

LIFT WWA

Spring 2018

INNOVATIONS IN AEROSPACE

FEATURE: Creating a Culture of
Continuous Improvement

The Wild Wild West of Blockchain

Flying High – Additive Manufacturing

EDITOR'S NOTE

The theme for the Spring issue of LIFT WA is Innovation in Aerospace: The Digital Age. It's timely. Innovation—in its forms of technology enhancements for processes, integration, manufacturing, and more—is culminating in disruption in nearly every aspect of the industry.

Our feature article, *Creating a Culture of Continuous Improvement at ATS*, highlights the value of embracing technology and innovation, perpetuating them throughout business processes and practices, and embedding them within the culture of the organization. ATS' Velocity program, a turnkey technical fleet integration service, is an example of how implementing a technology platform can increase efficiencies and provide a higher value to customers.

Blockchain and artificial intelligence (AI) have the potential of syncing organizationally or on a business-to-business level. From predictive maintenance, process improvements, parts certifications, recruiting, supply availability, "smart" contracts, and more, these technologies look to be the next wave of high tech that will change the way aerospace companies do business.

The convergence of such technological advances and those on the shop floor—as in additive manufacturing—and in the deployment of strategic initiatives for workforce development—such as in apprenticeships and STEM, particularly in the K-12 environment—reveal a fundamental shift and opportunity for the future of aerospace on many fronts.

In essence, it is time for **Being BOLD in the Age of Innovation**. The theme of AFA's 13th Annual Governor's Aerospace Summit, **BOLD** are the **Big** Ideas, **O**pportunities for Growth, **L**eading the Way, and **D**isruption (markets, thinking, technology, processes, innovation, materials, etc...) in aerospace. **SAVE THE DATE:** October 10, 2018, at the Lynnwood Convention Center.

The highly anticipated announcement by Boeing of whether they will develop the 797, or NMA (New Mid-Market Airplane) continues to be a hot topic. Yet, even

as Boeing contemplates its next move, AFA is co-leading the Governor's Choose Washington Council for the NMA with the goal of winning the design, build and assembly of the aircraft. Further, AFA is Being Bold by bringing industry suppliers and businesses together in a way never done before for new airplane development. The AFA NMA Supplier meetings are designed to strengthen the supply chain while identifying value that may be included in the Choose WA proposal.

We are delighted to announce that Dr. Ashish Kumar, CEO and founder of Zunum Aero, has joined the AFA Board of Directors. Zunum Aero is preparing to fly its first 12-seat hybrid-electric airplane in 2022. As it seeks to cut regional travel times in half, Zunum is scaled to cut emissions by 80 percent while flying up to 700 miles at an estimated low cost of eight cents per seat mile (\$250 an hour).

The future of aerospace is being led by those who embrace technological advances, are able to innovate with low environmental impacts, and who figure out a way to create value for their customers, all the while creating margins that align with a strong business case. AFA continues to work on your behalf to help make this possible.



Kelly Maloney
LIFT WA editor
AFA president and CEO



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IN THE AGE OF
INNOVATION

13th Annual Governor's **AEROSPACE SUMMIT**

— 10.10.2018 —

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Innovation in Aerospace The Digital Age

Feature Story

Creating a Culture of Continuous Improvement at ATS

Aviation Technical Services (ATS) provides a broad and growing portfolio of technical services in MRO, Engineering, Component Services and Parts Development worldwide. Since its founding in 1970, ATS has become one of the largest independent MROs in North America serving over 100 airline and OEM customers globally. The company's growth is largely due to its culture of continuous improvement, its ability to anticipate customer needs, and its capacity to empower innovation in a very competitive market.

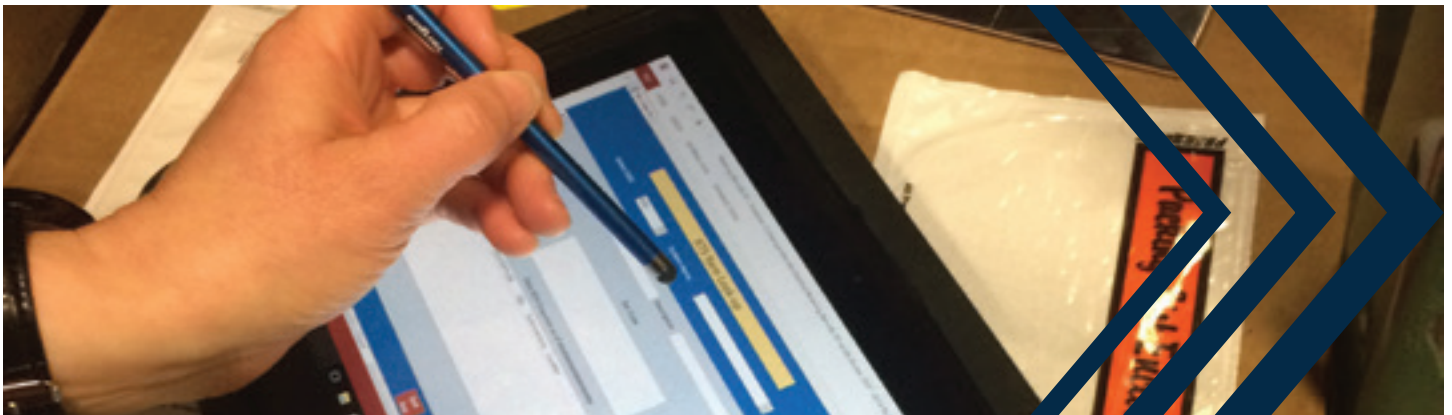
The MRO industry is faced with cost pressures such as rising wages, offshoring, and decreasing turnaround time requirements from OEMs and commercial customers. In the face of these pressures, ATS has consistently made process improvements and used technology applications to deliver higher efficiency and industry-leading turnaround times. This commitment to continuous improvement is driven throughout the organization.

