

THE PORTER REPORT

3Q 2018 | RICHMOND, VA INDUSTRIAL MARKET REVIEW

INDUSTRIAL CONSTRUCTION PIPELINE ACTIVE IN ALL QUADRANTS.

⇒ At the close of the third quarter, the **overall industrial market occupancy** has decreased to **89%**, down from 94% at the mid-year mark, with the delivery of Phase I of the Virginia I-95 Distribution complex and the addition of a large vacancy in a free-standing facility in the Meadowville area; the two referenced facilities, both Class A buildings with southside locations, have added a combined total of more than 675,000 square feet to the vacancy, which has been partially offset by one large transaction in the southeast quadrant of the metro area. **Class A occupancy** has decreased to **94%**, down from 97% at the end of the second quarter with the addition of the new available product referenced above. The **Class B occupancy** rate has decreased slightly to **87%**, down from 88% at the end of the second quarter. The quarter closed with a round of active sales to a combination of users and investors.

⇒ **Cascades Inc.** has purchased the former Bear Island Paper Mill in Hanover County for \$34.2 million, with plans to spend between \$275 to \$300 million to upfit the equipment. The site consists of a 601,000-square-foot facility on 1,620 total acres, and the project will create 140 jobs. Bear Island will resume paper manufacturing operations for an initial two-year term, and Cascades will begin to upfit existing equipment with plans to begin production of recycled containerboard in 2021. Cascades is a Canadian leader in the recovery and manufacture of green packaging and paper tissue products.

⇒ Social media giant **Facebook** has plans to expand its investment in Henrico County, increasing the scope of the planned data center at the White Oak Technology Park from two to five buildings at a cost of \$750 million beyond the \$1 billion investment announced last year. The company will build three additional buildings of 500,000 square feet each, bringing the total planned complex to more than 2.4 million square feet. **Facebook** expects that the expansion will support more than 1,500 jobs during construction and 200 jobs once the data center opens. Construction is expected to continue until at least 2020.

⇒ German grocery retailer **Aldi** has opened its new 562,500-square-foot distribution center and divisional headquarters off I-85 in Dinwiddie County. **Aldi** purchased the 80-acre site in 2017 for \$3.6 million and invested \$57 million in the development of the site. The facility is home to more than 150 employees and includes racking for 25,000 pallet positions and a solar system that powers the majority of the refrigeration equipment, among other features. **Aldi** has opened eight retail grocery stores in the Richmond market since 2015 and plans to invest \$5 billion to grow to 2,500 stores nationwide by the end of 2022, with the aim of creating 25,000 new jobs nationwide.

FEATURED PROPERTY

Airport Logistics Center (Henrico, VA) Laburnum Ave & Seven Hills Blvd

Building 1: 246,760 SF (Expandable)

805,190 SF Total • Master-Planned Industrial Park • CSX Rail Access
1.5 Miles from Richmond Int'l Airport (RIC) • Immediate I-64, I-95,
I-295 & I-895 Access • Less Than 80 Miles from the Port of Virginia
135' Truck Court Depths • 60' Loading Bay • 32' Clear Height
Multiple Docks + Drive-In Doors

ESFR Sprinkler System • LED Lighting • Pre-Cast Concrete
For Lease: Call for Information • Available May/June, 2019

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AVAILABLE MAY/JUNE, 2019

Pictured: Becknell Industrial's Airport Distribution Center (Richmond, VA)

INDUSTRIAL CONSTRUCTION PIPELINE

- ⇒ 1.5MM SF Deepwater Industrial Park - BTS Planned (Richmond City)
- ⇒ 461,700 SF Virginia I-95 Distribution - Phase I Complete (Richmond City)
- ⇒ 437,000 SF Bissell Complex - Phase I Planned (Chesterfield Co)
- ⇒ 324,629 SF James River Logistics Center - Start 4Q 2018 (Chesterfield Co)
- ⇒ 246,760 SF Airport Logistics Center - Start 4Q 2018 (Henrico Co)
- ⇒ 220,000 SF Pepsi Distribution Center - BTS Complete (Chesterfield Co)
- ⇒ 152,000 SF Northlake Commerce Center - Planned (Hanover Co)

