

Washington Manufacturing Alert

The Newsletter
Of The State's
Most Important Industry

Vol. 12, Issue 10
May 4, 2020

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Aluminum: Once Hot Metal Cools Off, Maybe For Good

The last operating aluminum smelter in the U.S. Northwest is shutting down, and there's no telling whether it or the once sizable Northwest industry it was a part of will ever return.

Alcoa termed its plan for the Intalco smelter in Ferndale, Whatcom County, a "curtailment," but hedged on whether that means the smelter might restart someday.

"It doesn't mean — or we don't mean to project forward

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Life After Coronavirus

Will Manufacturing Change Because Of The Pandemic?

BY BILL VIRGIN
Editor/Publisher

At the moment, Covid-19 is the dominant factor of influence of virtually every aspect of business.

But what happens when that moment has passed? Will the changes for manufacturing be permanent and if so what will they be?

We asked some manufacturing experts, and here are their thoughts:

Matt Wicks, chief robotic solutions architect at Honeywell Intelligrated, and chair of the Robotics Industries Association.

Covid-19 will have short-term impacts on manufacturing operations. Many companies are repurposing existing manufacturing lines and flexible automation tools to increase the fabrication of personal protective equipment and other essential supplies as well as shifting their manufacturing to address shifts in the rapidly changing consumer demands. Companies are also turning to robotics and automation to fill the manufacturing and supply chain gaps that have been generated by changes in consumer spending.

In the near term, facilities such as distribution centers will normalize their labor and drive toward resuming their operations. This is when organizations should be reflecting on the impact of this disruption and how their operations can be more resilient as well as how they can address the challenges with the labor market.

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Covid-19 News Wrap-up: Boeing Downsizes Itself

In a move that signals the regional commercial-aerospace sector is likely to be in contraction mode for months if not years to come, Boeing announced plans to cut both airplane production rates and employment.

Boeing Chief Executive David Calhoun said the company is reducing employment overall by 10 percent, or about 16,000 positions, through voluntary and involuntary layoffs and attrition. The cuts will fall hardest on the commercial airplane and services divisions and on corporate services, which will see reductions of more than 15 percent. That means the cuts will be particularly felt in Washington state, where Boeing had 71,829 employees as of Jan. 1.

In terms of plane production, Boeing said it will restart assembly of the Renton-built 737 Max at "low rates," building to 31 planes per month during 2021. Production had been at 52 planes a month before a worldwide grounding of the Max fleet last year following two fatal crashes.

The 787, assembled in Everett and South Carolina, will go from a current production rate of 14 planes a month to 10 this year and to seven in 2022. The 777 and its successor, the 777X, will be cut from the current five planes per month to three a month this year. Production rates for the 767 (three per month) and the 747 (0.5 a month) will remain as is.

Calhoun said U.S. air passenger traffic is down 95 percent from a year ago. "The

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Manufacturing Experts Assess What Will Be Different After Covid-19

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In the long term, they increasingly will turn to robotics and automation solutions to address labor challenges. Many supply chain jobs can be repetitive and potentially dangerous, resulting in high turnover, low morale, and a need to constantly retrain workers, all at a steep cost. Robotics offer the tremendous potential to address these labor and productivity growth challenges. Robots are a natural fit because they are by nature more flexible than other types of automation. This pandemic may cause companies to rethink their automation investment plans. Companies that have already invested in robotic solutions are well-positioned during this period of social distancing. Looking ahead, more organizational leaders will open their eyes to the benefits of robotics and automation, which can make their companies more competitive and more innovative for the long haul.

Lisa Anderson, LMA Consulting Group, Claremont, Calif.

Manufacturing will definitely change as it emerges from the coronavirus pandemic. Weaker manufacturers that don't innovate and proactively manage the demand and supply misalignment will go out of business whereas the stronger manufacturers (whether big or small) will thrive. Manufacturing leaders were already questioning their supply chain because total cost is at parity with China, Amazon-like customer expectations are required for growth, technological advances made customer advancement rapidly achievable and labor costs less relevant, and the tariffs already pushed them over the edge.

