Challenger
Altair	Not In	Not In	Product Challenger	Product Challenger	Product Challenger
Alten	Leader	Not In	Product Challenger	Product Challenger	Product Challenger
Altran	Leader	Leader	Leader	Leader	Leader
ARRK Europe	Not In	Not In	Not In	Market Challenger	Not In
Assystem	Not In	Not In	Product Challenger	Not In	Not In
Assystem (Expleo)	Not In	Not In	Not In	Product Challenger	Not In
Atos	Product Challenger	Product Challenger	Not In	Not In	Not In
Ausy	Not In	Not In	Product Challenger	Product Challenger	Not In
AVL	Not In	Product Challenger	Not In	Not In	Not In
Axiscades	Contender	Contender	Contender	Contender	Not In
Belcan	Not In	Not In	Market Challenger	Market Challenger	Not In
Bertrandt	Leader	Not In	Not In	Not In	Not In
Birlasoft	Not In	Not In	Not In	Not In	Contender

Engineering - Service Partners Cross-Quadrant Provider Listing 2 of 3

	Automotive – Product (Design, Development and Pilot) Engineering	Automotive – Manufacturing Engineering	Aerospace – Product Engineering	Aerospace – Manufacturing Engineering	Oil and Gas – Digital Oil Field (Upstream and Midstream)
Capgemini	Leader	Leader	Leader	Leader	Leader
Cognizant	Leader	Product Challenger	Not In	Not In	Leader
Cyient	Product Challenger	Not In	Leader	Leader	Rising Star
EDAG	Not In	Contender	Not In	Not In	Not In
EGAT	Not In	Not In	Product Challenger	Product Challenger	Not In
eInfochips	Not In	Not In	Contender	Contender	Not In
EPAM	Market Challenger	Not In	Not In	Not In	Market Challenger
Esterline	Not In	Not In	Market Challenger	Not In	Not In
Expleo	Product Challenger	Product Challenger	Not In	Not In	Not In
Ferchau	Product Challenger	Not In	Product Challenger	Product Challenger	Not In
Genpact	Not In	Not In	Product Challenger	Not In	Not In
Happiest Minds	Contender	Not In	Not In	Not In	Not In
Harman	Product Challenger	Product Challenger	Not In	Not In	Not In
HCL	Leader	Leader	Leader	Leader	Not In
Hinduja Technologies	Market Challenger	Not In	Not In	Not In	Not In