SELECTED INDUSTRIAL TRANSACTIONS

- ⇒ 601,504 SF SOLD | 10026 Old Ridge Road (Hanover Co)
- ⇒ 184,000 SF SOLD | 1500 Commerce Road (Richmond City)
- ⇒ 170,000 SF INV SOLD | 12305 Lakeridge Parkway (Hanover Co)
- ⇒ 143,638 SF INV SOLD | 8025 Quality Drive (Prince George Co)
- ⇒ 109,546 SF INV SOLD | 2401 Dabney Road (Henrico Co)
- ⇒ 108,897 SF REDV SOLD | 1505 Robin Hood Rd (Richmond City)
- ⇒ 47,954 SF LEASED | Interport Business Center (Henrico Co)



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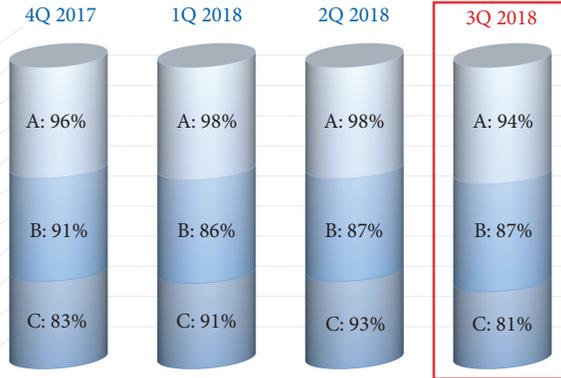
INDUSTRIAL MARKET VACANCY

3Q 2018

VACANT & INVESTOR-OWNED INDUSTRIAL PRODUCT

40K SF MIN RBA* EXCLUDING FLEX & OWNER-OCCUPIED PROPERTIES | *RBA Total: 27.3MM SF in 174 Existing Buildings

3Q 2018: COMBINED OCCUPANCY RATES & NET ABSORPTION (CLASS A & B PRODUCT)



The combined industrial occupancy rate of Class A & B product has decreased to 91% from 94% at the end of 2Q 2018.

Net Absorption from 2Q 2018: -775,670 SF (Class A/B)

Net Absorption from 2Q 2018: -533,683 SF (Class C)

NOTE: CoStar reports an industrial occupancy rate of 96.3%, unchanged from the 2nd quarter of 2018, based on a total 116.8 million square feet RBA in 2,780 existing warehouse properties, and a positive net absorption of 308,288 square feet for the quarter. CoStar's industrial RBA includes both owner-occupied and investor-owned properties, but excludes flex space, defined as 50% minimum office.

Vacancy Rate & Trends

40k < 75k SF RBA

RBA: 2.48MM SF (46 Buildings)

9.1% of Total Market RBA

	Class A	Class B	Class C
Total Bldgs	3	26	17
Total RBA	186,000	1,392,750	904,973
Vacant SF	0	230,570	76,525
Vacancy Rate	0%	17%	8%

CLASS A	NWQ	NEQ	SWQ	SEQ
Total Bldgs	0	2	1	0
Total RBA	0	132,000	54,000	0
Vacant SF	0	0	0	0
Vacancy Rate	0%	0%	0%	0%

CLASS B	NWQ	NEQ	SWQ	SEQ
Total Bldgs	9	9	6	2
Total RBA	459,518	475,257	357,595	100,380
Vacant SF	45,416	118,079	67,075	0
Vacancy Rate	10%	25%	19%	0%

CLASS C	NWQ	NEQ	SWQ	SEQ
Total Bldgs	8	4	5	0
Total RBA	450,882	206,950	247,141	0
Vacant SF	64,500	12,025	0	0
Vacancy Rate	14%	6%	0%	0%