The coronavirus is adding fuel to the fire in reevaluating sourcing networks and supply chain risk. Manufacturers will in-source and near-source with increasing speed. It will be a unique opportunity for manufacturers to retool, redesign and redefine their future, and manufacturing careers will gain a significant boost as people see the value in es-

sential businesses.

Rebecca Morgan, president of Fulcrum Consulting-Works, Inc., Cleveland

Very little will look the same after COVID-19, including manufacturing. Many manufacturers will not make it through this. None will emerge untouched.

Our industry has been evolving quickly toward Industry 4.0 and that will accelerate. Businesses have learned that big changes believed to take months or years can be done in days if made a priority. Partnerships have been verified or exposed as a sham. The importance of supply chain capabilities, financial stability, and flexibility is front and center. Any manufacturer looking to return to the good old days is in deep trouble. Leaders who take time to think will observe new relationships, new capabilities, and new thought processes during this crisis. That potential has been sitting dormant all along. We've simply not looked for them.

Andy Zanelli, president and CEO, Visual Communications Co., Carlsbad, Calif.

Many companies in the United States are learning painful lessons about their vulnerabilities, and they won't want to rebuild their supply chains the way they were pre-Covid-19. They will want to have more autonomy so that if this were to happen again, another pandemic, another trade war, or something else, they will have the capacity to deal with it. This can be addressed in a few ways, beginning with understanding what the true cost is to manage a global supply chain. A frequent result of this analysis will be that the total cost of ownership of products manufactured in North America has become highly competitive with Asia, leading to a massive increase in nearshoring. Another lever to pull will be to build redundancy into the system, so that they may still be engaged in China or wherever, but they will also have meaningful capacity in North America.

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Bill Virgin, Editor and Publisher. Editing assistance: Jenny Cole. Send news items, letters, subscription requests and other queries to the editor, at 15642 129th Court SE, Renton, WA, 98058 or editor@manufacturingalert.com. Phone: 425-227-4471.

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sharp reduction in demand for our airplanes that we see out over the next several years won't support the size of the workforce we have today," he said. "We believe this industry will recover, but it will take two to three years for travel to return to 2019 levels, and it will be a few years beyond that for the industry to return to long-term growth trends."

Boeing's suspension of production and the planned cuts in the number of planes assembled are already having an impact on suppliers. Safran Cabin filed a layoff warning notice with the state for 205 employees in Bellingham; the layoff was termed permanent. Hexcel Corp. filed similar warnings for its Kent (160 workers) and Burlington (128) facilities.

■ Cosmo Specialty Fibers, the Cosmopolis maker of wood pulp, announced a 90-day curtailment of operations starting May 1. The mill employs about 200 workers.

"The virus has caused a shutdown of the U.S. and European retail clothing industry (who are our customers' customers)," the company said in a statement. "Once the global retail clothing sector recovers, we expect that the South East Asian textile industry will quickly ramp back up and our order flow should also recover."

Cosmo Specialty Fibers said it will fill orders from existing inventory.

■ Truck manufacturer Paccar Inc. (Kenworth, Peterbilt and DAF) annually issues a forecast for sales of Class 8 trucks in the U.S. and Canada, and revises it quarterly.

In its latest quarterly earnings report, however, Paccar didn't attempt an estimate, saying economic uncertainty made it difficult to come up with one for North America, South America or Europe.

The company did report a profit for the quarter, although its factories are shut down currently. Paccar Chief Executive Preston Feight told investment analysts on a conference call the company is starting "a gradual resumption of truck production at selected factories." Timing for specific plants will depend on government directives and parts availability from suppliers.

In the meantime Paccar is trimming its capital expenditures and research and development budgets by a total of \$145 million.

■ First-time unemployment claims for manufacturing for the week of April 19-25 were 6,045 initial claims, down 2,290 from the previous week, the Employment Security Department said.