Engineering - Service Partners Cross-Quadrant Provider Listing 3 of 3

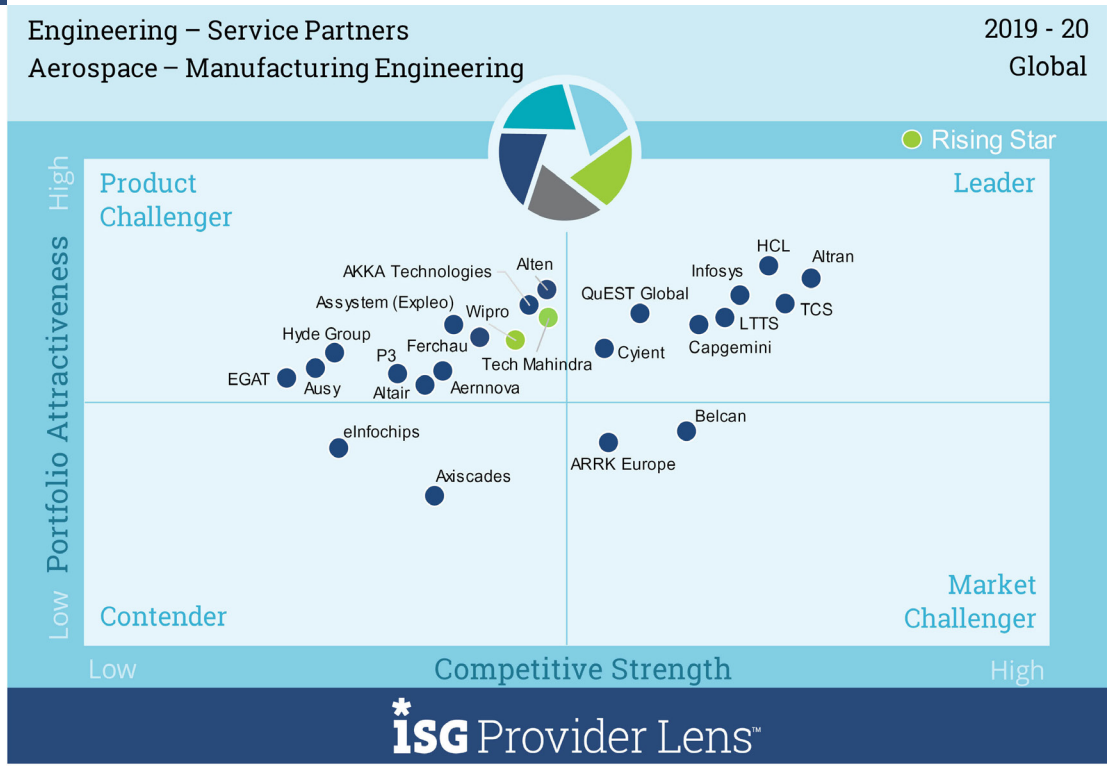
	Automotive – Product (Design, Development and Pilot) Engineering	Automotive – Manufacturing Engineering	Aerospace – Product Engineering	Aerospace – Manufacturing Engineering	Oil and Gas – Digital Oil Field (Upstream and Midstream)
Hyde Group	Not In	Not In	Product Challenger	Product Challenger	Not In
IAV	Not In	Product Challenger	Not In	Not In	Not In
Infosys	Rising Star	Leader	Leader	Leader	Leader
Innominds	Contender	Not In	Not In	Not In	Contender
ITC Infotech	Product Challenger	Not In	Not In	Not In	Not In
KPIT	Product Challenger	Not In	Not In	Not In	Not In
LTTS	Leader	Leader	Leader	Leader	Leader
Luxoft	Product Challenger	Not In	Not In	Not In	Market Challenger
P3	Not In	Market Challenger	Product Challenger	Product Challenger	Not In
QuEST Global	Rising Star	Rising Star	Leader	Leader	Rising Star
Semcon	Contender	Contender	Not In	Not In	Not In
T- Systems	Not In	Market Challenger	Not In	Not In	Not In
TCS	Leader	Leader	Leader	Leader	Leader
Tech Mahindra	Leader	Product Challenger	Rising Star	Rising Star	Product Challenger
Wipro	Leader	Leader	Rising Star	Rising Star	Leader

Engineering - Service Partners Quadrants

AEROSPACE MANUFACTURING ENGINEERING

Definition

Manufacturing engineering typically starts after the prototype development across all processes of industry-scale production. Aerospace manufacturing engineering specialist service providers focus on all aspects of the supply chain, technology and launch management (including quality management), process planning, layout creation, standard operating procedure (SOP) development, requirement analysis, functional safety and regulatory compliance and certification. This quadrant analysis considers the credibility of service providers in up-to-the-minute technologies across the manufacturing value chain such as additive manufacturing or 3D printing, aspects of Industry 4.0 or Manufacturing 4.0 and industrial robots.



Source: ISG Research 2019

AEROSPACE MANUFACTURING ENGINEERING

Eligibility Criteria

- The service provider considered should have capabilities in delivering manufacturing services partially or fully across at least one aircraft component segment, such as aerostructures, aero systems, engine, avionics or interiors.
- The engineering and R&D player should typically have the capability to deliver a commercial-scale manufacturing process implementation according to the enterprise requirement, guided by a robust, consultative methodology.
- The provider should have intense development capabilities that can couple existing technologies with disruptive innovations such as Industry 4.0 and 3D printing.

Observations

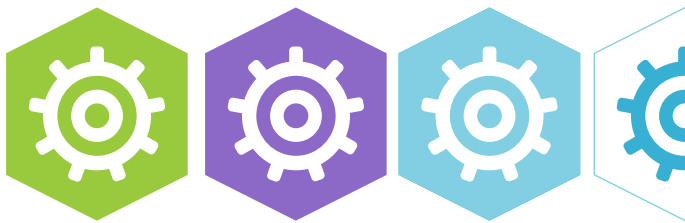
- **Altran*** is a prominent engineering R&D (ER&D) services provider in the aerospace and defense sector and a leader in aerospace manufacturing services.
- **Capgemini*** is a leader in aerospace manufacturing services with strong capabilities in digital manufacturing and transformation services.
- **Cyient** distinguishes itself in the sector through its supply chain capabilities and transformation services.
- **HCL** places a heavy aerospace manufacturing focus on Engineering 4.0 services and global delivery.
- With strong attention to additive manufacturing and plant engineering services, **Infosys** is a leader in aerospace manufacturing services.