Vacancy Rate & Trends

75k < 150k SF RBA

RBA: 7.44MM SF (69 Bldgs)

27.2% of Total Market RBA

	Class A	Class B	Class C
Total Bldgs	22	31	16
Total RBA	2,601,465	3,280,629	1,554,564
Vacant SF	189,378	245,000	336,441
Vacancy Rate	7%	7%	22%

CLASS A	NWQ	NEQ	SWQ	SEQ
Total Bldgs	4	11	3	4
Total RBA	431,144	1.31MM	342,936	520,198
Vacant SF	0	45,740	0	143,638
Vacancy Rate	0%	3%	0%	28%

CLASS B	NWQ	NEQ	SWQ	SEQ
Total Bldgs	2	12	10	7
Total RBA	209,546	1.22MM	1.15MM	691,777
Vacant SF	0	115,000	40,000	90,000
Vacancy Rate	0%	9%	3%	13%

CLASS C	NWQ	NEQ	SWQ	SEQ
Total Bldgs	4	1	8	3
Total RBA	389,305	82,625	746,090	336,544
Vacant SF	108,897	0	64,000	163,544
Vacancy Rate	28%	0%	9%	49%

Vacancy Rate & Trends

150k SF Min RBA

RBA: 17.39MM SF (59 Bldgs)

63.7% of Total Market RBA

	Class A	Class B	Class C
Total Bldgs	32	18	9
Total RBA	11,619,017	3,994,570	1,773,140
Vacant SF	746,557	693,835	370,742
Vacancy Rate	6%	17%	21%

CLASS A	NWQ	NEQ	SWQ	SEQ
Total Bldgs	4	13	2	13
Total RBA	1.15MM	3.80MM	1.56MM	5.11MM
Vacant SF	0	0	461,700	284,857
Vacancy Rate	0%	0%	30%	6%

CLASS B	NWQ	NEQ	SWQ	SEQ
Total Bldgs	2	9	6	1
Total RBA	601,695	1.78MM	1.16MM	450,000
Vacant SF	142,800	90,000	112,803	348,232
Vacancy Rate	24%	5%	10%	77%

CLASS C	NWQ	NEQ	SWQ*	SEQ
Total Bldgs	2	1	5	1
Total RBA	336,138	200,000	862,202	375,000
Vacant SF	0	0	203,742	167,000
Vacancy Rate	0%	0%	24%	45%

*Adjustment in Class C vacancy and RBA attributed to planned demolition of former tobacco storage warehouses & redevelopment as Deepwater Industrial Park (SWQ City)



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REPORT: THE NEXT INDUSTRIAL REVOLUTION

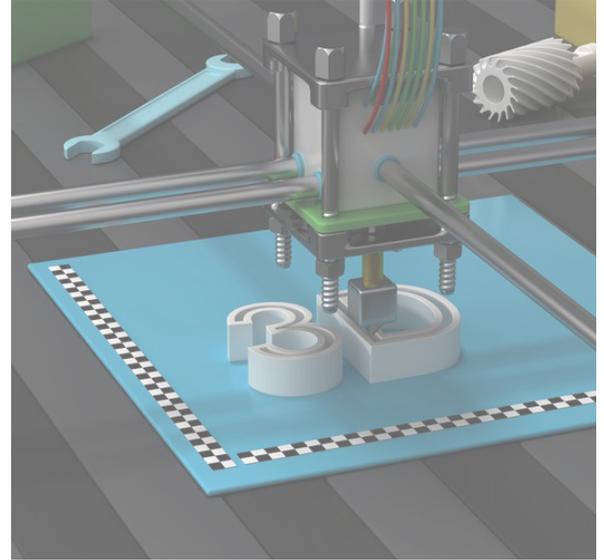
3-D PRINTING REMAKES MANUFACTURING

Ric Fulop, the 43-year-old co-founder and chief executive of Desktop Metal, is eager to show off the skunkworks for the company's giant 3-D metal printers, which can produce stainless steel, aluminum and other metal alloy parts at assembly-line speeds and in large quantities. The four machines—which are 16 feet long, 6 feet tall and weigh about as much as an SUV—are in various states of production.