In fact, ATS was recognized for its achievements in this area in 2016. ATS received Aviation Week's MRO of the Year Award (Leading Independent Organization) for a span time reduction program called Velocity. A turnkey technical fleet integration service, Velocity uses technology and standard work improvements that enable our customers to accelerate capacity growth through introduction of mid-life aircraft to their fleet more quickly. Through efficiency and innovation, ATS decreased turnaround times for our customer Southwest Airlines by 65 percent, and they now benchmark their other MROs off of our span times.

Velocity was so successful for customers in reducing waste and increasing efficiency that an investment was made to take this program to the next level, expand it across the organization and embed it in the company culture. ATS decided to expand this program to other aircraft types, including Airbus, and across the four business units by creating an Operational Excellence team. Operational Excellence means that improvements are being made throughout the entire value stream in order to standardize the process improvements, make them predictable so that we can commit to the span time reductions, allowing our customers to capture the benefit of aircraft returning to revenue production faster.

I lead the Operational Excellence team, which is a little different than a lean office because we deal with the people aspect more directly and purposefully than simple lean conversion. Its goal is that each and every employee possesses the ability to seek value in what they do every day to create value to the customer. Where the value chain breaks down, we want employees enabled to initiate and take action to fix it. By putting people first, ATS is empowering innovation on every level.

Operational Excellence requires that all employees look at this from the same mindset, so everything is measured, tracked and shared. ATS currently uses digital tools such as tablets for inventory management, electronic work orders and quality control sheets which gives employees the information they need at their fingertips versus having to walk back and forth to a stationary computer. Visual tools, such as large LED screens, give ATS the capacity to view all of the work that's going on





“Our ability to execute operational excellence across the company will allow for future growth as we become a one-stop shop for customers.”

“ATS currently uses digital tools such as tablets for inventory management, electronic work orders and quality control sheets which gives employees the information they need at their fingertips...”




and displays the work flow metrics in real time. Barcode scanners are also being used to increase efficiency. Using these tools ensures that ATS is embracing the efficiencies enabled by the digital age so that we are always delivering a quality product in the most efficient manner.

As we look to the future, we will use technology and innovation to do the things that don't require that brainpower of human intelligence so that we can keep our people focused entirely on value-added activities. A simple example might be how we get kits up in the airplane to the mechanic. ATS may use robots to move product around versus a person – which frees up employees to add value in another way. And just as importantly, this maximizes employee safety by minimizing twisting, turning and lifting. This efficiency is passed on to our customers and helps them create revenue by returning their assets to service faster.

Our ability to execute operational excellence across the company will allow for future growth as we become a one-stop shop for customers. ATS is known for our expertise and ability to meet any challenge on the B737 aircraft because we've been working on them for years, but our success comes from taking that knowledge, turning it into best practices, and using innovation and automation to expand it across the company. Being a one-stop shop not only allows us to offer a breadth of capabilities, but also it offers control so that we know what we are committing to so that we can meet those commitments. Additionally, our goal would be to provide those services in a way that it is cost-competitive and of the highest quality.

Last year, CEO Matt Yerbic was recognized as AFA's Executive of the Year because of his leadership within the aerospace industry and at ATS. Under Matt's leadership, ATS has experienced rapid growth and plans to continue

on the same path by embracing the operational excellence program. We are taking what works well, continuing to improve it, and expanding it across the company. It's a cycle of continuous improvement. All employees feel a part of the momentum to deliver increased efficiency, higher quality, and better customer service – for both internal and external customers. Technology will continue to evolve, but we will be right there with a new process to introduce it, and then pass those efficiencies on to our customer. We are playing to win, not playing to not lose. The whole plan and transformational steps are outlined on the walls in my office. But that's not the secret. The secret sauce is in the people and how we do it. 



Carla Bowman, Senior Director - Operational Excellence

With ATS since 2017, Carla has worked in Aerospace for 40 years and has an extensive background in OEM, fabrication, MRO operations and supply chain. Carla has held positions from the shop floor to executive leadership, driving continuous improvement throughout all levels of the organization in order to improve competitiveness and set new benchmarks for efficiency. Above all else, Carla believes in work/life balance and making each day count.

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The Wild Wild West of Blockchain

How Aerospace can ride the blockchain revolution for increased efficiencies.

We have all been asked the question, “If you could go back in time and live in a particular era or decade, which would you choose?” If you’re like me, you carefully weigh the pros and cons. The roaring 20s would offer great music, but also prohibition. In the Jurassic period, you could camp with dinosaurs, but that also means THERE WOULD BE DINOSAURS! After internal debate, I tend to land on **The Wild, Wild West**. Riding horses, shooting guns and exploring the undiscovered sounds like my kind of adventure.

