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July/August | Volume 9, Issue 4

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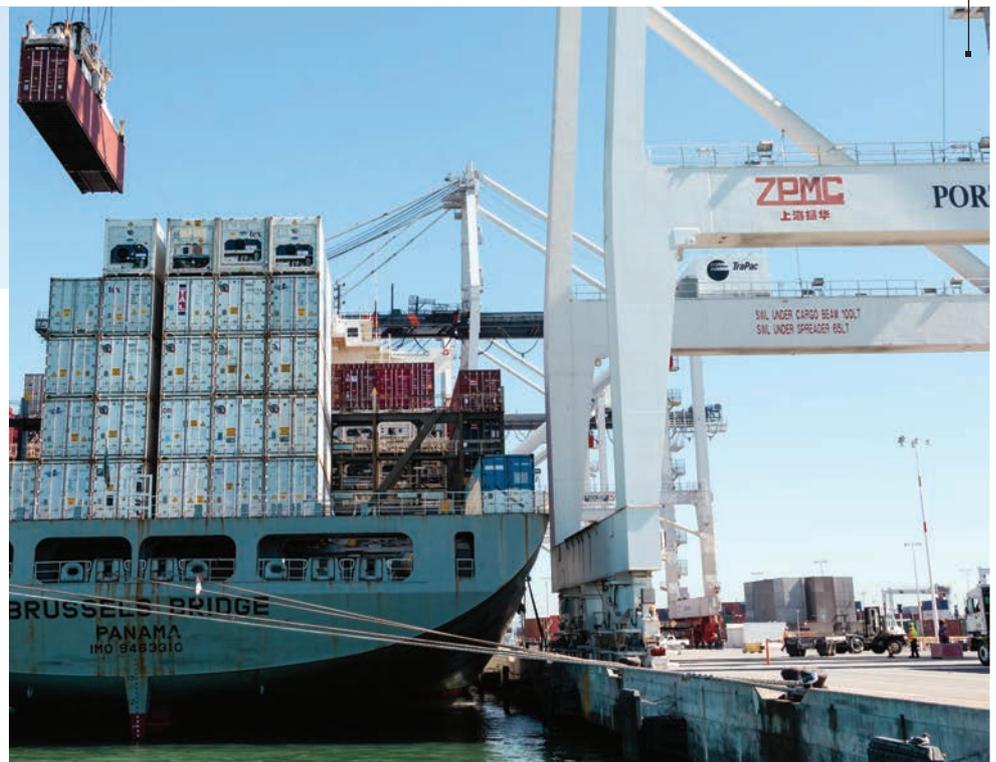


“Freight rate recovery will depend on decreased capacity and increased cargo options, both of which hinge on the resolution of current political debates. A trade agreement between the US and China and the reduction or dissolution of current tariffs should improve global economic sentiment and see the flow of bulk cargos revive, driving demand for bulk carriers in their primary markets. Likewise, this could restore stability to oil prices and revitalize the energy market, unlocking investment into infrastructure projects.”

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ON THE COVER

Breakbulk and multipurpose project cargo vessels today face pressures from many quarters, including but not limited to sector consolidation, competition from underutilized tonnage in other sectors and the agonizingly slow development of U.S. offshore wind.

Image: AAL



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Credit: Jeff Sauters

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Editor's Note

Within this edition's report on the fascinating world of breakbulk operations, *MLPro* contributor Barry Parker advises, "In the cargo shipping world, there is the bulk sector, the container segment, and then, there is *everything else*." 'Everything Else' encompasses a wide swath of innovative handling techniques, one-of-a-kind cargo fixtures and a complex set of logistical challenges that can be found nowhere else. Moreover, a wide range of diverse cargoes define this sector; with supply and demand, world politics and trade patterns impacting breakbulk every day. This story, central to the editorial focus of this folio, begins on page 28.

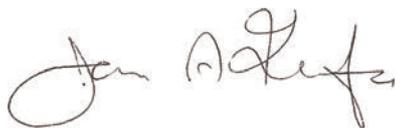
Separately, and with the expansion of the Panama Canal now safely in our choppy wake, the advent of ever larger vessels, expressed in terms of deadweight tons, TEU capacity, deep draft or any of a dozen other metrics, are now considered 'old hat.' Not quite settled are the necessary improvements to the deep draft ports and terminals that must accommodate these impressive behemoths, especially on this side of the big pond. Nevertheless, that work continues in earnest, coast-to-coast, in many ways, with a dozen different goals.

Up until now, it has been the physical aspects of ports and terminals that have gotten the most attention in terms of needed infrastructure. At the same time, the most progressive operators have turned their attention to the IT side of the equation. And, it turns out that there are just as many issues – connectivity, bandwidth, remote and/or autonomous operations and cyber security among them – to address, improve and contend with. Quite possibly, the move towards wireless operations tops that complicated list of tasks. Hence, a primer on tomorrow's tech advances for terminal and port operations – already here today – starts on page 44 of this edition.

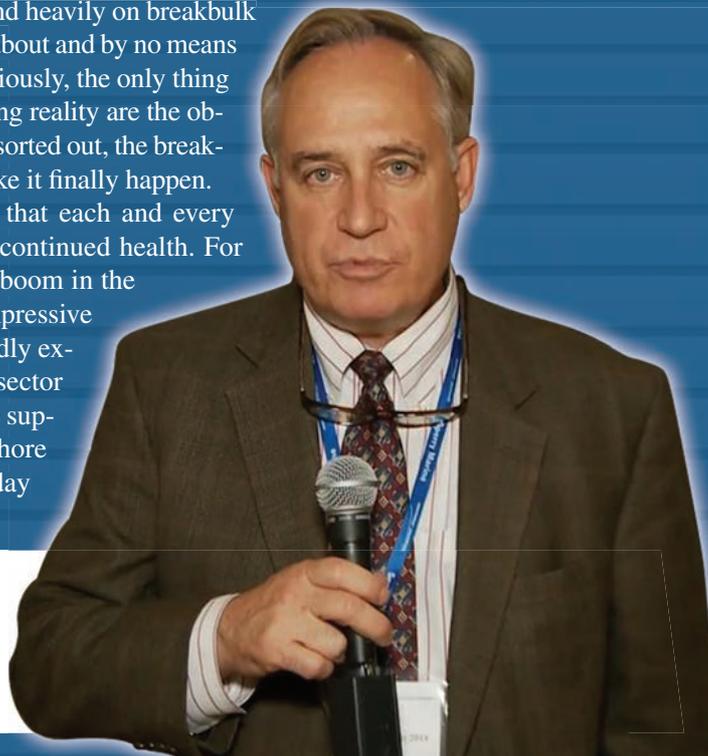
The confluence of breakbulk operations and the offshore sector, however, may well be the biggest story of the year – next year; that is. That's because domestic offshore wind, long awaited and (apparently) coming to fruition, will depend heavily on breakbulk and project cargo expertise to get the job done. Long talked about and by no means a done deal, the hint of a fresh breeze is at last upon us. Curiously, the only thing stopping this renewable green wave of energy from becoming reality are the objections from the most unlikely of stakeholders. Once that's sorted out, the breakbulk and project cargo sector will be ready to step up to make it finally happen.

Finally, as I assembled this edition, it occurred to me that each and every sector of shipping is actually dependent on others for its continued health. For example, those tank barges waiting for the petrochemical boom in the U.S. heartland would have nothing to do were it not for impressive project movements being leveraged to construct those rapidly expanding Midwest refineries. Likewise, the domestic wind sector increasingly looks to both the otherwise moribund offshore support vessel business as well as breakbulk to further its offshore aspirations. It turns out that every sector of shipping today depends on 'everything else.' Who knew?

*Breakbulk:
everything
else ...*



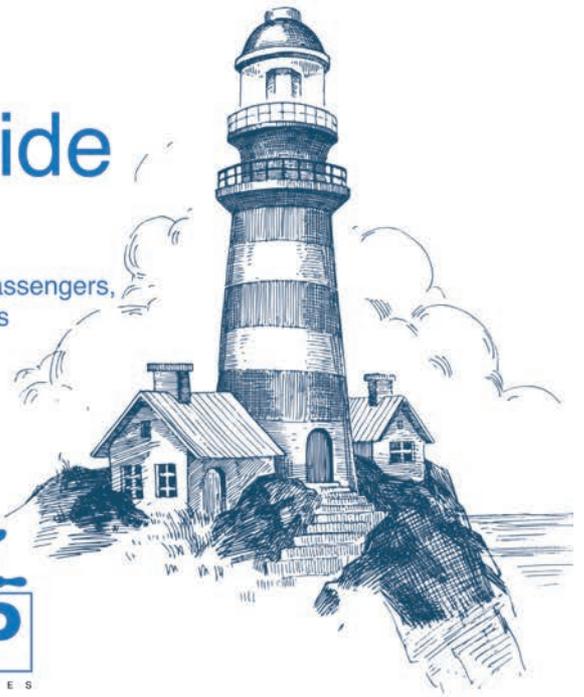
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The Latest Waterfront Development Hustle

It's a tale as old as time. Which is why some of the oldest land use regulations, notably the public trust doctrine, have survived as basic underpinning notions of western property law. The importance of the preservation of public control and access to navigable waterways and urban waterfronts for water dependent uses, such as commerce, may not be readily obvious to the average citizen, but that doesn't change the basic and indisputable logic and necessity of the rules.

While the hustle and the players inevitably change, the allure of private waterfront ownership and development persists. In the 1850's during the California gold rush, the leaders of the newly formed City of Oakland began to sell off their waterfront (of course, the City's founding visionaries saw fit to make themselves business partners in the sale). Ultimately, decades later, the U.S. Supreme Court stepped in and ruled that these were public lands and not for sale.

Most of these lands were reconstituted into what is known now as the modern Port of Oakland.

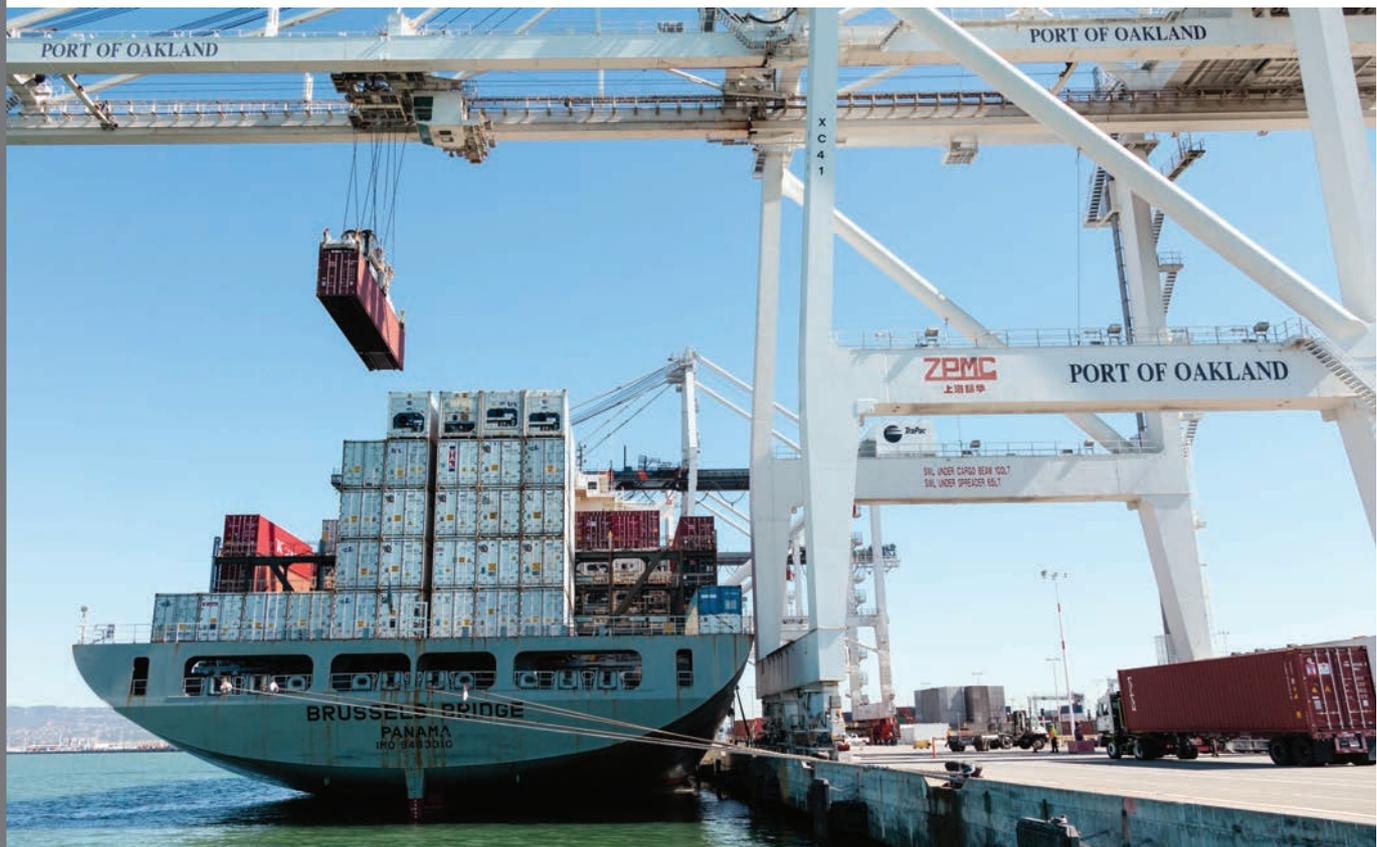
Given our collective waterfront history, it is really no surprise that these exact same lands are now the subject of the latest effort to privatize the waterfront with a grandiose vision

for private development – a new housing, office, luxury hotel, and baseball stadium proposal by the Oakland A's.