They'll be able to 3-D print 100 times faster than existing high-end 3-D printing systems used for aerospace, and at one-twentieth the cost, without the tooling required for traditional manufacturing processes. "It's the first metal printing press," says Fulop, [native of] Venezuela.

Desktop Metal's original machine, which began shipping this year at a cost of \$120,000, is a desktop model (thus the company's name) designed to 3-D print metal prototypes or low-volume runs. This one—which uses a variety of metal powders and has a price tag of more than \$1 million for an initial installation—is for mass production.

Desktop Metal's pitch to America's largest manufacturers and most innovative industrial startups is that its machines can print fast enough and at a low enough cost to replace casting and CNC machining for numerous metal parts. **The term "3-D printing" covers a number of different technologies by which machines create three-dimensional objects from digital files; in the most common process, the machine lays down many thin layers of material in rapid succession, building up the end product based on the digital design.**



"The way we make things is about to fundamentally change," Fulop says.

"With 3-D printing you don't need tooling anymore, so it is enabling a new industrial revolution."

Only a few years ago, proponents envisioned a world in which hobbyists would buy little 3-D printers for their homes. That never really panned out. The \$3,000 machines spit out cheap-looking, clunky plastic objects that no one wanted or needed. Instead, it's now clear that the real value of 3-D printing isn't in making keychains and other doodads, but in the \$12.8 trillion global manufacturing industry. **Putting 3-D printers on the assembly line will usher in a new era in which smaller factories, located closer to consumers and tied together by software, can print parts on demand with no minimum order size.** Better yet, it's possible to design parts that are lighter, cheaper and more efficient than what could have been fabricated in the past.

That's a huge deal, and not just in metal, which is Desktop Metal's forte, but in the larger space of plastics and composites, which helps explain why startups have been rushing into digital manufacturing. In the new world envisioned by proponents of 3-D printing, **cars and planes could become lighter and more fuel-efficient, replacement knees could be designed** with sponge-like metal surfaces that bones can grow into, and outdated tractor parts could be printed on demand at a local outpost when they fail. Manufacturers will benefit from being able to design and produce new items faster and more efficiently, while **consumers will gain by being able to order up custom items that previously would have been prohibitively expensive.** **Wohlers Associates, a 3-D printing industry analyst, forecasts that sales of industrial 3-D printers could reach \$11.7 billion next year and \$18.2 billion by 2021.**

Desktop Metal sold 357 printers of both types last year, according to Wohlers—an exceptionally fast rollout for a company that was founded in 2015—to buyers that include Ford, Caterpillar and Google's advanced technology and projects group. The backlog of orders for its 3-D printers currently tops \$120 million. Forbes estimates that revenue, minimal last year as the company launched its products, could reach \$50 million this year as it ships its printers. Desktop Metal has been signing up new customers faster than it can produce machines, and its mass-production printer won't begin shipping until 2019, so it won't work through that backlog this year. Next year, if all goes well, should be its breakout year in which revenue could top \$100 million.



GE Ventures⁺



The company has raised \$277 million in venture funding from investors that include Ford, BMW, New Enterprise Associates, GE Ventures, GV and Kleiner Perkins—at a valuation of more than \$1 billion. NEA's Dayna Grayson, an early investor who has known Fulop a decade, believes **Desktop Metal's speed is its advantage.** "There are companies that spend years in labs before they go to market," she says. "Ric moves at the speed of light. He just says, 'We're going to do this,' and off we go."

Fulop launched Desktop Metal in 2015 with six co-founders, including Chiang and other MIT professors.