We are at a point in time that resembles the Wild, Wild West when it comes to blockchain. Some articles liken blockchain to the internet in the 90s, but I prefer to live in a more sensationalized state of mind where coders are cowboys and the new gold is cryptocurrency.

Blockchain is not just Bitcoin or cryptocurrencies, it is so much more. Simply stated, the blockchain distributed ledger technology is a database of transactions that is shared and synchronized across multiple computers and locations – without centralized control. Blockchain databases can include certifications, loans, identities, logistics manifests – almost anything of value.

Often these transactions are routed through third-party intermediaries, making processing time-consuming and expensive. Blockchain technology enables true data sharing by omitting the intermediary, dramatically speeding up multi-participant transactions and lowering costs, while ensuring all parties are protected.

With reductions in processing time and increased transparency and security, blockchain poses significant potential just like the gold rush offered prospectors the opportunity of unimaginable fortunes. Similarly, while not all prospectors found fortune, blockchain is not a good fit for every process or transaction.

To help our teams determine if we’ve struck gold we ask these questions.

- Do I have a need to share transactional data?
- Are there multiple parties that are generating transactions to modify the database?
- Is there an absence of trust? Am I not willing to let another modify database entries?
- Would removing an intermediary expedite the process?
- Do interactions require the completion of a transaction?





We have been working with our customers and partners in the A&D industry ecosystem to identify and define how blockchain can best be leveraged in our unique sector. A couple of use cases our team is exploring include:

- Building trust and transparency in aircraft manufacturing and operations by leveraging blockchain to maintain secure certifications for parts, products, personnel and organizations.
- Increasing security and trust in a complex multi-tier supply chain with end-to-end data integrity and provenance.
- Simplifying contract management with collaborative “smart” contracts for a scalable system of record.

Even though it is not quite the frenzy of 1849, it’s still exciting to see how blockchain technology can impact our industry. As Industry 4.0 rolls out across the plains of the aerospace and defense industry, we get the opportunity to slip on our cowboy boots, mount our horses and begin exploring the new frontier.

So the only question that remains is — when the dust settles, where will you be — on the Oregon trail without an ox or a passenger on the Transcontinental Railroad? 



Maggie Nelson

As a member of SAP Aerospace and Defense Industry Business Unit, Maggie enjoys leveraging her experience as a helicopter pilot and a passion for amplifying the customer voice to help aerospace and defense companies imagine, define and drive their digital transformation strategies.



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AI's March Toward Democratization



The concept of artificial intelligence (AI), and its continued march toward democratization, has been taking shape around the world since 1955 when American computer scientist and cognitive scientist John McCarthy first coined the phrase.

For consumers, AI has gradually become a normalized part of their everyday lives—from Netflix recommendations to TurboTax, we constantly interact with AI in ways meant to enhance our experiences.

While consumers have flocked toward intelligent products and applications, business and industry have been reluctant to embrace it.

But all that is changing. 2018 is gearing up to be a game changer in the adoption rate of AI, with large and medium-sized companies incorporating AI into their processes, production lines, services and products.

In aerospace, the promise of the benefits of AI is legitimate, so much so that it has almost become synonymous with the definition of “innovation” itself. The advantages of AI include operational efficiencies, such as improving internal processes, new product design, helping with training and other functional duties, as well as applying analytically driven data to increase quality assurance.

As aerospace OEMs, suppliers, MROs, and airlines integrate AI into their processes, these organizations are beginning to understand the magnitude of its promise.

“We see digital as a big growth opportunity for us, a big part of our future, taking it off the aircraft, analyzing it, and making it help us be more efficient,” said Jody Franich, vice president of Boeing Global Services Supplier Management at the March A&DSS conference in Seattle.

Franich’s hope for more efficiency is perfectly timed with the third wave, or third generation, of AI, which has to do with “deep learning” or machine consciousness. Deep learning allows the AI system to analyze data from multiple interacting systems, associate these data to form relationships or patterns, and therefore make predictions about machine behavior that can make processes more efficient and predictive, ultimately resulting in saving lives, time or money, to name a few of the possible benefits.

However, before AI is able to “think” about and prevent mechanical issues, it requires input from technology that monitors a machine’s or an environment’s processes: Enter super-sensors. Super-sensors have the ability to track heat, movement, vibration, sound, weight, light, and speed without the need for thousands of individual sensors all over the room or machine.



Carnegie Mellon University (CMU) has embarked on a Synthetic Sensor project, underwritten by Google, which is applicable to aircraft. Potentially, super-sensors could be installed directly in an aircraft, or on the assembly line, and could be able to assess whether an engine is functioning normally based on vibrations or temperature.

As thousands or millions of individual variables are brought together, they form information that is greater than their individual parts. These parts can conceivably be utilized through a process called generative design; the concept of an AI engine examining all variables and contemplating all resulting scenarios in order to accomplish the best outcome.

A tremendous amount of progress has been made in regard to AI in the 63 years since McCarthy ushered the concept into the minds of those ready to embark on this journey; yet there is still so much more left to be explored, deployed, adopted and conquered. Only the future knows what heights AI can help us reach. ▲



Madeline Maloney has been writing industry-specific content since 2011, with articles on health care, food culture, aerospace, and education. She received her Masters in teaching in 2013 from Seattle University.