This proposal is for an existing marine terminal, Howard Terminal, which is at the intersection of rail, trucking and vessel operations, and would functionally eliminate the existing buffer zone between residential and commercial uses and heavy industry. The terminal currently handles over 325,000 truck transactions a year and serves as a training facility for members of the International Longshore and Warehouse Union.

The proposal has had the effect of unifying the Northern California intermodal supply chain in fierce opposition – and for good reason. Should this project cause congestion for truckers, delay vessels, reroute cargo, result in additional operational/environmental restrictions or litigation, one hundred percent of the downside financial risk of this project rests entirely with the port tenants, customers and workforce – not the project proponents.

The Port of Oakland has been pressured to fast-track an approval for this project, but has instead promised the trade community that it will first embark on a process of evaluating whether or not the project can be made compatible with existing seaport uses. This is a critical and important step which



CREDIT: Port of Oakland



Where there is the allure of the water, there is no shortage of dreamers, visionaries, hucksters, investors, or salesmen willing to expound on the endless new possibilities.

could determine whether or not a project can even go forward at this site or what major mitigation measures will be required to ensure no business or labor impacts will occur to the existing working waterfront.

However, direct requests from the maritime industry to the City of Oakland to slow down their environmental review of this proposal until after the Port has actually evaluated the project's compatibility with a working seaport have gone unanswered. Instead, as revealed at recent hearings by the Oakland City Council, the City staff is already proactively championing the project as an economic development catalyst for redevelopment.

That's not to say that cities cannot reclaim or revitalize their waterfronts – they can, they do, and in many instances they should – but only so long as they conduct the proper analysis and review and have a thorough, concerted and honest conversation about the loss of their ability to be a working seaport.

While some cities don't find it would be economically viable, others will protect and work to preserve their maritime industries and communities. In San Francisco, which had limited direct maritime activity impacts at their redevelopment

locations; their ballpark development was made part of a holistic multi-year waterfront planning process. In contrast, San Diego rejected a football stadium and hotel complex replacement of their working waterfront.

These types of decisions can only be made properly after the conversations, analyses, and evaluations of port assets have occurred.

But that's why the public trust doctrine exists – to save us from the salesmen and carnival barkers chasing the allure of a quick buck and from the dreamers seeking a grand redevelopment of our waterfront alike. Our land use regulations exist to elevate the collective and long-term public good in order to force the conversation about how best to preserve our unique and irreplaceable urban waterfronts.

In Oakland, the next fight will be to see who is listening.

The Author John McLaurin

is President of the Pacific Merchant Shipping Association

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Are You Cyber Safe?

“Parasitic malware feasts on critical infrastructure”

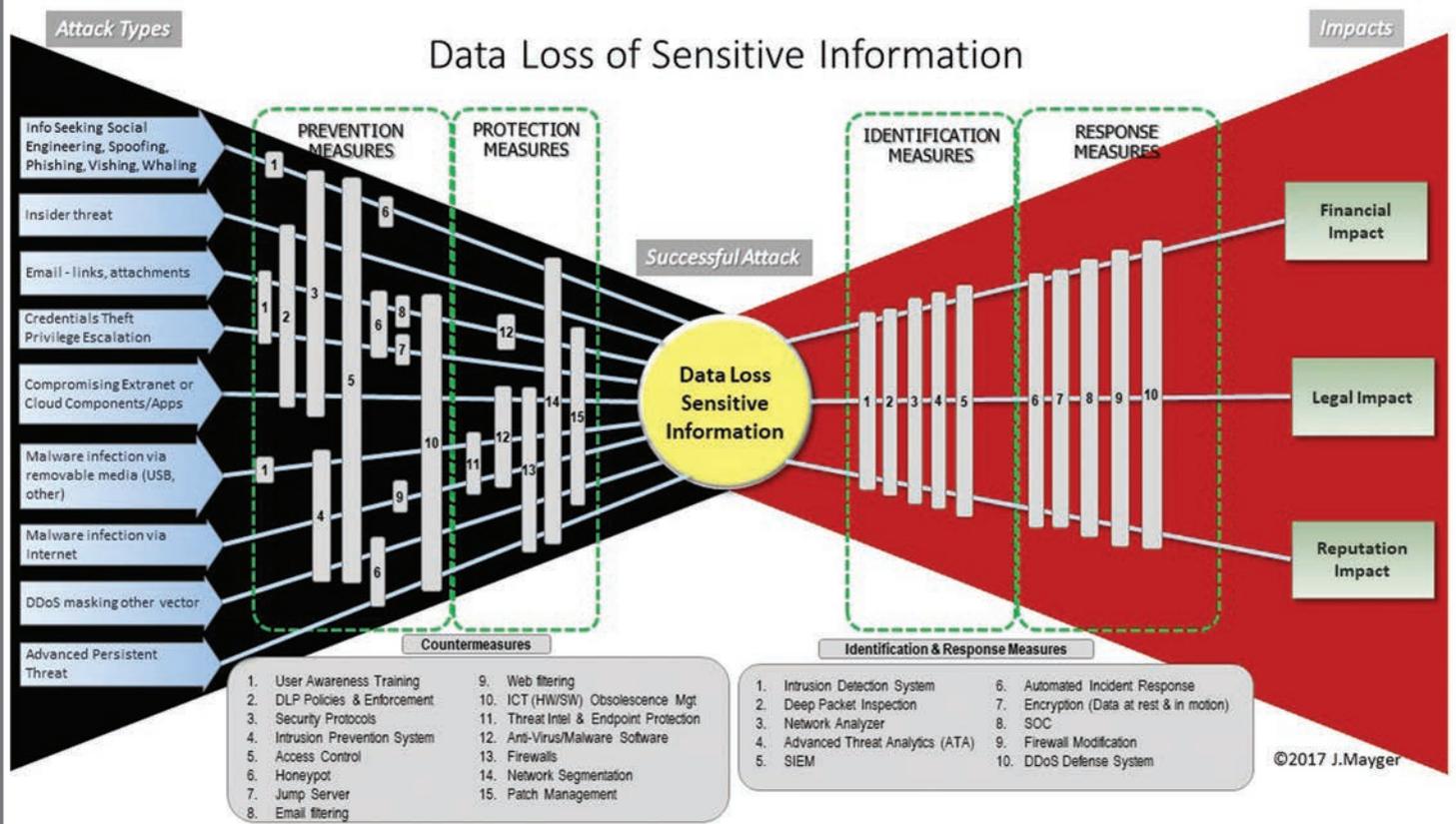
“Digital vigilantes weaponize vulnerability disclosure”

“Rushed digital transformation destroys trust”

It's easy to become desensitized to cyber threats in the face of shrill ever-present headlines and the feeling of helplessness that no matter what we do, it's never good enough. But ignoring safety is never wise. Disregard of cyber safety endangers not only businesses where we work, but can also hurt us personally when we ignore cyber hygiene in internet banking, social media and many other online pursuits. While there is no silver bullet and no one solution to cyber safety, layered defenses are best practices and rely on multiple measures to

detect and protect against cyber dangers (see Figure 1).

Advanced by Shell Oil in the early nineties, the 'bow-tie' method is one way of analyzing and detecting weak points or gaps in how risk is managed. The method takes its name from the shape of the diagram, which looks like a bowtie. The bowtie diagram mainly does two things. First, it gives a visual summary of all plausible incident scenarios that could exist around a certain hazard. Second, the bowtie represents what a company can do to control those scenarios by identifying





While there is no silver bullet and no one solution to cyber safety, layered defenses are best practices and rely on multiple measures to detect and protect against cyber dangers

tripwires or safety barriers. By applying the bowtie to cyber risks, we can visualize their impact and mitigating activities, creating a clear differentiation between proactive and reactive risk management.

The starting point of any bowtie analysis is the hazard, that which has potential to do damage, a successful attack. A successful cyberattack results in an event (represented by the center), and in this case, the event is data loss of sensitive information. Threats (on the left) are whatever will cause the event. Consequences are to the right, the result of the event (the impact). In the case of sensitive data loss, there may be financial, legal or reputational impact or all three. Prevention and protection measures (safety barriers) can prevent a successful attack. If the attack bypasses the countermeasures and there is a successful attack, identification and response measures are critical in mitigating the impact of a successful attack.

All cybersecurity risks and events can be illustrated by four bowtie analyses. These include:

- ***Data loss of sensitive information;***
- ***Malicious software infection;***
- ***Distributed denial of service (DDoS); and***
- ***Physical Information & communication technology (ICT) perimeter intrusion & unauthorized access to ICT equipment.***

Since best practices for information security involve layered defenses, security programs should deploy multiple prevention, protection, identification, and response measures. These best practices are relevant to any network environment such as process control networks, industrial control systems or corporate networks. One very necessary measure is the establishment of a Security Operations Center (SOC), which monitors, detects, investigates, and responds to cyberattacks, around the clock. A SOC for 10,000 employees costs about USD \$1 million annually. But among all the defensive measures, a SOC lowers the risk exposure from cyberattacks the most.

Another necessary measure, Security Awareness Training is critically important because one-third of cyber breaches are caused by employees/insiders.

Cybersecurity budgets vary depending on the industry and risk. Defense companies are high on risk because of nation-state spying. Utilities supporting critical infrastructure have elevated risk profiles as well. Banks tend to spend more than construction companies, but the average annual cybersecurity

budget across all industries is approximately one-quarter of one percent of revenues. For instance, a USD 3 billion dollar industrial company should target approximately USD \$8 million yearly on cybersecurity.

Privacy concerns and breaches have resulted in the European General Data Protection Requirement (GDPR). The California Consumer Privacy Act (CCPA) takes effect on January 1, 2020. Both regulations have far-reaching tentacles and teeth. Non-compliance with GDPR can result in fines up to 20 million Euro or 4 percent of annual global revenue, whichever is higher. CCPA will levy fines of USD \$7,500 per violation if the business does not cure the violation within 30 days of being notified. An effective security program is a necessity for multiple reasons including good governance and, to be sure, no company wants to be in the cross-hairs of regulators.

An experienced security practitioner can frame security in terms of risk, the language of executive management. While the amount of security (and budget) depends on the company's risk appetite, insufficient security elevates risk. The migration of applications to AWS or Azure adds a new layer of complexity. A cybersecurity consultant can help companies meet their security needs including cloud app security, network security architecture, governance and regulatory compliance, business continuity planning, assessments and audits, or augmenting staff to close temporary skill shortages to name a few.

It used to be death and taxes were the only certainty. Today it's also about getting hacked. English author Aldous Huxley said that cynical realism is the intelligent man's best excuse for doing nothing in an intolerable situation. Doing nothing is not an option in cybersecurity.

The Author **Jeffery Mayger**

provides cyber security advisory services at Concord, a consultancy for information technology integration and security services. His cybersecurity background includes Chief Information Security Officer (CISO) for global mining company Sibelco and information security services to upstream oil/gas customers. In addition to his B.S in Mechanical Engineering, Mr. Mayger also holds a Master of Business Administration (MBA) from the University of Texas. His Information Security background includes designations as Certified Information Security Professional (CIS-SP) and Certified SCADA Security Architect (CSSA). Mr. Mayger can be contacted at jeffery.mayger@concordusa.com.

Trust and Independence:

Key metrics for a consolidating market of Multi-Purpose Vessels.

By Kyriacos Panayides

The multipurpose sector has experienced a tough first half of 2019, following a trend of difficult market conditions spanning over a decade. Fallout from ongoing global political trade discussions is taking its toll on both project and commodity trades, cutting down volumes at a time when external competition from non-MPV carriers is at its most fierce and the MPV fleet is still struggling with overcapacity. Still, and as it has been noted by a number of stakeholders, the number of vessels with lift capacity of less than 100t SWL is in decline and this trend is expected to continue for the foreseeable future.

The overhaul of marine fuel driven by the impending IMO 2020 deadline has not thinned out the MPV fleet as much as some had anticipated. In fact, Drewry has reduced its forecasted demolition tonnage for 2019 by 17% in its latest quarterly report. This stems from the fact that most MPV carriers are planning to pass on the cost of the expensive low sulphur fuel oil to their customers. This levels the playing field for older vessels as it dodges the vast investment required to adopt alternative compliance options such as fitting scrubbers or LNG tanks, which would force older, less efficient, and less specialised vessels towards demolition – resulting in an aging fleet with limited lifting capacity, a lack of specialization that end users need, and leading to concerns amongst them about the safety of their cargoes during transit.

Meanwhile the MPV fleet is still fending off competition from bulkers and feeders side-stepping into the sector in search of project cargoes to buffer against their own declining commodity trades. The combination of elements contributing to the struggling multipurpose market has been enough to drive some carriers towards consolidation strategies and others out of business altogether, with owners of smaller fleets in particular unable to make up their losses.