■ Contract electronics manufacturer Key Tronic Corp. said its Juarez, Mexico, plant has reopened after being temporarily shut down on government orders. The company said it successfully petitioned the government that its

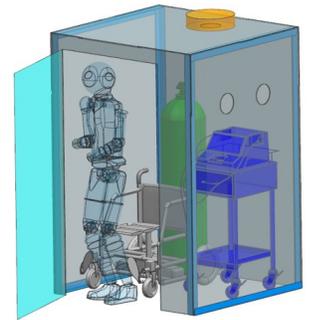
products fell under the category of essential.

For the fiscal third quarter ending March 28, the Spokane Valley-based company reported revenues that were higher than a year ago but less than anticipated, which it blamed on the pandemic's disruption of the supply chain that delayed delivery of components from China.

Key Tronic said it has seen order increases from makers of home-consumer products, healthcare and home exercise equipment, but decreases from the gaming industry.

■ Janicki Industries, the Sedro-Woolley maker of tooling for the composites industry, has designed and built an isolation booth for patients who tested positive for the Covid-19 virus, and completed the project in 10 days.

The booths, requested by local hospitals, are four-foot square and eight feet tall, and made of clear polycarbonate. Features include a door sized for wheelchairs and a fan and filtration system to prevent the spread of the virus.



■ Eddyline Kayaks in Burlington and Chinook Enterprises in Mount Vernon have both begun producing face shields.

■ Ferndale-based Superfeet, a maker of custom shoe inserts and orthotics, and its sister company Flowbuilt Manufacturing said they will add production capacity sufficient to produce 30,000 protective hoods in May. The companies said they delivered 42,000 hoods to hospitals in the Northwest in April.

■ Seattle-based Weyerhaeuser Co. suspended its quarterly dividend and cut executive pay to conserve cash. "During the second quarter, customer market conditions have deteriorated across our businesses, consistent with the broader macroeconomic environment," the company said in its quarterly earnings release. During April, Weyerhaeuser cut operating capacity by 20 percent for lumber and 15 percent for oriented strand board, and plans to continue those reductions in May. In engineered wood products, the company reduced operating capacity across its product lines by 15 percent to 25 percent for the month of April. In May, Weyerhaeuser expects to reduce engineered wood products operating capacity by an additional 10 percent, resulting in a 25 percent to 35 percent overall reduction in operating capacity for the month.

■ Everett-based industrial conglomerate Fortive Corp., the parent of Fluke Corp., has postponed spinoff of certain subsidiaries as Vontier.

2020 Will Mark a Turning Point in Additive Manufacturing

Editor's note: In the latest in a series of guest columns on manufacturing topics, Harshil Goel, chief executive of Seattle-based Dyndrite, assesses the state of additive manufacturing and explains why 2020 will be all about the software that drives it.

Innovation in additive manufacturing hardware and materials in the last decade has been nothing short of phenomenal: an industry that was 'good enough' to do rapid prototyping, but nothing more, 20 years ago, has evolved into a thriving market that is providing certified parts for planes, satellites, energy infrastructure, automobiles and medical implants. The technology has arrived onto the manufacturing shop floor and is established as an essential tool in the design-to-production value chain.

Yet additive manufacturing remains constrained. Quality issues, lack of compliance to six sigma repeatability, speed and throughput have made scaling difficult, especially as compared to traditional manufacturing processes.

Every day additive manufacturing systems are engineered to be faster, more accurate and build more robust parts but are prevented from achieving maximum quality, repeatability, speed and scale by the very tools, file formats and software on which the work is based. The truth of the matter is, the hardware we use has outpaced the software that drives it. Call me biased, but I strongly believe 2020 is the year when software finally catches up, and leaps ahead.

There are five key trends that I see happening:

Trend 1: Your 3D printer is becoming a 3D printing supercomputer

As 3D printer build sizes, resolution, precision and accuracy increase, so too the amount of data needed to drive the process. OEMs such as HP cite 3D file sizes of more than 4.5 terabytes for its MJF 3D printers – and these have a build size of 380 x 284 x 380 mm. If that build volume is increased by 50 percent, that file size will increase by a factor of 3.375 (1.5^3) or a whopping total of 15.2 terabytes. Using legacy or CPU-only software solutions to handle this amount of data has become untenable. This is about to change.