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Flying High

Additive Manufacturing is Changing the Face of the Aerospace Industry

In this exclusive interview, Scott Sevcik, VP Manufacturing Solutions at Stratasys, offers his insight on how additive manufacturing continues to impact the aerospace industry and what we can expect from the technology moving forward.

“The impact on the aftermarket is, perhaps, even more dramatic.”

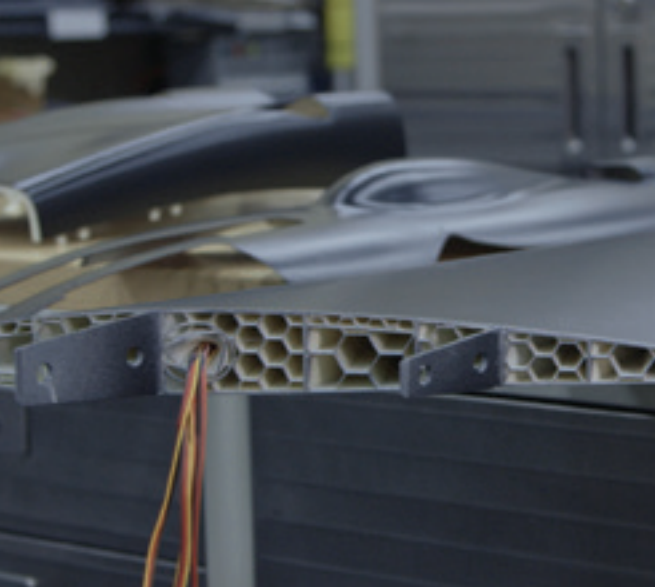
1. What makes additive manufacturing such a good fit for the aerospace industry in particular?

Additive manufacturing technology, such as that offered by Stratasys, helps aerospace manufacturers reduce costly design challenges, and downtime, while innovating faster, testing more thoroughly, and producing customized, flight-ready parts. The aerospace industry is constantly pushing technological boundaries to reduce weight and increase vehicle performance. Additive manufacturing accomplishes those goals.

Aerospace component production is a low-quantity, high-value operation. Because the quantities are low, users receive less mass-production benefit as they aren't amortizing tooling and development costs over as many units. With additive manufacturing of production parts, there *is* no tooling to amortize. Therefore, at aerospace quantities, the technology is often a lower-cost alternative to traditional manufacturing methods.

2. How has the relationship between additive manufacturing and the aerospace industry evolved in recent times?

We have been working closely with aerospace OEMs for years. The use of the technology continues to take steps forward. Stratasys' ULTEM 9085 material caters specifically to the needs of the aerospace industry. This material provides high strength-to-weight ratio and meets flame, smoke and toxicity requirements for aircraft interior applications. We're now seeing more aircraft OEMs and interiors OEMs adopt our applied additive technologies to meet their supply chain efficiency and low volume custom production needs.



For example, our relationship with Airbus stretches back several years. We collaborated with them first to prove feasibility on FDM technology for flight-ready parts, and now Airbus has serial production 3D printed polymer parts on their A350 XWB aircraft.

We continue to help customers innovate and advance their industries. In June 2017, we announced a technical partnership with BOOM Supersonic, providing additive manufacturing expertise to enable the company to make its supersonic goals a viable reality through 3D printed tools and printed parts on-vehicle.

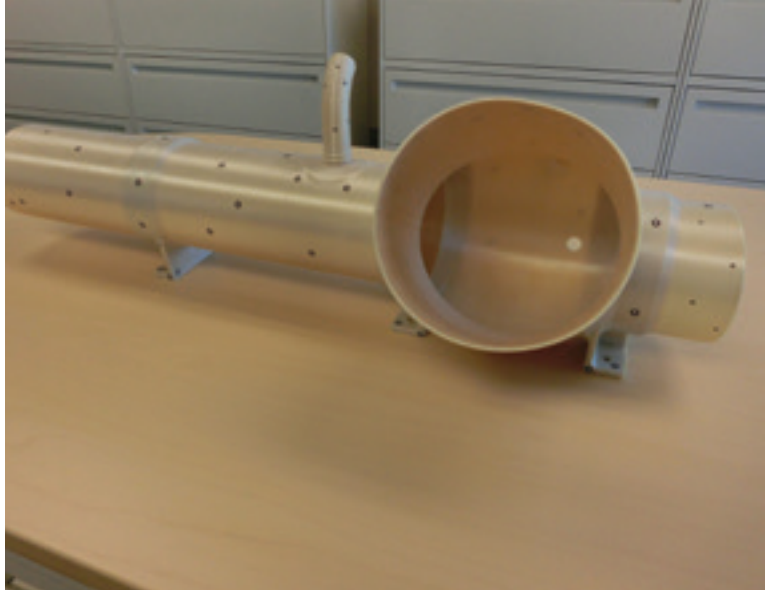
3. How does 3D printing improve supply chain flexibility?

3D printing completely redefines the economics of a make/buy decision. Instead of making one decision during the development phase about producing or buying a certain part, access to additive manufacturing technology enables you to make that call at every procurement. Based on current capacity and the urgency for the part, you can choose to produce it within your own facility or outsource it to a qualified supplier. The ability to produce the same part on another qualified machine allows you to move around production for better efficiency and risk reduction.