Multipurpose operators, vying to retain their independence within the consolidating market, need to be strong in their positioning and their service offering. It takes unparalleled industry knowledge, expert engineering capabilities, a state-of-the-art fleet, and a solid reputation for delivering excellent



service under budget. At AAL, we've managed to uphold our commitment to our customers in this difficult market through prudence and effective forward planning. Without these cornerstones, it can prove difficult to retain business and generate profit in a time of reduced freight rates, as we've seen in numerous recent cases in the project cargo sector.

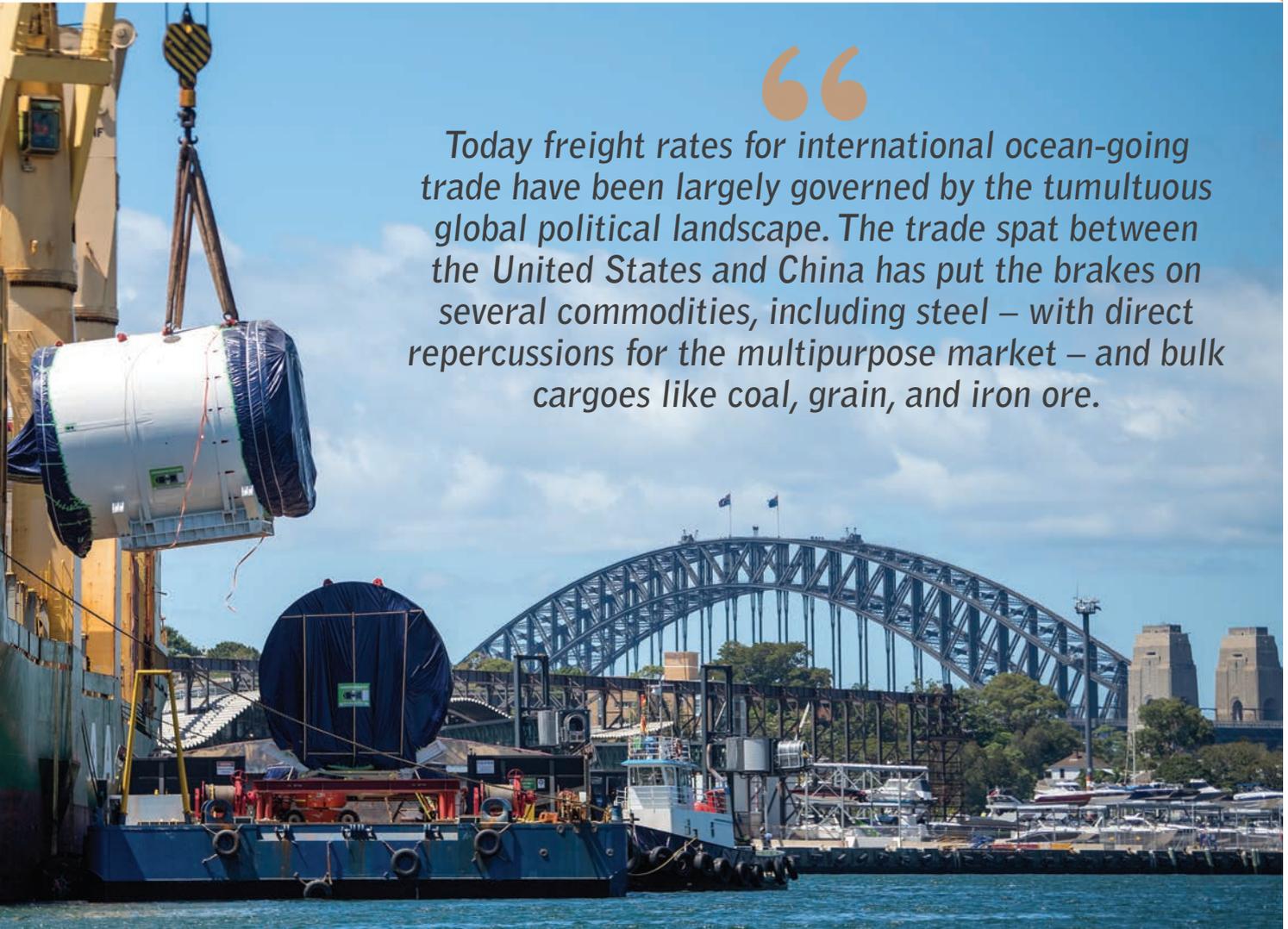
INVESTING IN TOMORROW

Today freight rates for international ocean-going trade have been largely governed by the tumultuous global political landscape. The trade spat between the United States and China has put the brakes on several commodities, including steel – with direct repercussions for the multipurpose market – and bulk cargoes like coal, grain, and iron ore. Furthermore, some major LNG projects in the United States have been postponed due to the trade uncertainties ahead.

The decline in bulk cargo trade, illustrated in Toepfer Trans-

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Today freight rates for international ocean-going trade have been largely governed by the tumultuous global political landscape. The trade spat between the United States and China has put the brakes on several commodities, including steel – with direct repercussions for the multipurpose market – and bulk cargoes like coal, grain, and iron ore.



port's sliding Baltic Dry Index early in 2019, has further pushed dry bulk vessels across market lines into the MPV sector for a piece of the project cargo pie. Meanwhile, instability of oil prices – equally hinged on global politics, and now in part on growing tensions within key trade lanes – are dissuading energy majors from signing off on oil & gas projects which constitute a large portion of the multipurpose market's core customer base. Over the longer term, oil prices are expected to average under USD \$70 per barrel and at this price there will be limited appetite for FIDs and new project investments.

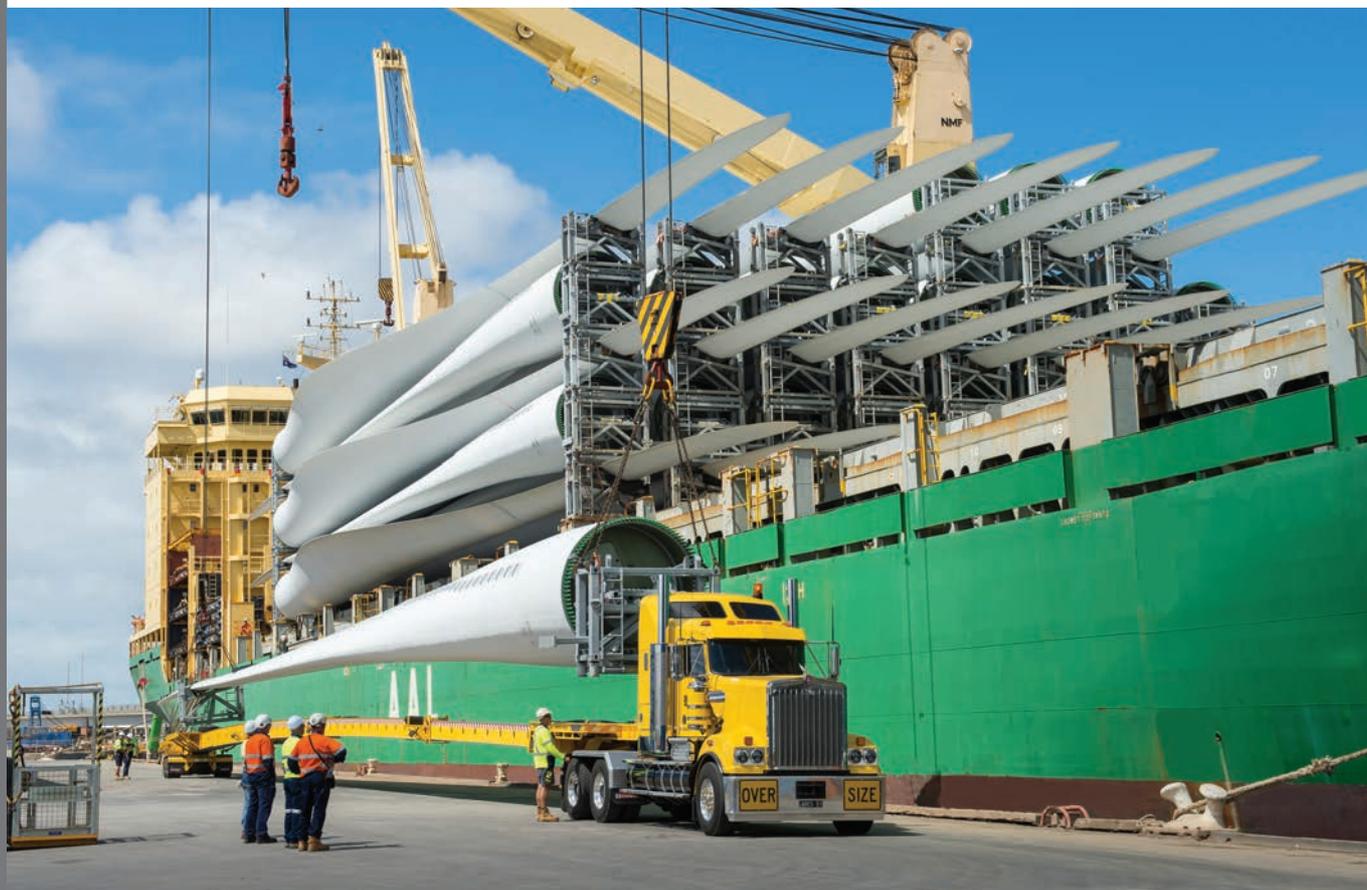
Freight rate recovery will depend on decreased capacity and increased cargo options, both of which hinge on the resolution of current political debates. A trade agreement between the US and China and the reduction or dissolution of current tariffs should improve global economic sentiment and see the flow of bulk cargoes revive, driving demand for bulk carriers in their primary markets. Likewise, this could restore stability to

oil prices and revitalise the energy market, unlocking investment into infrastructure projects.

These resolutions are however dependent on movements on the global political stage, away from national protectionism and towards a more collaborative, solutions-driven mindset, and the optimism towards this eventuality at the beginning of 2019 has yet to be rewarded.

THE (SOMEWHAT) SUNLIT UPLANDS

It is not all doom and gloom. The addressable demand for the multipurpose vessel (MPV) fleet is looking at an average annual growth of 1.2% to 2023, according to Drewry. And the increasing environmental awareness has also shifted investors' perspectives onto alternative methods of power generation. Policymakers, financiers, and the general public have given great support to investment in, renewable energy projects – chief among them, onshore and offshore wind.



Wind turbine capacity has grown considerably over recent years. This results in needing longer blades and more powerful components to generate enough power to supplement, and in some cases replace, existing fossil fuel power. The transportation of such turbine blades requires careful planning and expert engineering – as well as the huge open deck space and stacking capability needed to accommodate their sheer length.

With its growing fleet of ‘mega-size’ MPVs – offering wind energy customers some of the highest cargo intake volumes in the sector – AAL’s fleet is future-proofed for the new generation of larger turbine components. For example, its 31,000 dwt A-class vessels boast a cargo intake capacity of 40,000cbm and lifting capacity of 700 tonnes. In 2018, one of these mega-MPVs transported a record 45 wind blades (63m each) on a single sailing to the Port of Adelaide in Australia. These were bound for the new AGL Silverton Windfarm and will produce 780,000 MWh of renewable energy per year – enough power to maintain more than 137,000 Australian homes.

Onshore wind capacity alone is expected to jump 32% to 60 GW in 2019, so demand for vessels to carry wind equipment between continents is unlikely to dry up – such stability is much-needed given the market’s unpredictability. AAL recently launched its Europe-Far East service to cater for this consistent cargo stream, while employing multiple ves-

sel types with a variety of stowage configurations to provide regular sailings and highly flexible port calls for a broad range of cargo types alongside; including large and heavy project cargo, breakbulk, steel and dry bulk commodities.

The assurance of frequent sailings, flexible port calls, and a range of tonnage options continue to be a significant selling point for AAL’s customers and reinforces our reputation as a leading independent carrier within the multipurpose market. A customer-first, quality-focused approach to business enables the operator to remain independent within the consolidating market and continue to expand and strengthen global networks across Europe, Asia, the Middle East, Africa and the Americas.

The Author **Kyriacos Panayides**

is Managing Director at AAL. Panayides joined the ranks of the shipping industry in the early 1990s following his graduation in Business Administration and post graduate studies in Shipping. A Fellow of the Institute of Chartered Shipbrokers, he combines extensive experience in multiple sectors of the shipping industry, such as shipowning, shipmanagement, commercial operations, tanker pools, liners and shipping agencies. Throughout his career, he has been involved in numerous shipping projects and transactions, as well as holding several directorial positions in shipping companies belonging to the Schoeller Holdings Group. Since 2015 he has resided in Singapore as Managing Director of AAL Shipping.



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CLASSNK'S PORT STATE CONTROL ANNUAL REPORT



Classification society ClassNK in July released its annual report on Port State Control. The report aims to assist ship operators and management companies in maintaining compliant operations by providing information about ships detained by PSC as well as deficiencies that were found on board from many port states in 2018. This comprehensive Annual Report on Port State Control (PSC) summarizes deficiencies identified during PSC inspections carried out in various countries around the world. According to ClassNK, the report is prepared with the objective of building awareness with the present state of PSC and thereby improving future onboard maintenance and inspections, and as well as Safety Management Systems.