GPUs (graphics processing units) are incredibly powerful, flexible, scalable and affordable architectures. Unfortunately, outside of rendering pretty pictures, most go unused in computational geometry. Employing the GPU's data handling and computing power in the manufacturing process means that additive professionals can have power to deal with massive file sizes both on a computer and in a 3D printer. Putting an Nvidia GPU into a 3D printer means you're bringing edge computing power to the point of manufacture – a preference for complex manufacturing instruc-

tions. In other words, you don't need terabytes of manufacturing data per build, just the instructions on how to generate the parts, which can now be computed in the 3D printer.

Trend 2: Users are gaining greater process control over active additive production

In-situ process monitoring and feedback is a developing area, mainly with metal PBF (powder bed fusion). But as users start to expect more process control, they need more sophisticated tools. 2020 will see the rise of "feed forward" applications that use both feedback systems as well as feed-forward systems that combine the powers of simulation software, such as from new Dyndrite Developer Council members, Ansys and Altair, and the 3D geometry kernel to adjust the print parameters during the build.



GOEL

Combine this with the GPU computing power in your 3D printer and there is now a sophisticated 3D printing process, delivering fewer failures, better part quality and smarter material usage.

Trend 3: Toolpathing in additive is getting more sophisticated

Once additive experts have greater visibility and control over the 3D print process, it is only natural that there will be a need for greater control over the toolpaths — more granular and real-time control of laser exposures, speeds and material feeds.

3D printing OEMs have started to adapt to this expectation, with EOS and Renishaw now exposing some print APIs to key customers, and companies such as Aconity and Open Additive delivering highly configurable metal additive systems. To support this effort, the Dyndrite Developer Council has also formed a Toolpath Working Group, with participants such as SLM, to address what tools users want and need. As additive engineers become more sophisticated in their search for better part production, so must the software they use be responsive to their needs.

Trend 4: Production engineers will start to abandon STL file formats

It is truly amazing that the STL file format has existed as a standard for more than 30 years. As a tessellated approximation of a 3D CAD design it was fine for rapid prototyping, but lacks the robustness required for production-grade additive. Even more recent developments in file formats such as AMF and 3MF use the same geometric phi-

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Guest
column

Guest Column: 2020 Will Be The Year Of Software In Additive Manufacturing

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philosophies as STL, tessellated triangles — representations that explode data, cripple computers, 3D printers, and, frankly, the industry.

Additionally, upon conversion, STL files often need to be repaired, destroying production momentum. They deliver pathological inaccuracies and by their very nature are an inherent disconnect from what the 3D printer is built to deliver — prints at the resolution of the machine, not the resolution of a tessellated approximation. As companies like Adobe figured out with Postscript in the 80s, why would you even print fixed-polygonal data if your machine were capable of printing higher order geometries, such as splines? Being able to bypass STL formats in the build preparation and printing process fundamentally improves the quality, speed of build, and the ability to produce bigger and more complex parts accurately.

Dyndrite's new 3D geometry kernel for additive manufacturing uses the original mathematical representation (B-spline, NURBS, and B-rep data) to deliver better additive toolpaths and thereby 3D printed parts. It avoids 'data-bloat' by not relying on millions of triangles to define a print. It builds quality in a printed part by having toolpaths defined by splines. This means improved repeatability and improved production speeds by eliminating the momentum-dissipating step of needing to repair the STL.

Trend 5: The most important change is happening in the people, not machines

Most predictions are typically about hardware, materials and software. But I think the most interesting and fundamental evolutionary change is about the people using them.

As Shawn Hopwood, Dyndrite's chief marketing officer often states, "Technology doesn't replace people. People who leverage technology replace the people who don't".

There is a demographic shift going on within design and manufacturing. Today, engineering students are required to have software coding experience, and many engineers have been curious enough to delve into self-learning for coding using the many online resources available.

Powerful languages such as Python make programming accessible to just about anyone, even elementary school students. Having the ability to quickly script a task, cobble together a repeatable workflow, or prototype an app will bring tremendous new efficiency and opportunity to the industry, especially as people begin to share. My favorite quote by Marc Andressen is that 'Software is eating the world.' And it is: having staff able to tackle this is key to the scalability of your business.