The impact on the aftermarket is, perhaps, even more dramatic. We have already seen obsolete parts replaced with reverse engineered 3D printed parts, and that has a significant impact on how operators are viewing the long-term implications of 3D printing. Imagine eliminating the tens of billions of dollars in inventory sitting idly on shelves around the world waiting for an aircraft-on-ground. When you can print a tool or a part, those tools and parts can be stocked digitally and produced on demand.

4. What are the challenges for additive manufacturing in the aerospace industry?

Process repeatability is the key. At this year's Paris Air Show, we launched our specific system for this market: the Aircraft Interiors Certification solution. This is based on the Fortus 900mc Production 3D Printer, designed specifically for producing aircraft interior parts that will need to meet stringent FAA and EASA certification requirements. We've incorporated the FDM ULTEM 9085 material and a new edition of the Fortus 900mc Production 3D Printer with specialized hardware and software, which is designed to deliver highly repeatable mechanical properties. The unprecedented level of part-to-part and machine-to-machine repeatability is establishing Stratasys FDM as the first mature manufacturing technology in additive. 



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Scott Sevcik is the vice president of Manufacturing Solutions for Stratasys. In this role, he is responsible for defining and developing the Stratasys product offering for high requirements manufacturing industries.



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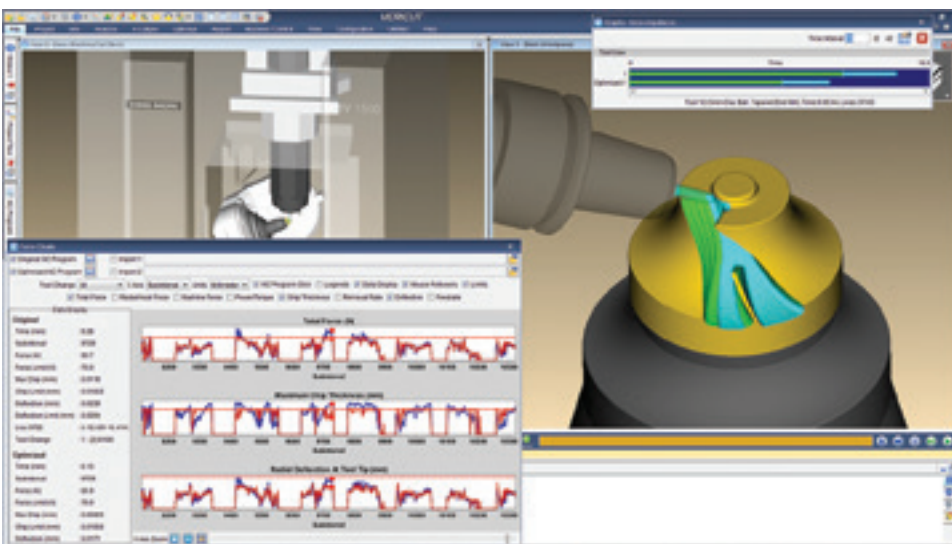
Gain Competitiveness Through High Efficiency Machining and Additive Manufacturing

To stay competitive in the global marketplace, aerospace manufacturing companies must create parts as quickly and efficiently as possible, and at the lowest conceivable cost. For machined parts, achieving the shortest cutting time is often related to feed rates, but that is only one of many factors. High-efficiency machining – choosing the optimal machining methods, while maximizing cutting tool and machine tool performance – are the real goals for modern day manufacturing. Additive Manufacturing (AM) is also now a viable manufacturing option, but many companies find it difficult to determine when it's a good fit.

Aerospace parts typically have very tight tolerances, so preventing small errors/gouges are important in the manufacturing processes. NC programs in this industry can be very long. Therefore, offline verification is key for high productivity by keeping expensive CNC machines running and making production parts, instead of wasting time proving out new or modified NC programs. Also, with more manufacturing methods available to create parts (machining, AM, hybridized methods, etc.), simulation software provides valuable information to help shops predict manufacturing times and maintain optimal production rates.

Aerospace shops are constantly being squeezed by increasingly compressed time schedules and reduced product costs (a double whammy), so they are looking for ways that can help them work leaner and faster. Focusing on the machining process, cutting tool suppliers have noted that maximizing chip thickness is the most important parameter for achieving a productive and reliable milling process. Effective cutting can only take place when maximum chip thickness is maintained at a value correctly matched to the cutter in use. A thin chip is the most common cause of poor performance resulting in low productivity. This can negatively affect tool life and chip formation. However, a chip thickness that is too high will overload the cutting edge, which can often lead to tool breakage. The degree to which this important advice is followed can dramatically impact how well machining is performed, influencing cutting tool life, and even impacting the resulting quality of machined parts.

Physics-based NC program optimization software is now available that micro-analyzes cutting conditions and optimizes program feed rates to achieve ideal chip thicknesses as much as possible, but without exceeding the tool's force limits, or the machine's available spindle



Physics-based NC program optimization software creates the most effective NC program possible by maintaining a content chip thickness while cutting.

power. This optimization technique creates the most effective NC program possible for any given cutting tool, in a particular stock material, and the machining conditions encountered. The result is significant time savings, higher quality parts with better surface finishes, and improved cutting tool and machine life. Charts in the software provide NC programmers with unprecedented viewing of the cutting process and related data. Excessive or potentially dangerous conditions appear as peaks or “spikes” in the chart graphs. Underutilized cutting tools (“areas of opportunity”), spindle power and torque requirements, and tool deflection can all be quickly identified and analyzed. This proactive analysis and optimization of NC programs makes them as efficient as possible the first time they are sent to the shop floor to be run on the CNC machine.