Ely Sachs, the elder statesman of 3-D printing who coined the phrase "3-dimensional printing" in his first patent and was the lead inventor of the binder-jet 3-D printing technology, joined the group as a co-founder. So, too, did Chris Schuh, an MIT professor of metallurgy whose research group has worked on developing new metal alloys at nanoscale. Sachs, 63, recalls how even years earlier he was interested in 3-D printing of metals, but it

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was hard then to get funding for projects in metal, and metal powders weren't readily available. "In many ways, metal parts are the best application for 3-D printing," he says, noting that by **creating lighter, less expensive metal parts, 3-D printing could eventually allow some pieces now made with plastic to be created in longer-lasting metal.** "It was exactly what I had been wanting to do years before."

In October 2015, Desktop Metal raised its first venture funding, \$14 million, to design a 3-D metal printer. Fulop and his team tested gears and other simple parts on the printers, then moved on to more complex ones. They tested a variety of metal powders and stress-tested the end products for strength. Fulop knew from the beginning that he wanted to launch a mass-production machine. "At the first meeting with Ely, we talked about doing production," he says. With VC funding pouring in, they realized they could launch two machines in 2017, a smaller one for prototyping and the giant production machine.

The production machine is based on a **technology that Desktop Metal calls single-pass jetting, a bi-directional printing process that uses more than 32,000 jets in conjunction with powder spreaders to jet millions of droplets per second. That creates high-resolution layers of metal that build up into a part with no tooling required.**

The result is that manufacturers can create metal parts in minutes instead of hours.

It's a faster, less-costly technology that's more suited to mass production than the laser-based process used to 3-D print parts for aerospace. "This is the reason that Ford and others have supported us," Fulop says. "In the time it takes the laser-based process to produce 12 propellers, Desktop Metal would produce over 560."

Since Desktop Metal's launch, Fulop says, its buyers have included the military, seven of the world's top 10 car companies, and major players in industries **ranging from medical devices to apparel.** Ford, which is both an investor and a customer, has already set up the smaller, studio printer in its Dearborn, Michigan, research facility and is now testing the printing of auto parts. Jabil, a contract manufacturer based in St. Petersburg, Florida, that makes everything from casings for iPhones to medical devices in more than 100 factories in 29 countries, also signed on early and is making a big bet on 3-D printing. It expects to ultimately buy thousands of 3-D printers of all types, including as many as 100 from Desktop Metal. "Jabil doesn't do things where we want to have three or four machines in a corner," says John Dulchinos, Jabil's vice president of digital manufacturing. "We're about finding applications where you leverage scale and manufacturing capability."

One early customer was Lumenium, a startup in Fredericksburg, Virginia, that is developing a new type of internal combustion engine that has a devilishly complex design with cooling passages that allow it to be both compact and powerful. "It is really a nightmare and takes weeks to create the passages," says Bill Anderson, Lumenium's co-founder and CEO. So when he saw Desktop Metal's machines in 2017, he was blown away. "We were pretty stunned by the booth," he says. "We never thought those parts could be produced in quantity at low cost." Working with Desktop Metal, Lumenium tested 3-D printing and cut both time and cost. **A saddle carrier with the cooling passages that previously had taken a week to make at a cost of \$980 could now be done in four days for just \$148.**



At his desk, Fulop keeps dozens of metal doodads, pieces that have been 3-D printed for testing that he's eager to show off. There's a small steel **prototype of a water impeller pump that would go into a BMW car; it cost \$80 to make previously, and just over \$5 with the 3-D printing technology.** Another steel part full of cooling channels is for an Audi assembly. These new shapes—whether hollowed out or with a maze of lattices running through them or with foam-like surfaces—look cool, **but they also can be 50% to 60% lighter than their old-school counterparts. That is a big cost savings in material, and a potentially larger savings in fuel costs for planes or cars.**



For the automotive industry, 3-D printing has enormous potential, but there's still a lot of R&D to be done before the machines are churning out parts in American factories. **"The biggest question is, how do you make the parts large enough and fast enough at scale?"** says Ken Washington, Ford's chief technology officer, who joined Desktop Metal's board of directors earlier this year.