Again, I'm biased, but I believe 2020 will be remem-

bered as a turning point in additive manufacturing, where both technicians and OEMs gain more power, freedom, and control over the production process and the software that drives it.

Harshil Goel is founder of Dyndrite, a developer of software for 3D printers. He can be reached at hgoel@dyndrite.com.

Alcoa Shuts Down Ferndale Smelter

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and say whether it will return to operations or won't return to operations," Alcoa CEO Roy Harvey said on a conference call with investment analysts. "When we make a curtailment decision, we do it not just with the current pricing in mind, but also looking forward a number of years. It's not necessarily just meant to represent the world as we see it right this very second, and we need to look forward at least 12 to 18 months."

The Ferndale smelter was already operating below its production capacity of 279,000 metric tons a year, but Alcoa said it will shut down the remaining 230,000 tons per year by the end of July.

Alcoa said the smelter recorded a net loss of \$24 million in the first quarter of 2020. "While our employees have worked diligently to improve the facility, the smelter is uncompetitive, and current market conditions have exacerbated the facility's challenges," Harvey said.

Alcoa said it now has 30 percent of its worldwide smelting capacity on curtailment. That includes a second smelter in Washington, its Wenatchee Works at Malaga along the Columbia River. That smelter has been idle since 2015.

A global production glut and high power prices relative to the rest of the world have helped do in the Northwest's aluminum industry, which used to include smelters in Tacoma, Spokane, Longview and Goldendale. Kaiser Aluminum still operates a rolling mill in Spokane, but no primary aluminum production.

Alcoa said aluminum prices have fallen more than 20 percent in the first quarter alone, and are down 45 percent from their highs in 2018.

Harvey said the global aluminum industry is seeing lower prices, inventories that are higher than last year, and a growing number of producers underwater financially. How fast the industry rebounds depends on how soon the pandemic is brought under control, how governments lift lockdown measures and implement stimulus programs, and strength of end-use markets including transportation, construction, packaging, machinery, electrical and consumer durables."

Newsire: The Latest In Washington Manufacturing

BELLINGHAM: Architectural Elements, a metal fabricator of decorative elements and building components such as lighting fixtures and staircases, has acquired Camtec Precision, a machine shop also located in Bellingham. AE was founded in 2007 by Joe Clark, and focuses on the large-scale Seattle commercial construction market, handling projects for such clients as Google, Facebook and Microsoft. Camtec Precision is a machine, tooling, and prototype company founded in 1985 by Chuck McCoy. The company's portfolio includes hardware for Bill & Melinda Gates' residence, other high-end residential projects and the shipping & maritime, aircraft interior refit, vintage aircraft parts production, oil refinery, aluminum smelting, electricity generation, rope manufacturing, and food processing industries.

WASHINGTON, D.C.: Two Washington companies were among the 24 receiving funding in the latest round of the U.S. Department of Transportation's Maritime Administration small shipyard grant program. Safe Boats International LLC in Bremerton, an aluminum boat manufacturer for military, federal, state and local law enforcement, fire and rescue agencies, will receive \$587,035 for a router and press brake. Mavrik Marine Inc. in La Conner, which specializes

in the construction of aluminum workboats, will receive \$564,850 for a bridge crane, welding system, and compressor.

BREMERTON: Inventech Marine Solutions has delivered a 44-foot twin inboard diesel-powered waterjet full-cabin tour boat to Argosy Cruises of Seattle. The boat has capacity for 38 passengers and two crew.

KENT: A team led by the Jeff Bezos-backed space venture Blue Origin has been selected by NASA to develop the Artemis landing system to return humans to the moon. As lead contractor, Kent-based Blue Origin will handle systems engineering, safety and mission assurance, and mission engineering and operations; and develop the descent element based on a rocket engine it has been developing. Other members of the team include Lockheed Martin, Northrop Grumman and Draper.

REDMOND: Data I/O, which makes devices for programming circuits in electronic devices, said first-quarter revenues dropped 21 percent due to closures in the global automotive industry. The company did pick up new orders from automotive customers and a ventilator manufacturer.



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