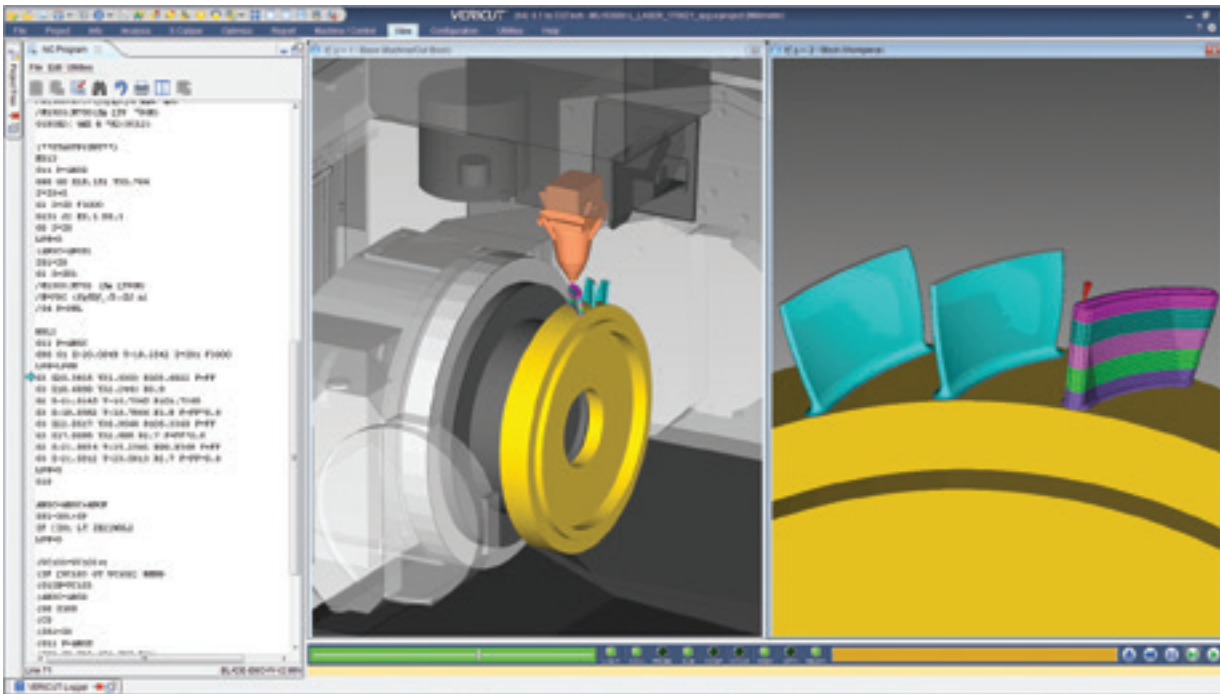
Another area of interest has been Additive Manufacturing. It’s now possible to simulate both additive material deposition, and traditional machining capabilities of new hybrid CNC machines, all in one simulation session.

A material deposition head on hybrid machines can make building certain precision parts easier and faster. And with additive programming software becoming more capable, there is a new trend: the desire to simulate any manufacturing process (additive, milling, turning, welding, etc.) in any order, to obtain the confidence to know it will ultimately add up to make the final part that was intended.

In addition to the usual NC programming problems – such as gouges, crashes with fixtures/clamps or machine components – additive programmers also must contend with AM-related parameters not being correct, such as laser activity, power, material feed, flow rate, and shielding gas activity. On top of all of that, additive hybrid machines are typically very expensive so shops using these machines do everything possible to protect their investment.

The need for more comprehensive simulation is further reinforced by most additive processes, requiring further machining (often referred to as post-process machining)





Software can simulate both additive material deposition and traditional machining capabilities of new hybrid CNC machines, all in one simulation session.

to achieve desired tolerances and surface finishes on at least some part features. This pushes simulation needs to a new level where additive process and post-process machining operations need to be simulated end-to-end, thus verifying the entire process. Simulation software also makes it possible to test various alternate manufacturing methods to help determine which will produce the best part while maximizing use of available CNC equipment.

Technology available today makes it possible to produce aerospace parts faster than ever before imaginable. But to do the best job for every scenario, companies will want to ensure their verification, simulation, and optimization software is all driven by the same NC code that will drive the actual CNC machine, thereby ensuring the highest level of profitability possible. ▲

Simulation software also makes it possible to test various alternate manufacturing methods to help determine which will produce the best part while maximizing use of available CNC equipment.



Bryan Jacobs -
 Bryan was CGTech's Marketing Manager for VERICUT software from 2004 through 2016. In 2017 he transferred to a sales role covering the Pacific Northwest and globally as the Boeing Account Manager.



Image: Aaron Ferrell | Aerospace Joint Apprenticeship Committee (AJAC). Pictured: Trevor Mackey, Production Technician Youth Apprentice from CubCrafters.

Career Connect Washington

The possibilities are thrilling.

