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FROST & SULLIVAN BEST PRACTICES AWARD

IIOT PLATFORM FOR SMART MANUFACTURING - GLOBAL

Product Leadership 2019

FORCAM
we speak machine

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2019

BEST PRACTICES AWARD

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Background and Company Performance

Industry Challenges

Smart manufacturing is rooted in advanced machine communication and real-time analytics that position a company to drive efficiency, reduce costs, improve quality, decrease risk, and optimize asset utilization by fostering a harmonized Industrial Internet of Things (IIoT) environment. Establishing a smart factory, however, involves several critical components, such as connectivity across machines, track and trace, and scheduling. The huge challenge is to find an all-encompassing solution that can help any company turn its plant into a smart factory, yet a majority of the existing platforms and systems lack wide-ranging functionality and may not even be capable of effectively communicating with the shop floor.

Another challenge is that today's companies are demanding not just a vendor but a partner that can guide them at any point in their journey towards running a fully operational smart factory. Under such circumstances, a future-focused company that offers an IIoT platform designed to help customers transform their outdated setup into a smart factory by addressing the aforementioned challenges is expected to secure a leadership position in the market.

Product Family Attributes and Business Impact

Match to Needs

Strongly committed to helping customers transform their legacy plants into IIoT-based smart factories, the German company FORCAM offers its unique FORCAM FORCE™ Ecosystem. Machine and order data acquisition, dynamic scheduling, predictive analytics, product data management, and track & trace are some of the critical components that a company should be looking at as it moves towards smart manufacturing, and FORCAM FORCE™ supports each of these elements. Frost & Sullivan is impressed that FORCAM operates not just as an IIoT player or as a manufacturing execution system (MES) player but as a blend of both. The unique approach to product leadership that FORCAM has taken to become a smart factory partner for its customers is delivery of an open-architecture IIoT platform embedded with complete MES functionality right out of the box. The result is the FORCAM FORCE™ Bridge IIoT Platform, which delivers the following functions to customers:

Data Collection: Aware that any company attempting to move forward with a smart factory setup and achieve efficiency on the shop floor must first establish a way to communicate with its machines, FORCAM FORCE™ was designed to offer machine connection through plug-ins. Some of the oldest machines in use do not have any form of communication, but FORCAM's I/O controller allows connecting and communicating with most legacy machines. It converts to Ethernet signals that can be used to monitor, track,

and control such machines. The plug-ins, on the other hand, can talk to PLCs, different protocols such as MTConnect®, as well as CSV files, Excel files, and databases.

Performance Analysis: FORCAM fundamentally understands Overall Equipment Effectiveness (OEE) and Overall Process Efficiency (OPE); therefore, it delivers out-of-the-box standard reports (up to 110) tied to OEE and OPE.

Dynamic Scheduling: Embedded dynamic and finite scheduling capability from FORCAM allows optimizing efficiency on the shop floor and mitigating reactive responses to customer requirements. In other words, based on any information from a production order, a FORCAM user can understand where the bottlenecks are occurring and have the system automatically balance the workload to fix the issue. FORCAM being futuristic in its approach plans to offer the first version of predictive scheduling at the end of 2019. Predictive scheduling means understanding the health of the equipment both today and in the future. For instance, if a machine indicates potential failure, predictive scheduling accounts for that what-if analysis in the planning simulation; it can look into the historical performance of the machine and use that for future projections.

What largely differentiates FORCAM is its connection to equipment health. So if the equipment is running too fast or slow, the system will work that performance into the actual schedule. For instance, if a machine is lagging, then an order that was expected to complete in 4 hours might take 8 hours; therefore, the ability to understand equipment status and condition when scheduling is a top differentiator for FORCAM. This is also one of the key reasons for embedding MES into the IIoT platform.

Track & Trace: Every time there is a product recall in any industry, companies know that a component has a problem, yet they must recall almost all of the products, which is costly. FORCAM's track and trace allows a company to perform a more granular approach to investigate what happened. For instance, if it was a part failure, FORCAM's track and trace feature offers a look at the history to see what was made with that part and when, which batch, and where the other components went. In other words, FORCAM provides the means to conduct more efficient research and investigation into issues, which will save its customers both time and money. In addition, track and trace not only cuts costs but also ensures customers meet legislative requirements, which is critical for a company to stay in business.