AEROSPACE MANUFACTURING ENGINEERING

Observations (cont.)

- **LTTS** is a leader in the market with a strong focus on hardware and embedded development and services.
- **QuEST Global** is a leader in aerospace manufacturing services with its solid mechanical engineering competency.
- With its client-centric solution delivery and solid Manufacturing 4.0 services, **TCS** is a leader in this space.
- **TechM (Tech Mahindra)** has strong PLM and end-to-end product optimization capabilities and is a Rising Star in aerospace manufacturing services.
- **Wipro** is a Rising Star for providing smart manufacturing services to OEMs and suppliers.

** Capgemini acquired Altran in June 2019. The companies are considered separately in this report.*



LTTS

Overview

L&T Technology Services (LTTS) is a prominent engineering and R&D (ER&D) services company and subsidiary of Larsen & Toubro Limited, the $18 billion Indian conglomerate operating in 30 countries. LTTS' manufacturing engineering capabilities span virtual manufacturing, smart PLM, operations management, digital factory and simulations, manufacturing automation, plant design and engineering and supply chain management. The company is specialized in the engineering design, product development, smart manufacturing and digitalization segments and has more than 350 patents filed for 51 of the top 100 global ER&D spenders.

Strengths

In-depth additive manufacturing capabilities: 3D printing has been one of the cornerstones of modern aerospace manufacturing engineering, with stakeholders progressing towards printing more aircraft components. To address the dynamic market requirements, LTTS has established robust in-house 3D-printing capabilities and reinforced them with a strong vendor ecosystem in India and China to support rapid prototyping. The company has successfully carried out design and prototyping for electrical enclosure BRKT, ignition modules, air vent assemblies and faucets, which has strengthened its foothold as an additive manufacturing partner.

Three-step approach to curtail utility consumption: LTTS showcases a dedicated offering for optimizing utility consumption represented as WAGES, which works on energy monitoring, metering and conservation and water/wastewater management. the methodology works on a bottom-up approach starting with the inspection of the installed base of energy meters (utility and electrical), identification of energy saving opportunities with optimal use of water, air, gas, electricity and steam and the resultant water and wastewater management. The offering is appropriate for the latest sustainable manufacturing models that is analogous to zero-power homes.

Caution

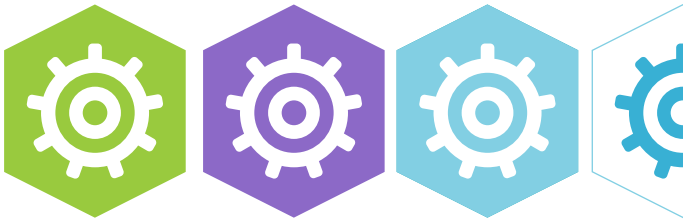
Unlike its peers, LTTS did not showcase research/innovation-driven partnerships with global academic institutions.

2019 ISG Provider Lens™ Leader

The company's strategy is appropriately aligned towards capturing a larger share of the lucrative aftermarket.

Methodology

METHODOLOGY



The research study "ISG Provider Lens™ 2019-20 – Engineering Service Partners " analyzes the relevant software vendors/service providers in the Global market, based on a multi-phased research and analysis process. It positions these providers based on the ISG Research methodology.

The study was divided into the following steps:

1. Definition of Engineering Service Partners market
2. Use of questionnaire-based surveys of service providers/vendor across all trend topics
3. Interactive discussions with service providers/vendors on capabilities & use cases
4. Leverage ISG's internal databases & advisor knowledge & experience (wherever applicable)
5. Detailed analysis & evaluation of services & service documentation based on the facts & figures received from providers & other sources.
6. Use of the following key evaluation criteria:
   - Strategy & vision
   - Innovation
   - Brand awareness and presence in the market
   - Sales and partner landscape
   - Breadth and depth of portfolio of services offered
   - Technology advancements

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Manali De Bhaumik is an analyst specializing in research on Digital and connected ecosystems. She is responsible for handling custom research assignments as well as analyst reports pertaining to her focus area. Manali would be focusing on IoT and engineering services with focus on different technology and verticals. Manali's core competencies are in the areas of market analysis and intelligence, competitive intelligence, secondary research, quantitative analysis and report writing.

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