Washington is a place of extraordinary opportunity and our future looks bright. In the next five years, our state expects 740,000 job openings for skilled workers. We should feel great about how many options for good jobs our children and grandchildren will have.

While the opportunity is there, we have a problem. Many of our students will not qualify for those jobs at all. Most of those jobs will require more education and training than a high school diploma. The latest data show that only 31 percent of Washington state students earn any kind of postsecondary credential before turning 26. That means that 70 percent of our high school students are not accessing many of the good paying jobs available right here. In aerospace and many other industries, good jobs

go unfilled or are filled by people from outside the state, while too many young Washington residents do not move past high school education.

Career Connect Washington aims to change this.

What is Career Connect Washington?

Washington already has successful programs that address this issue within specific industries, age ranges, and skillsets.

Aerospace in particular has leveraged career-connected learning to prepare students for career opportunities. These programs are both employer-led efforts (Boeing's CorePlus) and state-funded (Aerospace Joint Apprenticeship Committee).

Career Connect Washington is an initiative of the Governor to create a 10-year vision and strategic plan for a nation-leading career connected learning and apprenticeship system.

Aerospace has shown us how to do this within an industry; Switzerland has a model for how to do it across a population. The Swiss start exposing students to exciting industries and careers in primary and secondary school. They also connect students to a variety of education pathways where they can achieve postsecondary credentials, four-year degrees, and more. In Switzerland, 70 percent of young people choose apprenticeship pathways to continue their education.

Aerospace has shown us how to do this within an industry; Switzerland has a model for how to do it across a population.



Image: Aaron Ferrell | Aerospace Joint Apprenticeship Committee (AJAC). Pictured: Raquel Taijito, Production Technician Youth Apprentice from Tool Gauge.

As a result of their career-connected education system, Switzerland has one of the lowest youth unemployment rates among developed countries.

How This is Working in Washington

We are at the very beginning of this journey. The Swiss approach is one model, but to design a fully integrated career-connected learning system that will work for Washington, Career Connect Washington is engaging a diverse group of leaders across the state.

At the forefront of this initiative is a business and philanthropy leadership steering committee, with industry sector leaders from Boeing, Alaska Airlines, Microsoft, Amazon, Kaiser Permanente, Juno Therapeutics, Saltchuk, SHE America, AGC, MacDonald-Miller, Avista, and more. Education and government groups are closely involved, as well as regional working groups, and other experts throughout the state.

Success will require collective action to break down barriers in policy, funding, and the perception of career-connected learning. We all have a role to play.

- Businesses will need to invest in the talent pipeline and trust that collaboration will yield better results.


- The education system will need to recognize career readiness as a measure of student success.
- Government will establish policy and provide funding to encourage innovation, cooperation, and career outcomes throughout the state.

And finally, students and families will have the opportunity to pursue high-quality, career-connected education.

The Pay Off

In return, businesses will see a large and diverse pool of Washingtonians ready to fill high-demand careers. Educators will have the tools to better engage and prepare students for their futures. And most importantly, future generations of students will have more options to build careers that fulfill and sustain them.

We have the chance to help Washington state students develop both a vision for their future, and the knowledge they need to take them there.

We know that getting there will take time and committed action. The possibilities, however, are thrilling. 

"Seeing education models around the globe, the Swiss model in particular, gave me an appreciation for a broader set of pathways to move students through their education and into rewarding careers. That means, among other things, increased use of apprenticeships and other types of structured career-connected learning.

I look at the industries in Washington and I see companies who are hungry to hire local, trained, diverse talent. I see students who want to start learning skills and getting that experience at a younger age. Career Connect Washington can build a system where employers, families, educators, government agencies, and others work together to train and grow talent in our state that directly connects to great jobs for our people."

~ Suzi LeVine
United States Ambassador to
Switzerland and Liechtenstein (Ret.)



Maud Daudon, Executive Leader of Career Connect Washington
She chairs the Washington State Student Achievement Council and was previously the CEO of the Seattle Metropolitan Chamber of Commerce.

Aerospace Suppliers and Businesses

JOIN AFA IN LEADING THE WAY FOR THE NMA

AFA: Being BOLD to win the NMA

Even as Boeing considers the feasibility of developing a New Mid-market Aircraft (NMA), AFA is leading the way to get the design, production and assembly in Washington state.

Industry engagement in this effort is essential, and our work includes efforts to strengthen the supply chain. AFA is convening Washington aerospace suppliers and other aerospace businesses to identify the **Big Ideas** that could help shape the proposal being made to Boeing.



WA Aerospace Suppliers and Businesses:

Help shape the proposal being made to Boeing to Win the NMA!

RSVP at AFA-WA.com/NMA to participate in AFA's NMA Supplier Meetings.

Washington: The NMA home team

AFA is also co-leading the Choose WA NMA Council, a multi-pronged, broad-based, statewide campaign led by business, labor, education, economic development, and elected leaders.

We know that Washington offers the lowest risk and highest return on Boeing's potential investment to design, produce, and assemble the NMA.

If Washington is chosen, it will ensure that we remain the global aerospace leader for another generation.



Washington's record of success in supporting the aerospace industry speaks for itself.

Together, we...

Built **29,228** commercial and military aircraft over the last century.

Delivered **10,000 737** single-aisle jets from Boeing's Renton plant.

Assemble more than **90%** of all commercial aircraft in the United States.