Energy Management: FORCAM's ability to track equipment current, pressure, vibration, and temperature in real-time via a streaming data concept is a fundamental requirement for running a true smart factory.

Document Management & Product Data Management: FORCAM supports digital manufacturing where documentation and CAD drawings become paperless and digitally available on the shop floor itself.

Overall, Frost & Sullivan applauds FORCAM for offering FORCAM FORCE™ Ecosystem, the open-architecture IIoT platform embedded with a complete MES functionality that stands out from competing products for inclusion of all the required tools a company needs to become a smart factory.

Smart Factory Starter Kits: FORCAM has launched its first Starter Kit in 2016. The collection of Starter Kits has expanded to five (5) plus a Free Trial version to help companies with an easy start to smart manufacturing at a fixed price. The approach allows companies to start small, win big, and scale fast creating a real business case, a proof of value.

Positioning & Design

While FORCAM can advance any company from any point on its journey to becoming a smart factory, chief among the differentiators are its ability to continuously innovate, talk to machines, and offer scalability and mobility.

Connectivity: Part of FORCAM's DNA is excellence in connecting to machines. While a number of industry competitors also connect to machines, the secret to FORCAM's machine connectivity is that it understands that 3 different machines will speak 3 different languages. Therefore, FORCAM merges the languages into a single language that can be understood in terms of productivity analytics, which becomes its common semantics layer. In other words, FORCAM's common semantics layer converts the signals, data, and messages from any machine or PLC into a common language. Finally, when the results are communicated to the organization, they are in this highly accessible language, which becomes a key element of smart manufacturing. In addition, when FORCAM talks about productivity for any kind of machine or part, it runs a comparison of productivity, not against the same set of machines but across any type of machine on the shop floor; it compares different controllers, machines, and even different applications.

Continuous Innovation: While a number of FORCAM customers already implement an MES, a common critique is that most of these systems do not talk very well to the shop floor. In an effort to address this issue, FORCAM came out with a bridge platform customers can rely on to form the communication link needed to bring the data from the machine into a layer that the MES can use. Essentially, FORCAM becomes that layer of communication and interpretation between the machines and the MES. Looking ahead, FORCAM aims for its customers to use the MES capability and applications that come embedded in the FORCAM solution.

Industrial APIs: FORCAM has an open architecture and provides a set of published, open APIs. A number of FORCAM's competitors also offer APIs, but what differentiates FORCAM is that it has turned them into industrial APIs. As such, when it publishes its APIs, a partner/customer understands them and is not left trying to interpret, but instead gains clear direction on how to build on and enhance them. Therefore, FORCAM APIs are

strikingly different as they are not just open APIs but form a production-oriented and production-focused library of APIs.

Scalability: For its global customers, FORCAM can roll up every machine, every production line, and every plant into a single global organizational entity. FORCAM can look at the company's OEE across all of its facilities and drill down to every machine. FORCAM's server-based approach allows it to scale and be deployed either on-premise or on the cloud. The differentiation here is that many vendors offer on-premise or cloud, but as two different solutions, whereas FORCAM offers a single solution that is both on-premise ready and cloud ready. As a result, FORCAM's customers can easily migrate between the two.

Mobility: The FORCAM solution is accessible anywhere, any time, and on any device. Such mobility and responsiveness enable users to not only remotely gather relevant information that impacts their day-to-day operations but also monitor performance and take the right, real-time decisions when it matters most and collaborate for the quick sharing of data on key performance indicators (KPI) with suppliers, partners, and customers.