Chapter 5, in particular, should be of great interest to *MLPro* readers. It contains statistical data from three key organizations; the Tokyo MOU, Paris MoU and the United States Coast Guard. Because these and other regional MOUs and Port States publicly announce their PSC data on their websites and publish Annual Reports every year, ClassNK was able to introduce abstracts of the recent results of detentions by the Tokyo MOU, the Paris MoU and the USCG in 2018. The similarities and differences between the three are telling. The data is voluminous and there are many ways to look at it. *In this case, we'll look at inspections and detentions per Recognized Organization – or in other words – the IACS Classification Society responsible for each vessel.*

Tokyo MOU

Also according to the Tokyo MOU annual report, in cases where a ship's certificates were issued by more than one recognized organization (RO), the number of inspections would be counted towards both of organizations, while the number of detentions would be counted only towards the RO that issued the certificate relating to the detainable deficiency or deficiencies. In 2018, 31,589 inspections were carried out in the Tokyo MOU region, and 934 ships were detained due to serious deficiencies found onboard. The following table depicts Inspections and Detentions per Recognized Organization (Tokyo MOU):

Recognized Organization	No. Inspections 2016 - 2018	No. Detentions 2016 - 2018	Detention Ratio (%)
ABS	11,353	213	1.88
BV	11,439	360	3.15
CCS	7,580	58	0.77
CRS	141	8	5.67
DNV GL	27,584	606	2.20
IRS	261	11	4.21
KR	9,545	165	1.73
LR	14,569	318	2.18
NK	32,754	812	2.48
PRS	135	9	6.67
RINA	3,125	93	2.98
RS	1,382	57	4.12



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In 2018, 17,952 inspections were carried out in the Paris MoU region, and 566 ships were detained due to serious deficiencies found on board. The following table shows the PSC performance of IACS affiliated Recognized Organizations among those announced by the Paris MoU for the three years from 2016 through 2018.

Recognized Organization	No. of Inspections 2016 - 2018	RO-responsible Detentions 2016-18	Performance Level
ABS	6,009	2	High
DNV GL	18,192	18	
CCS	869	0	
LR	12,505	14	
BV	11,450	25	
NK	8,393	23	
KRS	1,233	2	
RINA	4,427	13	
RS	2,926	15	
PRS	531	3	
CRS	153	1	
IRS	155	3	Medium

U.S. Coast Guard

Closer to home, and in 2018, a total of 10,418 individual vessels visited U.S. ports, and a total of 9,025 SOLAS based safety examinations were conducted by the USCG during the year. The following table(s) of USCG Statistics shows the number of safety related detentions for the three years from 2016 through 2018. *The good news?* The three-year average detention ratio decreased for the second year in a row from 1.39% to 1.06%. Like the Paris MoU and the Tokyo MOU, the Coast Guard also breaks the data down many different ways; in the second table below, by Classification society, as well.

Detentions by Year (Safety / SOLAS-based Assessments)

YEAR	Distinct Vessel Arrivals (*)	Detentions	Annual Detention Ratio (%)	3 Year AVG Detention Ratio
2016	9,859	98	1.04%	1.58%
2017	10,190	91	0.98%	1.39%
2018	10,418	105	1.16%	1.06%

(*) Distinct Vessel Arrivals: Number of ships greater than or equal to 500 GT, calling upon at least one U.S. port. SOURCE: USCG

Recognized Organization Performance Table (USCG)

Class	Vessel Examinations				Class-Related Deficiencies				Detention	Targeted	
	Society	2016	2017	2018	Total	2016	2017	2018	Total	Ratio	Points
ABS	1,836	1,685	1,936	5,457	-	-	-	-	-	0.00%	0 points
BV	1,113	1,166	1,191	3,470	-	-	2	2	0.05%	0 points	
CCS	231	194	240	665	-	-	-	-	0.00%	0 points	
CRS	17	14	20	51	-	-	-	-	0.00%	0 points	
DNV GL	2,122	3,271	3,658	9,051	-	-	3	3	0.03%	0 points	
IRS	13	13	22	48	-	-	-	-	0.00%	0 points	
KR	242	314	269	825	-	-	-	-	0.00%	0 points	
LR	2,403	2,405	2,684	7056	-	1	-	1	0.01%	0 points	
NK	2,296	2,282	2,478	6,941	-	-	1	-	0.01%	0 points	
PRS	17	22	32	71	-	-	-	-	0.00%	0 points	
RINA	284	320	431	1,035	-	-	-	-	0.00%	0 points	
RS	34	29	32	95	-	-	1	1	1.05%	5 points	

The full text of each respective Annual Report can be obtained from the following websites:
 Tokyo MOU <http://www.tokyo-mou.org> / Paris MoU <http://www.parismou.org> / USCG <http://www.uscg.mil/>

The ClassNK Port State Control Annual Report can be downloaded by clicking:
https://www.classnk.or.jp/hp/pdf/publications/Publications_image/PSC18E.pdf

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A Closer Look



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PORTS: Baltimore



CREDIT: John Wilhelm

The Port of Baltimore is poised to muscle its way into the nation's elite top 10 ports. How that happened really isn't hard to understand. That's because what comes next will be the dividend of many years of focused planning.

By Joseph Keefe



The Port of Baltimore is one of only a few East Coast ports able to handle some of the world's largest ships, welcoming the 14,424 TEU Evergreen Triton earlier this year.

overall increase in tons. Coal exports continue to set records with over 21.5 million tons exported in 2018. 2018 also brought the first LNG exports through the Port. The POB also saw growth in the overall general cargo tons led by containers and automobiles.

Also in 2018, the Maryland Port Administration (MPA) handled a record 10.9 million tons of general cargo at the State owned marine terminals. In terms of containers alone, a record 1,023,161 TEU's were handled and this marked the 9th straight year of growth in containers.

Separately, the Port of Baltimore handled over 850,000 auto units in 2018 (another record). Today, the Port of Baltimore is ranked as the nation's 11th largest port in terms of foreign cargo tonnage and 9th largest in terms of dollar value. Still, and at the same time, countless other U.S. ports reported 'record' volumes and tonnage of one kind or another in the past 12 months.

At a time when trade wars and the perception of a slowing global economy might suggest that the party is over (for many domestic ports), much is still happening in Baltimore that portends even greater cargo volumes – of all types. None of that happened by accident. Nevertheless, and with no shortage of happy port stories emanating from sea to shining sea, it takes an unusual set of circumstances to project even more excitement in any one location. Baltimore's story is one such place. Diversification – and careful planning – is what fuels that engine.

Breakbulk: location, location and ... location

Not everything fits into a 40-foot steel box. Hence, and in a business where flashy container numbers often dominate the conversation, breakbulk operations also constitute an important and interesting slice of that general cargo pie. Baltimore owns a big part of it. That's because the Port's location and proximity to states such as Pennsylvania, West Virginia, and Ohio allow it to be an ideal port for handling cargo destined to those states. In the hinterlands, the demand for breakbulk, special project cargoes is still robust.

The power generation markets, as well as the auto press projects going to Detroit, are all handled at POB. Recently, an ongoing export business of nuclear casts weighing up to 300,000 pounds with accessory crates weighing up to 80,000 pounds came through the Port of Baltimore destined for Russia, South Africa, and the UK. According to Richard Scher, Director of Communications, MDOT Maryland Port Administration, at the Port of Baltimore, "The public terminals have made significant inroads in recent years with other breakbulk cargoes, including wind turbines, transformers, locomotives, refinery and energy production equipment." He continued, "Two heavy lift cranes and enhanced on-dock rail capabili-

The Port of Baltimore consists of state owned marine terminals managed by the MPA and privately owned marine terminals. Approximately 90 percent of all general cargo tons move through the MPA's public terminals, while the private terminals handled most of the Port's bulk commodities.

In 2018, the Port of Baltimore (POB) experienced a record year in foreign cargo tons. Import and export tons totaled nearly 43 million tons, surpassing the previous mark set in 1974. The value of foreign cargo that the POB handled was \$59.7 billion. Coal and LNG exports were the primary reason for the ports

Port of Baltimore

ties allow direct discharge on and off a ship. Dundalk Marine Terminal sports three heavy lift pads with a capacity of 32.5 tons per axle per pad which helps the Port with heavier loads.”

Baltimore: anything but boxed in

In 2018, the Port of Baltimore (POB) experienced a record year in foreign cargo tons. Import and export tons totaled nearly 43 million tons, surpassing the previous mark set in 1974. Headlining that growth was twelve months of simply huge container growth, with the Port surpassing one million TEU’s for the first time ever. As impressive as that growth might be, it is also likely that the port hasn’t even scratched the surface of where it could be, five years from now.

Not one, but three different infrastructure advantages, one involving natural circumstances and the other, coming improvements, could propel that growth even further. First, Baltimore is one of the only East Coast ports with the necessary water depth and infrastructure that’s able to accommodate the today’s supersized post-panamax boxships. Beyond this, and perhaps just as important, the Maryland Department of Transportation’s Maryland Port Administration (MDOT MPA) will soon receive \$6.6 million in U.S. Department of Transportation grant funding to contribute to a project that will deepen a second container berth to 50 feet at the Port of Baltimore’s Seagirt Marine Terminal. Beyond this, and importantly, the state of Maryland will contribute \$7.8 million and Ports America Chesapeake, which operates the Seagirt Marine Terminal for the MDOT MPA, will add \$18.4 million for a total project cost of \$32.7 million. That’s the quintessential definition of a so-called P3 – public-private – partnership.

Richard Scher explains, “We have an outstanding relationship with Ports America Chesapeake, our private partner at our Seagirt Terminal.” He continued, “It is a true partnership. We communicate every day, Travel and work closely together to market and promote container business through The Port of Baltimore.” Importantly, Ports America constructed the deep berth, paid for the supersized ZPMC cranes and will do the same for the new 50-Foot berth. “We look forward to many successful years working with them,” he added.

Last but certainly not least, it has been said many times by many port executives that access to a class 1 rail system is key to any big port’s growth plans, especially as the nation’s highways become more and more congested. The ability to ship and receive boxes from the hinterlands, eschewing the long highway route for the short, so-called ‘last mile’ delivery, also speaks to a port’s commitment to a greener environmental signature – inside and outside its gates. If so, then Big Baltimore has that box checked, as well.

Today, The Port of Baltimore offers access to not one, but two Class One ‘on-dock’ railroads; namely, CSX AND NS. Scher adds enthusiastically, “They are key partners of ours. Also, we will be adjusting Baltimore’s Howard Street Tunnel, NEL, which is owned by CSX, to handle double stacked container trains. That will make us more competitive with New York and Virginia on the container side on the freight equation.”

Rolling Along with RO/RO

The Port of Baltimore handled over 850,000 auto units in 2018 (another record). Indeed, among the nation’s ports, the Port of Baltimore ranks first for autos and light trucks, roll

TOP U.S. PORTS CARGO IN VALUE (IN MILLIONS)

Rank	U.S. Port	2018	2017
1	Los Angeles	\$ 297,048	\$ 283,940
2	Port of NY/NJ	\$ 206,827	\$ 189,740
3	Houston	\$ 159,249	\$ 131,474
4	Georgia Ports	\$ 119,516	\$ 107,675
5	Long Beach	\$ 109,166	\$ 99,897
6	Virginia Ports	\$ 79,336	\$ 77,757
7	SeaTac	\$ 77,510	\$ 75,245
8	SC Ports	\$ 72,690	\$ 69,754
9	Baltimore	\$ 59,723	\$ 53,962
10	New Orleans	\$ 53,371	\$ 50,171
11	Oakland	\$ 49,203	\$ 47,790
ALL	Top 25	\$ 1,761,609	\$ 1,602,201

TOP U.S. PORTS CARGO (TOTAL TONS)

Rank	U.S. Port	2018 Tons	2017 Tons
1	Houston	201,540,173	180,855,210
2	New Orleans	127,643,304	127,795,757
3	Port of NY/NJ	85,170,792	81,626,497
4	Los Angeles	80,378,413	78,551,891
5	Gramercy	80,219,057	75,737,847
6	Virginia Ports	69,827,662	63,156,849
7	Corpus Christi	66,840,666	63,060,655
8	Long Beach	53,709,451	53,571,196
9	Port Arthur	52,920,432	50,534,141
10	Lake Charles	44,050,520	37,874,562
11	Baltimore	42,993,122	38,213,697
TOTALS	Top 25	1,600,723,570	1,527,434,07

on/roll off heavy farm and construction machinery – for eight consecutive years. Naturally, The Port of Baltimore hopes to continue that momentum. It turns out that, once again, location plays a major part in that enviable metric. For starters, says POB’s Scher, “The Port of Baltimore is further inland than any other East Coast Port. That puts us closer to the Midwestern markets and associated manufacturing facilities than other ports.” It starts with locality, then, but it doesn’t end there.

The port also offers four on-dock auto processors, all of which provide a number of good choices for automakers. “The Port of Baltimore has a unique quality program unmatched by any other port,” insists Scher, who explains further, “This includes monthly meetings with all the key players in the auto supply chain to discuss current performance and best practices.”