The other big question for Fulop and Desktop Metal is competition. HP, which has been rolling out its own industrial-size 3-D printers for plastics, just launched its production-scale metal 3-D printers, for example, and 3-D printing startups abound. Which players win will depend on both technology and price. **"It's becoming a crowded market,"** says 3-D printing analyst Terry Wohlers. "There is always room for something that is faster and better and lower cost."

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Printing giant HP today launched its much-anticipated 3-D metal printer, the latest foray in the fast-growing market for industrial-scale 3-D printers. HP, which is already in the market with a production-scale 3-D plastics printer, said that it has been working with two major customers on creating 3-D printed metal parts for the automotive and medical industries, and that it would begin offering 3-D metal printing production services next year. **Only in 2020 will it begin to sell the 3-D metal printers themselves, at a price just under \$400,000.**



While the rollout is being done in a very controlled way as befits a giant corporation with \$57 billion in trailing 12-month revenue, the move into 3-D printing of both plastics and metal represents an enormous bet on the future of manufacturing. It also comes at a time when HP, the world's top seller of personal computers by market share, has been facing concerns about slowing growth from its printing supplies. "Without a doubt it is a big bet for the company," Stephen Nigro, president of HP's 3-D printing business, told Forbes. "Without a doubt, we have aspirations that this will become a big part of HP's business in the five-to-10 years' time frame."

HP had already made a big bet on 3-D printing with its industrial-scale machines for the printing of plastics, which use what it calls multi jet fusion technology. Its new machines for 3-D printing metals, which it calls metal jet, will use a similar binder-jetting technology to those plastics ones, and will also be for mass production.

"We stood back and we said, 'We can do something equally disruptive in the metal space of what we did in the polymers plastics space,'" HP Chief Technology Officer Shane Wall explained during a visit to the company's Palo Alto headquarters over the summer. "We did a very in-depth set of work that went on for **almost two years in HP Labs, and came up with a really interesting, very disruptive technology.**"

Going after mainstream production has been the holy grail for metal 3-D printing. High-end, laser-based processes have been used to 3-D print metal for some time, especially in the aerospace industry. **But it's only recently that technology has been introduced that would allow 3-D printing of metals at scale.** Desktop Metal, a venture capital-backed company with a valuation of more than \$1 billion, has been pre-selling its own production scale 3-D metal printers and will begin shipping them in 2019.

The technology underlying HP's new metal printers builds off the company's three decades of experience producing inkjet printers, the earliest of which it introduced in 1984, Nigro said, and **takes advantage of what he called "the inkjet Moore's law," in which the performance of those printers doubles every 18 months. The new 3-D metal printers will have a total of 60,000 nozzles in each machine, for example, a vast number that will give them speed, quality and redundancy should any one nozzle fail.**



"We believe our solution will be the lowest operating cost in the industry," CTO Shane Wall said. "We have been in super-stealth mode so people have been wondering."

The first two customers, GKN and Parmatech, have begun testing parts for their customers at HP Labs' facilities in Silicon Valley and Barcelona. GKN, which is the largest provider of powder metal parts for the automotive industry and produces 30 million parts a day, is testing designs with its customers Volkswagen and Wilo, a German pump manufacturer. Parmatech, meanwhile, is a leading provider of metal parts for healthcare and is working with Johnson & Johnson and Primo Medical. "We are making non-structural products," said Chris Franks, president of commercial sinter metals at GKN. **"We've been selecting products that are safe to launch quickly.** For these applications, there's a lot of flexibility in terms of design."



HP's Nigro said that he expected the company to gain better traction with its 3-D metal printers **by doing the production service first to allow customers to see its advantages before plunking down the major capital expense for a printer.** Then, too, it will allow HP to produce those printers more slowly than if it opened for orders today. "If you look at the history of the 3-D printing industry," he said, "you'll see that there is a history of people announcing products and slipping, slipping, slipping because it is very difficult to do."