Customer Acquisition & Growth Potential

FORCAM has 360 customers spread across the medical, heavy engineering, automotive, and aerospace industries, and its solution supports 100,000 assets connected globally, a number that is increasing rapidly. Its customers include Lockheed Martin, BorgWarner, Chrysler, and KUKA. Because FORCAM is scalable it accommodates a range of customers, from the smallest, in the $20 to $50 million range, all the way up to customers that are running billions of dollars. Companies find FORCAM attractive as it helps them boost efficiency on the shop floor and remain flexible to new requirements from their customers. In other words, FORCAM is about driving profitability and increasing revenues in its clients' organizations, and not simply focused on cost reduction. As such, it fosters initiatives such as advanced shop floor management, advanced process optimization, digital manufacturing, and demand-driven supply chain.

One of the best practices implemented by FORCAM that also differentiates it from a lot of other vendors is its desire to stay involved with customers until they feel fully independent. When FORCAM first visits a customer site, it not only deploys the solution but establishes a relationship through setting up a series of improvement initiatives. In fact, FORCAM guarantees a 5 to 10% increase in productivity and stays involved until it sees that increase realized. As a result, its customers know they have continuous support and engagement available to them until they feel confident to fly solo and until FORCAM feels confident to walk away. Frost & Sullivan finds FORCAM exemplifies the industry's customer-centric and outcomes-focused best practice.

FORCAM also released a smart factory starter kit and launched FORCAM Academy in 2018 to supply customers with training materials on how to use the solution, deploy it, and improve upon it. What also makes FORCAM appealing to companies is that it supports a phased approach towards realizing a smart factory whereby a client need not implement

all of the smart factory components at the same time or in any rigid sequence; instead, its customers can mix and match them based on the priorities of their facility. A phased approach ensures that there is no drastic change to the shop floor environment, meaning there is no rip-and-replace required.

Expanding Partnerships:

With regards to expansion into more target accounts, FORCAM has a business development strategy in place that hinges on close working relationships with the Digital Manufacturing and Design Innovation Institute (DMDII), universities, and partners. DMDII has a 25,000 sq. ft. shop floor with 50 machines, and half of those are connected to FORCAM FORCE™. Customers, vendors, and any walk-in can experiment with those systems for no charge. FORCAM is also very dedicated to partnering with universities and has strong initiatives coming in 2019 where the universities will bring FORCAM's technology closer to the students who can get hands-on training related to creating a virtual factory.

The company also has a vast, functional-driven partner network, system integrators, and collaborations with other shop floor vendors who take FORCAM FORCE™ to market and introduce it to their customers. In addition to educational and sales partners, FORCAM is developing partnerships on the applications side with any company creating a technology that may benefit the manufacturing sector.

With a robust (and continuously expanding) customer base and partner network that complements its customer-centric and outcomes-focused approach, FORCAM appears positioned to strengthen its industry leadership as more companies make the transition into IIoT environments and embark on their smart factory journey.

Conclusion

Today's companies needed an IIoT platform that would support their transformation into smart manufacturing, and the vendor-agnostic FORCAM FORCE™ Ecosystem, an open-architecture IIoT platform embedded with a complete MES functionality, successfully addresses this need. FORCAM renders unmatched customer value as it supports any company at any point in its journey towards establishing a smart factory. The company has secured a competitive edge by not only providing the IIoT platform but by becoming a true smart factory partner. As part of its commitment to customer success beyond the product purchase, FORCAM guarantees a 5 to 10% increase in productivity and stays involved with its customers until that goal is reached.

Frost & Sullivan is impressed by FORCAM's exemplary customer-centric and outcomes-focused measures. A constant focus on innovation and incredible connectivity across machines are two other key differentiators of FORCAM. In addition to offering the solutions needed to become a smart factory, FORCAM is unique for providing industrial APIs, a bridge platform, and also a futuristic approach to working on predictive scheduling. For its strong overall performance, FORCAM has earned Frost & Sullivan's 2019 Product Leadership Award.