Acknowledging Today’s Success, Planning for Tomorrow’s Changes

When it comes to the Port of Baltimore, local port executives can point to any number of cargo modes and types as ample proof of the port’s national and global competitive positions. Among those cargoes, the Port ranks second in the nation in terms of exported coal. The value of foreign cargo that the POB handled was \$59.7 billion. Moreover, Coal and LNG exports were the primary reason for the ports overall increase in tons. Last year, coal exports continue to set records with over 21.5 million tons exported in 2018, the same year that also brought the first LNG exports through the Port.

The news comes with caveats, however. A more friendly federal position on the use of coal as well as several external variables (foreign casualties, logistics) drove some of those gains. But, Baltimore can’t rely on coal forever. Inland barge operators know this and are actively positioning themselves for the future, weaning themselves from a dependence on a commodity that, eventually, intense pressure from the environmental lobbies and political arenas will exact its toll.

To be fair, the state-owned public marine terminals here don’t handle coal for the Port of Baltimore, hence POB declined comment on that situation. Nevertheless, coal remains a big part of the port’s business mix, if only for a limited – as yet defined – period into the future. If and when that drop-off comes, however, POB will be ready.

The nation’s 11th largest port in terms of foreign cargo tonnage and 9th largest in terms of dollar value hasn’t been sitting on its hands; nor did it arrive in its enviable perch by accident. Richard Scher explained, “Our success stems from a strategic plan that we have been following for more than 20 years. That plan recommends a diverse cargo approach.” He continued, “Many other ports are container heavy, which means during challenging economic times, those ports have seen their container business drop by 40 percent, or more. By concentrating our efforts on not just containers, but also cars,

“We have an outstanding relationship with Ports American Chesapeake, our private partner at our Seagirt Terminal. It is a true partnership. We communicate every day, Travel and work closely together to market and promote container business through The Port of Baltimore. We look forward to many successful years working with them.”

– Richard Scher,
Director of Communications, MDOT
Maryland Port Administration
— Port of Baltimore

heavy machinery, forest products and breakbulk, we are better able to absorb harder hits against one particular commodity. We are very happy with how we are trending.”

Looming Large in the Center Porthole

If yesterday’s homer runs don’t win today’s ballgames, then a look back at the Port of Baltimore’s state-owned marine terminal’s record for its Best Fiscal Year (July 2017-June 2018) for general cargo tons and most TEU’s in a single month (90,152, May 2018) are nice memories, but in no way a guarantee of future performance. Nevertheless, and despite the looming rain clouds of a (possibly) slowing economy and the specter of a full-blown trade war between the United States and China, POB’s cargo numbers are up from the record plateaus of 2018. “General cargo is up two percent, containers, are up six percent and cars are up six percent last year’s record totals,” said Scher.

Knocking on the door to the coveted Top Ten list, this diverse port already boasts leadership in more than one sector. But, Baltimore’s real strength resides in its multi-modal, diverse cargo base. Containers, bulk, breakbulk, RO/RO and a fair tanker trade spanning petroleum and LNG; that’s an enviable spread. Common sense says that even modest growth across all modes would propel the port to the next level. Deeper, wider, diverse and growing, Baltimore’s future is limited only by the imagination of its principals, cargo stakeholders and the supply chain itself. That’s big. That’s **Big Baltimore**.

Breakbulk



CREDIT: Port of Houston

Breaks

the

Mold

In the cargo shipping world, there's the bulk sector, the container segment, and then, there is "everything else."

By Barry Parker

When it comes to 'everything else,' breakbulk is the cargo that resides in between, comprising much of that remainder, including forest products (lumber, baled pulp) and steel. Breakbulk may, at times, share space on multipurpose vessels that also handle heavylift and project cargo, but can also be transported on vessels that handle drybulk. Prior to the advent of containerization, bales, barrels and pallets dominated. Today, most general cargo moves in standard sized containers.

Where the items have not been containerized, many move on vessels, both multipurpose and drybulk, often scheduled in semi-regular breakbulk "parcel" services. But beyond cargo and vessel data, breakbulk is all about service, with carriers customizing their offerings to attract demanding movers of industrial cargo.

Analysts at Drewry, who closely cover the marketplace for multi-purpose vessels (MPV) which haul substantial amounts of breakbulk cargo, say "The ultimate driver for that sector is



“

While momentum on this service continues to build, the Great Lakes and the St. Lawrence Seaway system continue to be a vastly underutilized alternative for cargo owners and freight forwarders that seek a more efficient connection to global markets. This is mainly due to governmental policies that prohibit a year-round season, in addition to other regulatory barriers.”

– David Gutheil, Chief Commercial Officer, Port of Cleveland



CREDIT: FEDNAVMEIAPAGE



CREDIT: Port of Cleveland

overall dry cargo demand.” In a report published in late 2018, the London-based consultants peg annual overall dry demand at 8 billion tons; 5 billion tons of which are bulk, and the remaining 3 billion tons, as general cargo. As much as two billion tons of that ‘general cargo’ category is moved as containerized goods.

THE MARKET: SUPPLY, DEMAND ... AND TRADE WARS

When evaluating market prospects, the supply side can get tricky, with various vessel types available depending on circumstances. Drewry analysis shows that multipurpose carriers can move bulk cargo. Specifically, in recent years, 1.3 billion tons of bulk cargo have moved on MPVs, especially where availability is subject to the vagaries of both vessel supply and cargo demand. Conversely, breakbulk cargo moves on smaller bulk carriers- readily available in times of glut; but stronger bulk carrier markets may pull tonnage away from the breakbulk trades. During July 2019, the drybulk market strengthened significantly (tripling actually) with the Baltic Dry Index (BDI) reaching over 2,000 for the first time since 2015, before backing down on renewed trade fears in early August.

On the demand side, the ongoing trade wars and related tariffs are an ongoing concern, with cargo destinations shifting for containerized cargo, some bulk and for breakbulk. Steel trades are a big component of the ‘everything else’ that is breakbulk. China,

while the subject of much attention, has not been a major supplier of steel into the United States, where steel imports into are down.

To be sure, the trade wars have taken a toll on imports of steel into the United States. U.S. Department of Commerce (DOC) data shows 2018 imports of 30.8 million metric tons (mmt), with 9.1 million of these from Canada and Mexico (both exempted from the tariffs in May 2019). Brazil (4.2 mmt) and South Korea (2.5 mmt) were exempted from the tariffs initially. Turkey had been hit with tariffs in 2018, which were eased back in Spring, 2019. On a monthly basis, DOC data shows 2.7 mmt of overall steel imports in May 2018, but only 1.9 mmt in May 2019.

The United States is a major breakbulk participant. Consider the U.S. Great Lakes, where Dutch shipping company Spliethoff and The Cleveland-Cuyahoga County Port Authority in Cleveland, Ohio launched a combined general cargo/ container run in late 2013. Dubbed the Cleveland-Europe Express, the route links the Ohio port with Antwerp. Montreal-based Fednav has also struck up a partnership of sorts with the Ports of Indiana, which operates Burns Harbor on Lake Michigan. David Gutheil, Chief Commercial Officer, Port of Cleveland, told *MLPro*, “The Port of Cleveland initiated the Cleveland-Europe Express in 2014 with the goal of diversifying our cargo base by attracting new containerized and project cargoes.”

The St. Lawrence Seaway, linking the Lakes with the At-



CREDIT: Wagenborg

Atlantic has several months of downtime in the winter, creating a problem for cargo interests striving for year-round consistency. Gutheil addressed this issue, highlighting institutional blockages, by saying, “While momentum on this service continues to build, the Great Lakes and the St. Lawrence Seaway system continue to be a vastly underutilized alternative for cargo owners and freight forwarders that seek a more efficient connection to global markets. This is mainly due to governmental policies that prohibit a year-round season, in addition to other regulatory barriers. Our current national policies and funding mechanisms continue to steer cargoes to coastal ports that are already highly congested, instead of developing policies that should promote the use of a deepwater, inland maritime system that moves cargoes closer to their origin or final destination.” In the important Europe-Great Lakes trades, Polsteam (with long standing contracts to move steel into the Lakes) and Royal Wagenborg are also major participants.

Notwithstanding the issues wrought by winter closures, Cleveland and Burns Harbor both have a “Plan B” for these winter months, when the Lakes are closed. During this time, cargo originating in (or bound for) the U.S. industrial heartland in the Midwest, can be trucked or railed with through bills of lading, through Fednav’s major hub in Montreal. Separately, Spliethoff runs cargo through the Valport Terminal in Valleyfield, just to the west.

The port of Houston is also major breakbulk gateway with products tied to the oil industry (and burgeoning activity in the Permian Basin and elsewhere) leading the charge. This year, overall tonnage increased, with statistics provided by the port showing steel imports increasing from May 2018’s 384,066 tons to 488,785 (26 % of total U.S. steel imports in the month) in 2019; a gain of 27%. Year-to-date (through June), Houston’s steel imports were up from 2.1 mmt to 2.4 mmt.

THE PLAYERS

Parcel services are important throughout the sector. Two important operators in the thick of the breakbulk action are Ultrabulk (which has corporate roots in the venerable East Asiatic Company) and Clipper Bulk, both based in Denmark. Illustrative of the overlap in vessel types, Ultrabulk’s parcel service brings cargo into North America from northern Europe, the Mediterranean and South America on chartered in bulk carrier tonnage. The recently re-organized Clipper Bulk is concentrating on rebuilding its business around specific sectors; for example, its Clipper Steel service brings parcels into ports along the U.S. East Coast (including Savannah, Camden, NJ and New Haven, CT) and into the U.S. Gulf (Houston and Mobile, AL). Clipper is the part owner of a steel terminal in Altamira, Mexico, where a different run connects to ports around the U.S. Gulf and Caribbean.

BREAKBULK SHIPPING

Throughout the world markets, other well known vessel operators handling steel and wood parcels on a regular basis include Western Bulk, J Lauritzen and MUR Shipping (part of MacSteel), Island View Shipping (with major partner Nasdaq-listed Grindrod, presently examining strategic alternatives), and NYK Bulk and Project.

Forest products are also an important component of breakbulk, moving typically on multipurpose ships and smaller bulk carriers. G2Ocean (an amalgamation of what was Gearbulk and Grieg) is a dominant carrier. Its trades span the Atlantic and Pacific oceans, with a major run being British Columbia to Asia.

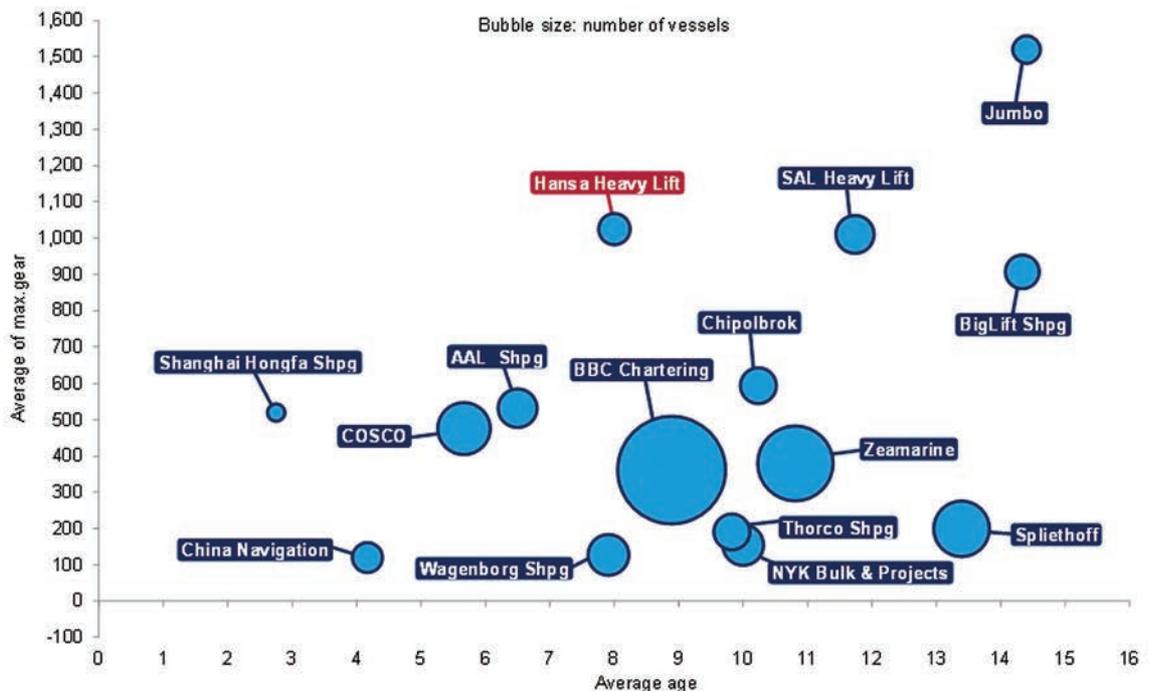
Specialized vessel configurations are an important element in breakbulk shipping. The G2Ocean online brochure explains, “As the leading carrier of unitized pulp, newsprint, fiberboard and other forest products, G2 Ocean understands how susceptible these commodities are to temperature fluctuation and moisture damage and how to prevent the damage from happening.” They add: “To control temperature and prevent condensation, we have equipped our vessels with forced draft ventilation and dehumidification plants. Our specialized cargo handling equipment, some of it purpose-designed, ensures safe handling during loading and discharge.” The fleet

includes Gearbulk vessels that are described as “Totally Enclosed Forestry Carriers (or “TEFC”s). These are fully covered, open hatch gantry crane vessels designed for weather-proof loading and discharge of all types of forest products.