Rolled out **714** planes from WA factories last year – **15x** more than our closest competitors.

Produce the largest composite wings in the world at Boeing's Composite Wing Center.

Advantages that set our aerospace industry apart...

- There are more than 1400 aerospace and related companies in WA, including machine shops, robotics, plastics, manufacturing, design & engineering, tooling, maintenance repair operators, and other related businesses.
- The aerospace culture of innovation has resulted in businesses and R&D firms focused on high tech, space, unmanned aerial systems, artificial intelligence, robotics, supersonic jets, hybrid-electric aircraft, and aviation bio-fuels.
- Workforce training programs and engineering programs – supported by industry, labor and by the state's universities and community and technical colleges – are churning out a steady stream of newly qualified workers.
- The property, plant, and equipment – and supplier network – are in place.
- We offer an experienced and stable aerospace manufacturing workforce – unmatched anywhere in the world.





Closing the Workforce Development Gap, One Robot at a Time.

Get involved in the sport where every kid can go pro!

FIRST (For the Inspiration and Recognition of Science and Technology) Washington engages youth ages 6-18 in exciting mentor-based programs that build science and technology leaders. Along with 5,500 mentors and event volunteers, we serve 11,500 youth on 1,140 teams across 130 school districts in 33 of Washington's 39 counties.

While this is a powerful statement, it is not enough. With nearly 1.1M K-12 Washington State students, the opportunity for growth is significant. Over 100,000 students are eligible to graduate each year, and yet Washington State employers are forced to look out of state to fill positions. Washington employers agree that in the next five years, 740,000 jobs in our state need to be filled and they want these jobs filled by locally grown talent.

At FIRST, youth can progress through four programs that use project-based learning: FIRST LEGO League Jr. (grades K-4); FIRST LEGO League (grades 4-8); FIRST Tech Challenge (grades 7-12); and FIRST Robotics Competition (grades 9-12). Our programs stand out among other programs in that they immerse youth into a real-world engineering



FIRST LEGO League
The Rose Dragons,
is an all-girls team from
Bellevue, WA. They have
since progressed to be
a FIRST Tech Challenge
Team 12506.



FIRST Robotics
Competition Team 4061
aka the PART SciBorgs
hails from rural Pullman
in eastern WA.

experience, a subculture of STEM that they can't get in a traditional classroom. Under the leadership of a coach/mentor, youth form teams, meet regularly to solve a challenge, and participate in friendly sports-like competitions throughout the year. Our programs use robotics as the vehicle for students to learn to experiment, deal with failure, research a problem, and learn valuable career, communication, and teamwork skills. Students as young as six apply this learning to design a robot around an annual challenge that is applicable to the real world.

While "robotics" may not be for everyone, kids are immediately drawn to the robot, which means kids from all abilities, economic circumstances, and ethnicities become engaged. The thrill of competition and playing a competitive sport that is built on science, technology and teamwork has the potential to outpace competitive sports such as soccer, football, basketball and lacrosse.

FIRST participants are 50 percent more likely to go to college, and twice as likely to major in a STEM field. Roughly 40 percent of FIRST participants come from Title 1 schools, which have a higher percentage of disadvantaged kids. Forty-four percent of FIRST participants are minority youth. Through our Girl's FIRST Initiative, we have increased the number of girls participating from 28 to 36 percent across all four of our programs. Our goal is to reach 50 percent.


Our vision is for every youth in Washington state to have the opportunity to participate in a FIRST program and to serve 22,000 youth by 2022.

Take a few minutes to get to know one of our teams, by watching the SOTABots Story at www.firstwa.org.

Boeing is betting its future on FIRST and FIRST Washington and we invite every member of AFA to get involved. Together we can cross the chasm of engaging all Washington state schools. Here is how you can help:

1. Help educate state lawmakers about FIRST programs and the impact we are having in building a local workforce for aerospace.

2. Volunteer with FIRST Washington. There are students who need your time and talent. It will be a rewarding and impactful experience for you as well.
3. Donate. All donations to FIRST Washington support teams. Donations may be restricted to a specific team or geographic area while unrestricted donations are allocated to teams with demonstrated need.
4. Join us for our annual FIRST to Change the World fundraising events. Wednesday, May 30th 7:30-9AM in Spokane and Friday, June 1st 11:30AM – 1PM in Bellevue. Register at www.firstwa.org.

In our programs, students have the hardest fun of their lives. Together we can close the workforce development gap and ensure that young people are ready for Washington state's jobs of tomorrow. To get involved with FIRST Washington please visit: www.firstwa.org 



Erin McCallum, president - FIRST WA

Erin works closely with individuals, businesses, trade associations, and public entities who share the passion in helping kids ages 6-18 to become leaders in science and technology through team and mentor based experiences. Ms. McCallum has spent 25 years successfully raising more than \$170 million for a number of high-profile community organizations in Washington state. She is a fourth generation Washingtonian, born and raised in Yakima, and is forever inspired by her husband, their three teenagers and the many animals on their North Bend farm.



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TOGETHER, WE GO HIGHER.

When we work together to create better opportunities for all, the possibilities soar. Boeing is proud to work with 1,700 suppliers and partners in Washington, spending about \$6 billion. Thank you, Boeing suppliers, for supporting the delivery of 748 airplanes last year.