Significance of Product Leadership

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. A comprehensive product line, filled with high-quality, value-driven options, is the key to building an engaged customer base. To achieve and maintain product excellence, an organization must strive to be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

- Acquire competitors' customers
- Increase renewal rates
- Increase upsell rates
- Build a reputation for value
- Increase market penetration

- Earn customer loyalty
- Foster strong corporate identity
- Improve brand recall
- Inspire customers
- Build a reputation for creativity

DEMAND

BRAND

Product Leadership

COMPETITIVE POSITIONING

- Stake out a unique market position
- Promise superior value to customers
- Implement strategy successfully
- Deliver on the promised value proposition
- Balance price and value

Understanding Product Leadership

Demand forecasting, branding, and differentiating all play a critical role in finding growth opportunities for your product line. This three-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communications, customer feedback, pricing, and competitor actions must all be managed and monitored for ongoing success. If an organization can successfully parlay product excellence into positive business impact, increased market share will inevitably follow over time.

Key Benchmarking Criteria

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Product Family Attributes and Business Impact—according to the criteria identified below.

Product Family Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability and Quality
Criterion 3: Product/Service Value
Criterion 4: Positioning
Criterion 5: Design

Business Impact

Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Operational Efficiency
Criterion 4: Growth Potential
Criterion 5: Human Capital

Best Practices Award Analysis for FORCAM

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

RATINGS GUIDELINES
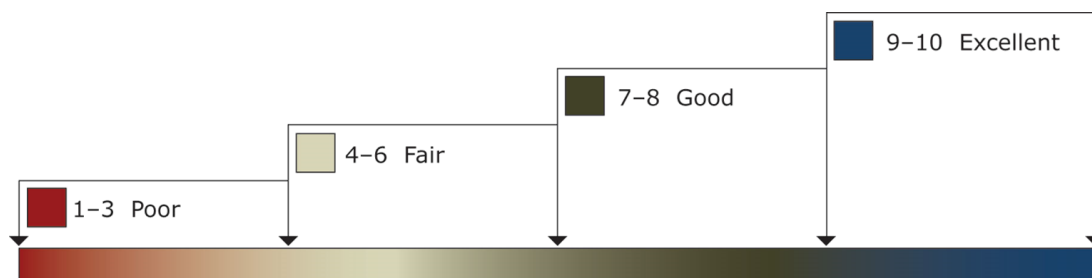
The Decision Support Scorecard is organized by Product Family Attributes and Business Impact (i.e., These are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key participants as Competitor 2 and Competitor 3.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Product Leadership	Product Family Attributes	Business Impact	**Average Rating**
FORCAM	**9.5**	**9.5**	**9.5**
Competitor 2	8.0	8.0	8.0
Competitor 3	7.5	7.5	7.5

Product Family Attributes

Criterion 1: Match to Needs
Requirement: Customer needs directly influence and inspire the design and positioning of the product family.

Criterion 2: Reliability and Quality
Requirement: Products consistently meet or exceed customer expectations for performance and length of service.

Criterion 3: Product/Service Value
Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 4: Positioning
Requirement: Products or services address unique, unmet need that competitors cannot easily replicate or replace.

Criterion 5: Design
Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

Business Impact

Criterion 1: Financial Performance
Requirement: Overall financial performance is strong in terms of revenues, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition
Requirement: Product strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency
Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high quality standard.