Royal Wagenborg, with MPP and conventional but highly versatile bulk vessels also emphasizes the specialized nature of these trades, saying: “Our fleet is modern and environmentally friendly, and with the enormous diversity in type and tonnage we are able to offer just-in-time shipments for large cargo contracts as well as spot shipments.” The fleet includes ice-strengthened dry-cargo vessels- many with box shaped holds. They add, “With our diversity in size and tonnage we offer transport solutions to the market. Our fleet of paper carriers is used specifically for the transport of forestry products, such as paper and pulp ...”

Project cargo, typically consisting of large pieces of machinery, tanks, and, in recent years, components for electricity-generating windmills, all move on the same multi-purpose ships that are taking more conventional breakbulk, often in “liner” type services. Royal Wagenborg, the Netherlands based carrier, offers a regular breakbulk service into the Lakes, along with Spliethoff. BBC, an operator of multipurpose ves-

Selected Premium Project Carrier Operators



Source: Drewry's Multipurpose Shipping Market Review and Forecast (www.drewry.co.uk)

MARKET DRIVERS: SIZE MATTERS

Because breakbulk cargo is industrial (rather than consumer driven), there is a relationship element which centers on careful scheduling and consideration of shoreside logistics-contrasted with a very transactional commodity like shipping business (which characterizes certain portions of the drybulk market and many container runs). Another participant in the trade, Ultrabulk (actually part of a larger Chile based organization- Ultramar) explains on its website: “Our partnership philosophy is based on long-term relationships, combining cargo contracts and tonnage procurement into the vital core of the Ultrabulk business model.”

The philosophy is further expounded in the online brochure of Pacific Carriers Limited (PCL), part of the Kuok group. Its fleet includes high-specification Japanese built handy sized bulk carriers (mostly open-hatch types) which are used in the forest products and steel trades. PCL notes: “We have formed joint venture whenever there are synergies. Strategic alliances with our customers are explored regularly as major cargo interests prefer to work with major shipowners in order to the minimize risks of contracting with single vessel or small owners where the risks are larger. As a large ship owning entity, we offer cargo interests increased flexibility.”

Great Volumes, Great Lakes

The breadth of breakbulk cargoes, and the interaction with other cargo types, can be seen from a posting on the website of Royal Wagenborg, a Netherlands based mainstay in the sector with active presence in the Great Lakes and St.

Lawrence. *They describe the action as follows:*

Recently it was very busy on the St. Lawrence River in Canada with Wagenborg vessels. Several Wagenborg vessels were calling the port of Baie Comeau at the same period. M/V “Azoresborg” is loading paper for the Caribbean, the “Thamesborg” is preparing her holds to load aluminium, the “Taagborg” is also loading aluminium and the “Amstelborg” at anchorage is waiting for a berth to discharge anodes from China. Besides these vessels, the “Alaskaborg” is also on her way to Baie Comeau to load paper for Brazil and the “Tiberborg” is on her way to Port-Alfred, a few miles ahead of Baie Comeau. Finally, the “Eeborg” and the “Fuldaborg” just left the St. Lawrence River for Europe. The “Eeborg” set direction to Ireland from Montreal and the “Fuldaborg” is heading to Tilbury from Quebec.



The Author



Barry Parker

Parker of bdp1 Consulting Ltd provides strategic and tactical support, including analytics and communications, to businesses across the maritime spectrum. The company can be found online at www.conconnect.com

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New ‘Eyes’ on the Prize

Tappan Zee Constructors
‘See’ Below Hudson River
with Trimble Marine
Construction Systems and
Teledyne Marine Imaging.

By Kevin Garcia

Since 1955, the Tappan Zee Bridge has been a critical thoroughfare for New Yorkers commuting between Rockland and Westchester Counties, located approximately 20 miles north of Manhattan and across the Hudson River from each other. However, a heavy increase in traffic and exponentially increasing maintenance costs ultimately lead to the decision to replace the historic bridge. The new Governor Mario M. Cuomo Bridge, the longest crossing in the New York State Thruway system, is designed to meet the needs of the future while supporting economic growth.

In 2013, Tappan Zee Constructors was contracted to design and build the twin-span crossing. The north span of the bridge officially opened to westbound traffic in August 2017, and the eastbound span was completed in September 2018. Tappan Zee Constructors began deconstructing the old bridge in 2017 – work that continues in 2019.

The new structure is already a landmark, featuring a 3.1-mile twin span cable-stayed structure. The bridge’s angled main span towers make it visually striking from all angles. When fully completed, it will include eight general traffic lanes, four emergency shoulders, a shared bike / pedestrian path and state-of-the-art traffic monitoring systems. Also unique is that the bridge has been designed and constructed to be mass-transit ready and can accommodate commuter rail.

Marine & environmental challenges

When it began in 2013, the Governor Mario M. Cuomo Bridge was the largest infrastructure project in the US, and it



required careful design and planning throughout all phases. The project scope required driving more than 1,000 cylindrical piles into the Hudson riverbed to create 41 pillars to hold up each span of the bridge. The final phase of the project involved the careful deconstruction and removal of debris from the old bridge. Making the deconstruction phase more challenging was the accelerated schedule for the project, the sheer size of the bridge, variable water depths of the Hudson River below, and windy conditions. The flow of the Hudson River, wide tide ranges, and water clarity and visibility were also major issues.

“As soon as the excavator bucket, clam shell bucket, or cutter head on a dredge goes under the water you can no longer see it, so you really don’t know what’s happening,” said Lou Nash, president of Measutronics Corporation, an integrator of Trimble Marine technology.

Tappan Zee Constructors consulted with Nash, the Measutronics team and Trimble to overcome these challenges. The positioning and guidance systems used included Trimble and



Teledyne components – Trimble software, hardware, and sensors for positioning, guidance and tracking of machines, and Teledyne marine imaging sonar for subsurface applications.

Eliminating unknowns: real-world conditions vs. 'the plan'

Trimble Marine Construction software was used across the project for excavation, placement of structures and demolition work. Heavy equipment used included excavators, clam shell cranes, cutter head on a dredge and more. Regardless of the tool being used with the machine – buckets, pincers, shears, hammers, jackhammers – using the marine software and sonar equipment each had precise guidance, giving operators clarity and visibility to work.

Blake Yaffee, area manager for the project's demolition portion, explains that his team started by using the system to establish a baseline of conditions in the river. This began with 3D point cloud data collection of submerged features via a

survey vessel using sonar.

"We're able to look at the structure beforehand and then take that imagery, evaluate and confirm elevations, quantities and conditions," said Yaffee. "We were able to deal with any items that might create issues in advance of performing any actual work on the structure."

After a baseline was set, Tappan Zee Constructors then used TMC software and a Teledyne high resolution multibeam echosounder to create a plan for 'breaking up' the old bridge's concrete structures into rubble, which could then be safely removed from the river bottom. Surface data was then provided to the various machine types for guidance in deconstructing the submerged structures.

"From our system, what the operator sees in the first phase is where the tool has been so that he's getting proper coverage of the inner deconstruction process," said Nash. "Once he feels he has reached a certain level that they want to start removing the materials, the sonar comes in and maps out the debris so it's able to track the tool as he's doing a deconstruction and he's able to provide guidance to the machines that have to remove the debris."

A 'bird's eye view' with pinpoint accuracy

Andrew Teese, a machine operator on the project, says the positioning equipment has been a significant advancement compared to conventional 'hunting and pecking' required for this type of marine construction work. Using traditional methods, a crew would likely excavate in a grid-like pattern in the general location of the old pier, from one end to the other. Instead, he was able to use the Trimble system on a Manitowoc 999 crawler crane with a clamshell tool to clean up the bottom of the river where the old pier was dismantled.

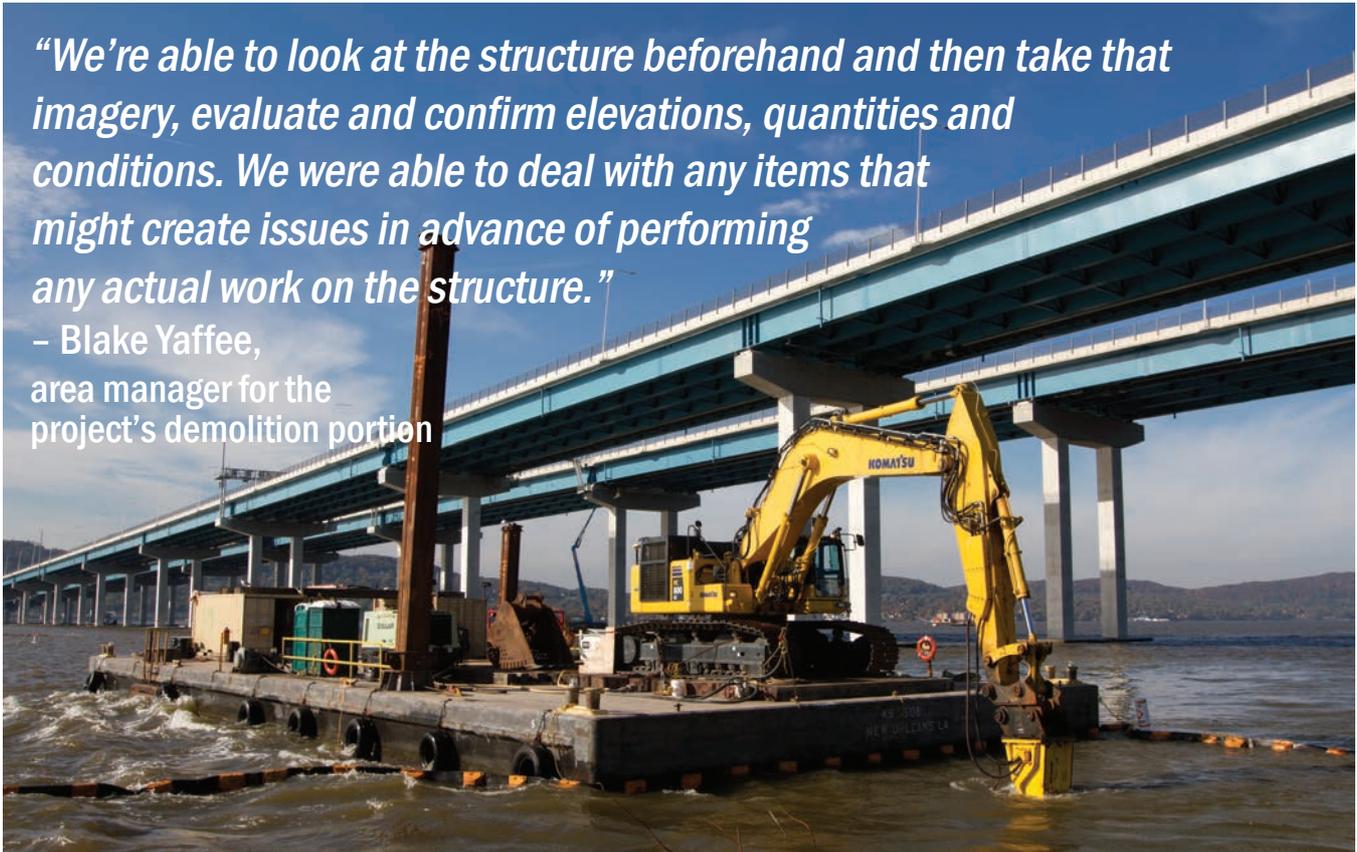
The software follows a 'traffic light-like' pattern, indicated in green on the operator's control box when excavation is needed and changing to yellow as the operator gets closer to grade. The system provides updated information so as the structure is 'broken up' and moved under the water, the images and colors are updated in real time. On the screen, Trimble's TMC software shows elevation, location, and a real-time 3D view. According to Teese, he has even been able to see and retrieve football-size pieces of concrete, which would have been nearly impossible to spot without sonar capabilities.

"It's a lot faster because we can see where we have been, we can see how wide the material had spread and we can progress through the pier and the rubble pile with accuracy," said Teese. "Things that you missed as you go through the area you can get a pinpoint location on, you don't have to look around for things, you just know where everything is."

With pinpoint imagery, including overlaid reference points and coordinates on top of the survey, the team then drew prisms around those 'missing' pieces of material and imported

“We’re able to look at the structure beforehand and then take that imagery, evaluate and confirm elevations, quantities and conditions. We were able to deal with any items that might create issues in advance of performing any actual work on the structure.”

– Blake Yaffee,
area manager for the
project’s demolition portion



that data into operators’ control boxes.

“Anybody that has performed water demolition is very familiar with the term ‘working in the blind’ because that’s basically what people do,” said Yaffee. “For us, the investment in the product against the scale of the project, together with the fact that the sonar and the software can be reconfigured and used on the next project, made it very easy for us to make the decision to bring this equipment on.”

Focus: Safety and the Environment

In addition to quickly identifying and removing debris underwater, precise positioning has helped Tappan Zee Constructors break up difficult components and material underwater, without relying solely on divers. Divers also have a more predictable and well-documented plan before they go underwater to work, which improves diver safety.

“Cutting steel piles with excavator mounted shears without either the support of a diver or spending a significant amount of time just feeling around is nearly impossible,” said Yaffee. “With this level of visibility and positioning we are certainly able to review the conditions with the divers before they go under.”

Scanning the river bottom, the team also identified eroded structures, components and materials that had collected over the years from the old bridge. Tappan Zee Constructors recorded these scans and was asked by the New York State

Thruway to remove the material. As a result, the site was returned to the state of New York in a more pristine condition than when they started work.

Yaffee believes that the technology has also allowed the team to carefully evaluate and document project progress. The tool’s real-time as-building capabilities provide daily insight into productivity and documentation that benchmarks were being met. Once tasks were completed, the team collected images of the area and identified any follow-on work that needed to be done.

Following this new workflow, Yaffee explains his team’s work has been safer, faster and more accurate. Not only that; the extended team can’t imagine going back to conventional methods.

“We no longer go through an evaluation process that we did initially to determine if it’s worth the investment, if there’s going to be a return on investment of bringing this equipment on,” said Yaffee. “In other words, it’s not going to make financial sense for us to have a piece of equipment out here that’s ‘blind’ while all the other pieces of equipment ‘have eyes.’”

The Author

Kevin Garcia



is business area manager for marine and specialty construction in Trimble’s Civil Engineering and Construction Division. He has more than 15 years of experience in specialty construction and can be reached at Kevin_Garcia@Trimble.com.



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OFFSHORE WIND: *CLOSE TO CONSTRUCTION?*

The beginning of July brought some upbeat, important news about offshore wind: **Construction!**

By Tom Ewing

Finally, starting with Dominion Energy's Coastal Virginia Offshore Wind Project, a joint venture with Danish wind developer Orsted is underway. True, this is a small project – just two wind turbines to be installed 27 miles east of Virginia Beach. But considering all the preceding hurdles, news about Dominion blew in as proverbial, hopeful fresh air. Surely, additional offshore wind construction news would quickly follow; news about a full line-up of projects ready to bust through interminable studies and studies of studies.

Indeed, there is a lot of offshore wind energy in the developmental pipeline. The table below shows wind energy areas (WEAs) from the Bureau of Ocean Energy Management

(BOEM) website, part of the Department of Interior. BOEM leads all federal offshore energy siting and development in the Outer Continental Shelf (OCS), including wind.

OFFSHORE WIND:

HARDER TO INSTALL THAN AN OIL PLATFORM

Importantly, a lease doesn't mean there is a project ready to go. In reality, there aren't many projects advancing within most of the WEAs. There are a lot of project ideas. New York State, for example, on July 18, announced its selection of two ocean-based wind proposals, a selection in response to a high-profile solicitation last November. The projects, Empire Wind and Sunrise Wind, are planned for Atlantic Ocean WEAs

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Current Leasing Status

Lease Number/Year	Company	Acres	State	Current Status
OCS-A 0482/2012	GSOE I, LLC	70,098	DE	SAP
OCS-A 0519/2018	Skipjack Offshore Energy, LLC	26,332	DE	COP
OCS-A 0483/2013	Virginia Electric and Power Company	112,799	VA	SAP
OCS-A 0486/2013	Deepwater Wind New England, LLC	97,498	RI/MA	COP
OCS-A 0487/2013	Deepwater Wind New England, LLC	67,252	RI/MA	SAP
OCS-A 0490/2014	US Wind Inc.	79,707	MD	SAP
OCS-A 0498/2016	Ocean Wind LLC	160,480	NJ	SAP
OCS-A 0499/2016	EDF Renewables Development, Inc.	183,353	NJ	SAP
OCS-A 0500/2015	Bay State Wind LLC	187,523	MA	COP
OCS-A 0501/2015	Vineyard Wind LLC	166,886	MA	COP
OCS-A 0508/2017	Avangrid Renewables, LLC	122,405	NC	SAP
OCS-A 0512/2017	Equinor Wind US LLC	79,350	NY	SAP
OCS-A 0520/2018	Equinor Wind US LLC	128,811	MA	SAP
OCS-A 0521/2018	Mayflower Wind Energy, LLC	127,388	MA	SAP
OCS-A 0522/2018	Vineyard Wind LLC	132,370	MA	SAP
Total		1,742,252		

Source: US Bureau of Ocean Energy Management (BOEM) / Notes: The lease number references location, ocean positioning and the filing year. SAP=Site Assessment Plan; COP=Construction and Operations Plan.

OCS-A 512 and OCS-A 487, respectively.

Except for Block Island in Rhode Island, all the work on US offshore wind is still preliminary, really just a library. Actually, the studies themselves are the projects. This investigative work is quite advanced in one or two WEAs. In others, lease holders have requested extensions. In some cases, work has stopped.

Importantly, the Atlantic isn't the only site with emerging projects. Icebreaker Wind is a six turbine, 20.7-megawatt offshore demonstration project in Lake Erie, eight miles from downtown Cleveland. It will be the first freshwater project in North America. It is winding down its regulatory and permit-

ting requirements, awaiting final okay from the Ohio Power Siting Board. Construction is slated for 2022.

The project most likely to start after Dominion is Vineyard Wind, off Massachusetts, about 14 miles from the southeast corner of Martha's Vineyard. Where power is concerned, this is the real deal: 800 MW, up to 100 offshore wind turbine generators.

A check on the federal Permitting Dashboard shows that Vineyard is tantalizingly close to completing seven major federal studies required to move to construction. Vineyard's work is estimated to be complete by November 14, 2019. (See Table 2 for a list of the federal studies required from Vineyard.)

Table 2: Federal Studies Required to Complete Vineyard's Federal Environmental Review & Permitting Process:

Study	Agency
Construction and Operations Plan	Department of Interior (DOI) and BOEM
Endangered Species Act (ESA) Consultation	DOI – Fish & Wildlife Service (FWS)
Section 10 Rivers and Harbors Act of 1899 and Section 404 Clean Water Act	US Army Corps of Engineers
ESA Consultation	Department of Commerce (DOC), and NOAA
Magnuson-Stevens Fishery Conservation and Management Act, Section 305 Essential Fish Habitat (EFH) Consultation	DOC and NOAA
Incidental Take Authorization – DOC - NOAA/NMFS (National Marine Fisheries Service)	DOC, NOAA, NMFS
Environmental Impact Statement (EIS)	DOI, BOEM

(*) This Table is just an example. Some projects require additional federal studies.

THE DASHBOARD LISTS TWO OTHER OFFSHORE WIND PROJECTS:

- *Bay State Wind, up to 110 WTGs, also off Martha's Vineyard: Permitting work started on the Construction and Operations Plan, in March of this year. All permitting is expected to be finished July 1, 2021.*
- *South Fork Wind Farm and South Fork Export Cable – a 15-turbine generation and cable project about 35 miles south-east of Long Island: South Fork has paused, according to the Dashboard. However, research work continues.*

Shortly after Dominion's optimistic announcement, Vineyard Wind received troubling news: that BOEM would not have its final approval – a Record of Decision – for the company's Environmental Impact Statement, expected on July 5. BOEM said its review was not complete, that it needed to push its deadline to August, later than expected, but still within the Agency's promised two-year window.

On its website, Vineyard Wind presented a stoical reply, commenting that the delay was disappointing, but not surprising for a first-time project. Vineyard Wind needs the formal Record of Decision (ROD) by BOEM to set its construction team in motion. The logistics are daunting.

Then there was more bad news for Vineyard Wind. This summary has only focused on federal reviews. In fact, of course, there are state and local reviews. And in Edgartown, MA, on Martha's Vineyard, the Edgartown Conservation Commission voted to deny Vineyard Wind the right to bury its transmission cables beneath Muskeget Channel, running through Nantucket Sound.

This unexpected "no" vote sent some difficult messages. Among many state governors and legislators offshore wind is unquestioned as a social and economic boon. At the local level, support is fractured. Vineyard Wind has since requested a superseding order from the Massachusetts Department of Environmental Protection (MA DEP) to overturn the Edgartown decision.

Residents in Easthampton, on Long Island, have raised similar, oppositional questions about the nearby South Fork project and its impact on Easthampton. Town officials may seek outside project review. New York's Department of Environmental Conservation has filed a preliminary nine-page set of comments advising NY's Public Service Commission that additional, extensive analysis is required before the project should be considered for a Certificate of Environmental Compatibility and Public Need.

In a message to BOEM, Vineyard Wind noted that "for a variety of reasons, it would be very challenging to move forward the Vineyard Wind 1 project in its current configuration if the final EIS is not issued within, approximately, the next four to six weeks" – or the end of August. MA DEP has up to 70 days to review Vineyard Wind's request. A DEP spokesperson said

the review will likely not take that long.

For Vineyard Wind, events may still turn as the company needs, but will that be timely? A Record of Decision is not an ending, it allows the next step within a much bigger process and sequence. A ROD confirmed in September could mean staying on schedule for work planned for November. A confirmation in November might be too late, for many reasons: weather challenges, marine mammal restrictions and, critically, too late to confirm contracts with specialty equipment suppliers and vessel operators.

ALL LOGISTICS ARE LOCAL

After BOEM's decision, next steps aren't much easier. Construction requires specialized vessels and equipment. Just how that might work is drawing a lot of brain power. The central challenge is that there are no American vessels available, as required by the Jones Act, for work in U.S. territory. It appears there are no vessels in the U.S. shipyard construction queue, either. The Shipbuilders Council of America represents American companies and shipyards. SCA was asked about new investments in new offshore wind vessels. SCA president Matthew Paxton sent a predictable e-mail reply, but one which left as many questions as it answered.

He said, "The industry is ready to build for the emerging offshore wind energy market and is looking forward to the opportunity. Additionally, the U.S. shipyard industry has the capability to build all kinds of vessels that are necessary to facilitate offshore wind installation construction."

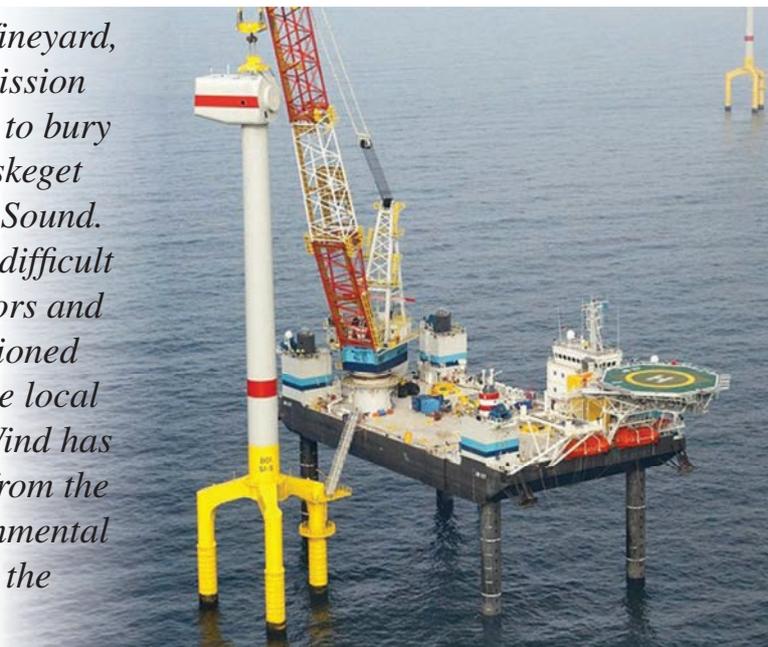
There are vessels available on the world market, but the Jones Act makes it difficult – almost impossible, save a waiver – for non-U.S. vessels to work in the United States. The Jones Act requires that all vessels working in US waters are American owned, American built and American crewed.

Emily Huggins Jones is an attorney with Squire Patton Boggs, based in Cleveland. She recently participated in a panel discussion, in Amsterdam, presented to European firms interested in the emerging US offshore wind market. Her advice: don't expect a Jones Act waiver.

Huggins Jones predicts that an initial project will follow the protocol used for Block Island: the requisite, foreign equipment will be moved to a work site, but not to a U.S. port. However, it will be supplied by Jones Act compliant vessels and barges.

She said this deliberate distancing can work to get this new industry started. "Will it be the same in ten years?" she asks rhetorically. "Probably not," she adds, "but we'll likely be at a place where those issues have been worked out." Huggins Jones said discussions are underway now at various corporate levels about whether it makes sense to have a pool of equipment, like the oil and gas industry. High costs are not the only problem. A bigger concern lurks in the background: whether there will be enough offshore wind work to justify those investments.

“... in Edgartown, MA, on Martha’s Vineyard, the Edgartown Conservation Commission voted to deny Vineyard Wind the right to bury its transmission cables beneath Muskeget Channel, running through Nantucket Sound. This unexpected “no” vote sent some difficult messages. Among many state governors and legislators offshore wind is unquestioned as a social and economic boon. At the local level, support is fractured. Vineyard Wind has since requested a superseding order from the Massachusetts Department of Environmental Protection (MA DEP) to overturn the Edgartown decision.”