Criterion 4: Growth Potential

Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to product quality and customer impact, which in turn enhances employee morale and retention.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.
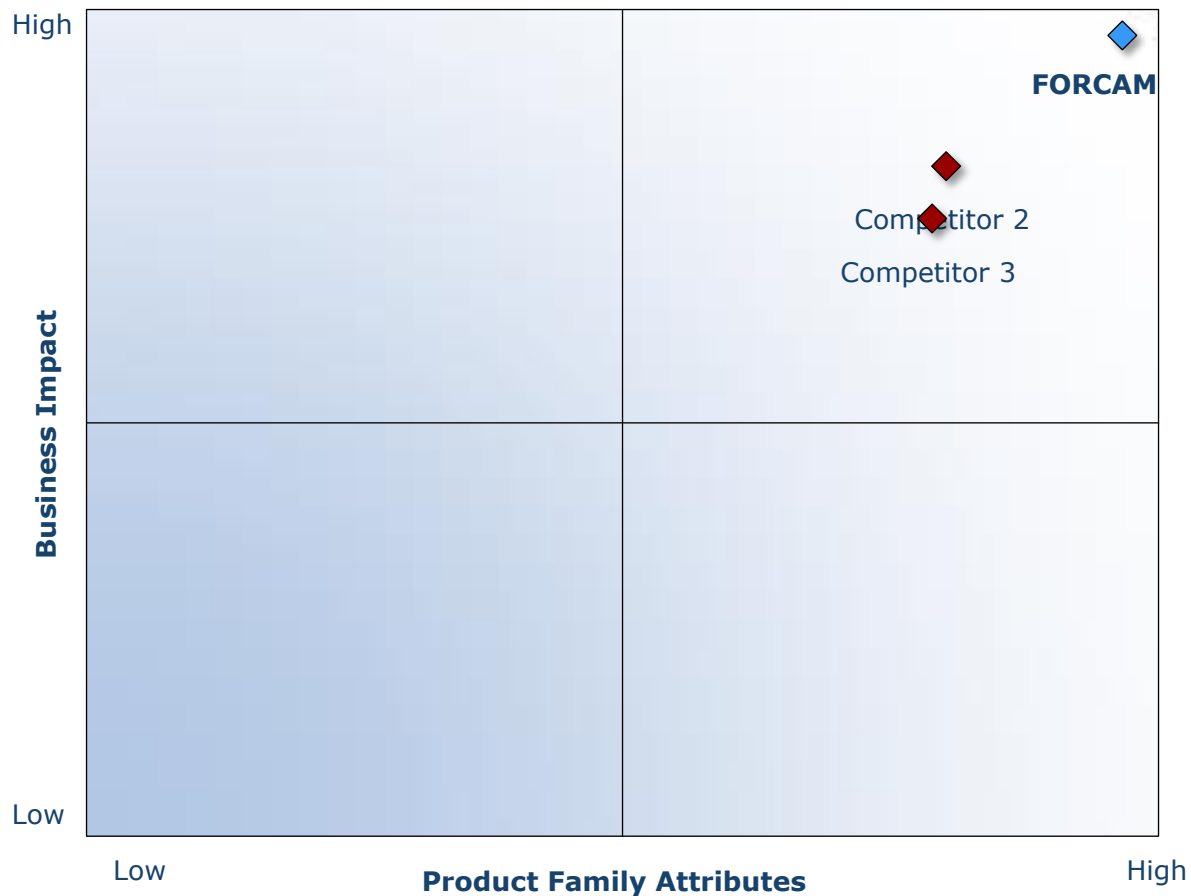
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan analysts follow a 10-step process to evaluate Award candidates and assess their fit with select best practice 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 globe	• Conduct in-depth industry research • Identify emerging sectors • Scan multiple geographies	Pipeline of candidates who potentially meet all best-practice criteria
2	**Perform 360-degree research**	Perform comprehensive, 360-degree research on all candidates in the pipeline	• Interview thought leaders and industry practitioners • Assess candidates' fit with best-practice criteria • 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-practice criteria • Examine eligibility of all candidates • 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 • Invite multiple perspectives on candidates' performance • Update candidate profiles	Final prioritization of all eligible candidates and companion best-practice positioning paper
5	**Assemble panel of industry experts**	Present findings to an expert panel of industry thought leaders	• Share findings • Strengthen cases for candidate eligibility • 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 • Pressure-test fit with criteria • 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 • Write nominations • 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-practice Award recipient	• Review analysis with panel • Build consensus • Select recipient	Decision on which company performs best against all best-practice criteria
9	**Communicate recognition**	Inform Award recipient of Award recognition	• Announce Award to the CEO • Inspire the organization for continued success • 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 • Design a marketing plan • Assess Award's role in future 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 our 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, leading to 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.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to 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 practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.

Contact FORCAM

With rapid growth industrial growth around the world coupled with a focus on production efficiency manufacturers understand that staying ahead of the competition and meeting the growing need for finished products requires leaner production through technological investment. Manufacturers must rise to the challenge of smarter production and proactively drive greater capacity, speed to market, and overall competitiveness.

To learn more about FORCAM's products, services, and initiatives in business and community, please visit https://www.forcam.com/en/