Separately, Icebreaker Wind officials (Lake Erie) are also thinking about the Jones Act. Dave Karpinski is Icebreaker’s VP of Operations. He was asked about plans for vessels and equipment. Ideas include bringing in a heavy lift vessel through the St. Lawrence Seaway or modifying an available barge with a heavy crane. “We haven’t committed to one plan yet,” Karpinski said, adding, “We’ll need approximately 1 to 1½ years lead time.” Karpinski said a foreign heavy lift vessel would be Jones Act compliant because “we wouldn’t be coming into any U.S. port. This is how the Block Island Wind Farm turbines were installed.”

Separately, Orsted responded to questions about their marine strategy by saying in a prepared e-mail message, “While we won’t be using a Jones Act compliant vessel for the installation of the foundations and the turbines, because one does not exist, we will ensure that any construction activities are fully compliant with all relevant rules and regulations.”

LOOKING AHEAD: ONE SIZE DOES NOT FIT ALL

It is also true that wind company websites list multiple projects coming online soon, between 2021 and 2024. On the world market, then, there is considerable doubt that the equipment available to take on the addition of concurrent U.S. offshore wind construction projects.

Jurgen de Prez is Commercial Director of Jack-Up Barge (J-UB), a Netherlands based company that provides self-elevating platforms for the global offshore energy market. De Prez was asked about supply and demand. Right now, he said, there is some overcapacity in jack-ups. But he expects that to change when new U.S. and Asian projects start, placing new demands on existing equipment working in the North Sea. Another upcoming issue, de Prez explained, is that increases in

turbine capacity require jack-ups with longer legs and larger cranes. “In this emerging market segment,” de Prez noted, “there will be an undersupply.”

Equipment used by the oil and gas industry cannot install foundations and wind turbines. Right now, J-UB’s contracts are set about two years in advance. De Prez estimated industry lead time averages between one and a half and two years.

Offshore wind requires multiple specialized vessels. Each project is different, but De Prez said that, generally, a jack-up barge would be towed to the work site. Some jack-ups are outfitted with propulsion systems, allowing autonomous movement within the offshore windfarm. The exact vessel used depends on the phase of construction, de Prez explained. Foundations could be installed by a floating unit or a jack-up, but only a jack-up installs turbines. Cable lay vessels link it all together.

In a way, actually building an offshore wind farm isn’t the hardest part. The hardest part, really multiple parts, is starting a new industry almost from zero. It takes a lot of energy to reach critical mass – before it’s all linked together.

Only one thing is for certain today. When it comes to offshore wind – domestic offshore wind – getting these clean, green and renewable energy projects done is probably more difficult than getting permission to build a refinery. Opposition comes from many – sometimes surprising – quarters. The wind is coming; you can almost feel the breeze. The only question is: when?

The Author

Tom Ewing



is a freelance writer specializing in energy, environmental and related regulatory issues.

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TRANSFORMING TODAY'S TRANSPORTATION TERMINAL FOR TOMORROW'S TECHNOLOGY

LTE/5G industrial wireless prepares terminals for a digital future.

By Matthias Jablonowski

Having implemented successive waves of digital technology over the last few decades, most terminal operations in ports worldwide have a variety of wired and wireless network technologies ranging from UHF and VHF, over wireless sensor networks (WSN) and LPWA, to Ethernet, meshed wireless and Wi-Fi — each supporting a different application of the terminal. With today's 4G/LTE networks and the coming of 5G, it is now possible to consider consolidating many of these digital applications onto a single, secure wireless network that will lay the foundation for further automation and significant productivity gains.

Challenged by volatile global markets and growing volumes, terminal operators need to become more agile and responsive. Faster turnaround times, better coordination with truck and rail operators, and the ability to accommodate changing vessel sizes all put additional pressure on terminal operations. Across berth, yard, truck and train operations, there is a growing reliance on digital technologies. Industry 4.0 technologies such as IoT, machine learning and AI will play an increasingly critical role in meeting these challenges, partly by enabling the automation of terminals, which will, in turn, provide greater flexibility and operational savings.

THE 'SILOED' TERMINAL TECHNOLOGIES OF TODAY

Current communications technologies at use in most ports are not sufficient to meet the future needs of terminal operations as they embrace digital transformation — especially the requirements of Industry 4.0 applications in the area of autonomous and remote operations. Most terminals today have

implemented a wireless infrastructure based on Wi-Fi for data communications between the central TOS and TOS clients running on vehicle-mounted computers and tablets in cranes, terminal trucks and straddle carriers. This is mostly used for job allocation and workflow coordination.

Voice communications are usually handled by TETRA or VHF radio for staff communications. An Ethernet LAN typically backhauls the Wi-Fi access points and connects cameras and more stationary equipment, such as rail-mounted cranes, to the central operational and business applications.

The wireless portion is the area that can be best improved upon with today's 4G/LTE technology. The high degree of mobility inherent in port operations presents challenges for Wi-Fi and, in general, it is not nearly as reliable, secure or predictable.

4G/LTE technology, which was designed for mobile networks, is also much more secure, can handle greater numbers of users per radio and is capable of handling higher bandwidth applications such as video. Crucially, it can even provide Ethernet-level performance for video cameras, rubber-tired cranes or any other application that today requires expensive cabling infrastructure.

Although LTE has been available for almost a decade, it has mostly been monopolized by mobile network operators who licensed the spectrum for use by 4G/LTE mobile networks worldwide. Some of those public carriers have leased the spectrum for industrial applications, but the cost was usually too high to justify its use. Hence, the widespread reliance on Wi-Fi, which was never designed as anything other than a best-effort network technology, is unsuitable for business or mission-critical applications. Unfortunately, it was the only wireless networking option for most enterprises.



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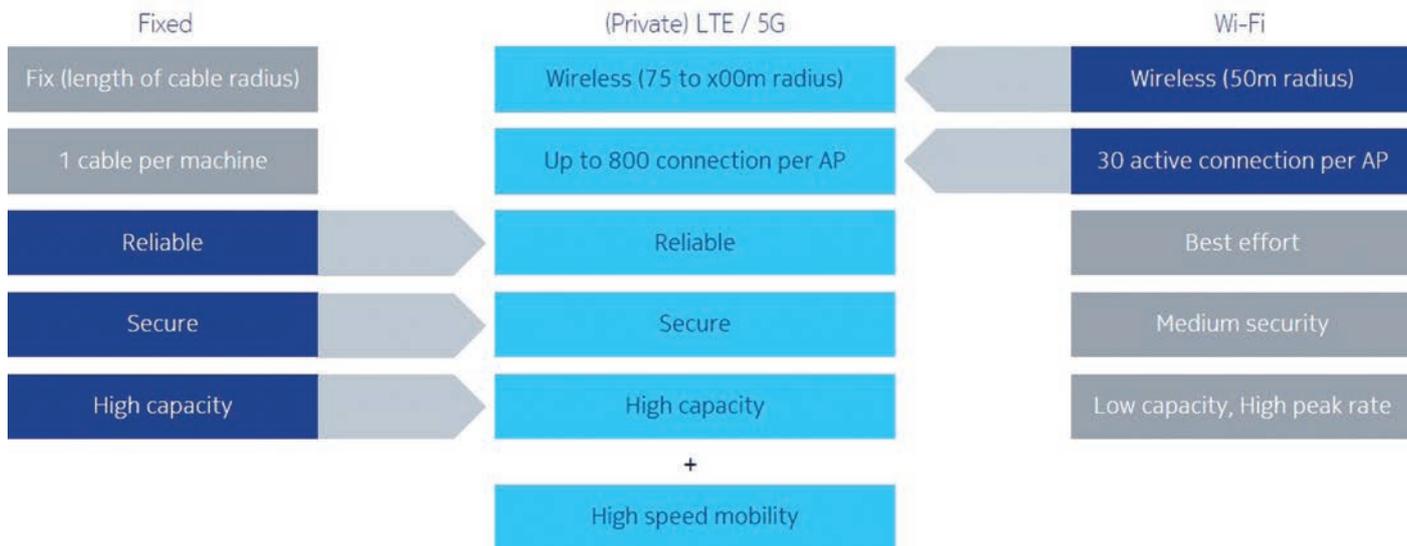
FUTURE TECH FOR TERMINALS

At the same time, widespread pressure placed on governments has freed up spectrum for use by enterprises in industrial and other applications from healthcare to mining. Additionally, 4G/LTE vendors have developed solutions that use unlicensed (e.g., Multefire) or 'lightly' licensed spectrum. They have also begun to produce enterprise-sized versions of the technology that are no more difficult to install and maintain than a standard LAN or Wi-Fi mesh network. The result is that port authorities and terminal operators now have better choices as they plan for their digital futures.

Figure 1 presents a summary of the advantages and disadvantages of Ethernet and Wi-Fi as compared to a private LTE network. There are additional features with the latest releases. Release 4.9G has specific enhancements for handling IoT devices, as well as the ability to create secure slices within the network to provide specific quality-level controls (QoS) for applications, for instance, higher bandwidth for video or low latency for automated or remotely controlled operations.

Over the coming five years, 4G/LTE is designed to evolve into 5G, which will be like a super-charged wireless Ethernet. In other words, it will be able to handle any of the applications cur-

Figure 1: Private 4G/LTE combines the best of Wi-Fi and Ethernet and adds high-speed mobility



rently being run over Ethernet in terms of reliability, security and capacity with far greater ability to scale, handle extreme low latency applications and generally support industrial automation.

Although the general availability of 5G for industrial applications is still some years off, 4G/LTE is fully capable of handling the communication needs of the terminal with a single network infrastructure today. As we've seen, it can replace Wi-Fi with a much more robust, secure and reliable network, but it can also replace the TETRA or VHF network as well. It supports dynamic group communications, push-to-talk and push-to-video, as well as call dispatch control and management.

On the mobility front, 4G/LTE also immediately enables applications such as unmanned aerial or drone inspections. Drones have proven themselves as a key technology in emergency situations where they can provide instant situational awareness. They are especially useful in terminal and yard operations where they can provide remote visual asset inspection, monitoring of dangerous goods and perimeter surveillance. There are LTE-based drone solutions available that include command and control of the drones in flight as well as transport of the HDTV signal.

AUTONOMY, REMOTE OPERATIONS ... AND BEYOND

The remote control of equipment, such as rubber-tired gantry cranes, is another application that showcases the capabilities of 4G/LTE and 5G. Remote operations require very low latency communications because of the need for almost instantaneous response from the remote operator. LTE/5G systems support these low latency requirements, including support for layer-2 transport of PROFINET. They also support the video uplink requirements from multiple cameras that would be required for remote command and control of the unit.

The advantages of using mobile cellular technology also go beyond drones and remote control of moving equipment. The greatest challenge for public 4G and LTE networks is to provide sufficient coverage to dense urban cores where there are numerous high buildings that create multiple challenges for wireless connections — challenges that 4G/LTE were specifically designed to overcome. On a smaller scale this is also the case in terminal and yard operations where stacks of containers can create real difficulties for many forms of wireless. LTE/5G technologies can easily overcome these challenges to provide ubiquitous coverage in the terminal yard.

Looking further into the future, Industry 4.0 applications will continue to digitally transform terminal operations. Along with automation and remote-control applications, we can also see the possibility of end-to-end management of all operational processes based on real-time data and sophisticated workflow management software.

Linking the various digital point solutions will require a ro-

bust, mission-critical communications system to connect mobile devices, sensors and actuators. This allows the creation of a digital twin, which software analytics can use, for example, to optimize the overall workflow. In terms of terminal operations, it is possible to save between 7 and 10 percent in the overall efficiency of operations using workflow optimization alone.

Although this may sound far off in the future, once installed, a private LTE network can function as a platform for future evolution. As an example of this, Stevedco, a terminal operator in the HaminaKotka port in Kotka, Finland, worked with Nokia to build a private LTE network to support video cameras that were installed on ship-to-shore cranes. The application was designed simply to record the status of containers before and after handling. Thus, in the case of future insurance claims, it was easy to establish clear responsibility.

Stevedco has since built other applications on top of the LTE network, because it was there. They have added perimeter surveillance and asset monitoring by video. All cargo handling equipment and personnel in the terminal and warehouses communicate over the LTE network. And they are considering future Industry 4.0 applications that they can launch off the LTE network.

Separately, Kalmar, part of Cargotec, is doing ongoing research on terminal automation and energy-efficient cargo handling. Their research test bed includes a private LTE network from Nokia as well. "The digital automation platform with its connectivity and application layers makes it possible for us to test new service products and concepts. That gives us the opportunity to demonstrate to our customers how our new services work, which is particularly valuable," says Pekka Yli-Paunu, Director, Automation Research, Kalmar.

Digital transformation of all industries is coming very quickly. Terminal operations are no exception. As part of a vital link in today's industrial supply chains, it will become table stakes for future ports to have digital awareness and management of everything passing through them in real time. Automation and autonomous technologies will find new roles in port operations just as they are being employed in many other areas of the economy. There is already a strong business case for moving to 4G/LTE, and it will only strengthen over time.

The Author

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is global practice lead of the Ports program at Nokia. Being intrigued by the opportunities of connected technologies and digital transformation, he works with port authorities and terminal operators on Port 4.0 and terminal automation projects as they embark on their smart ports journeys. Matthias has been instrumental in the expansion of Nokia into the Transportation industry.

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