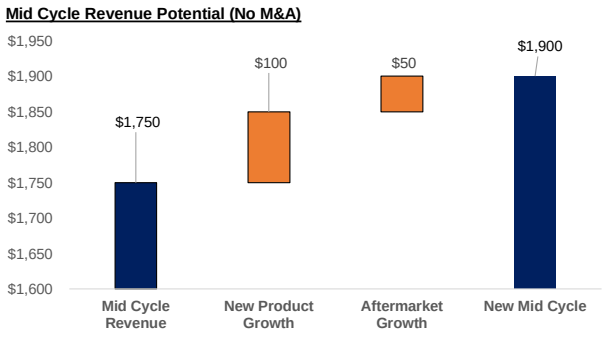
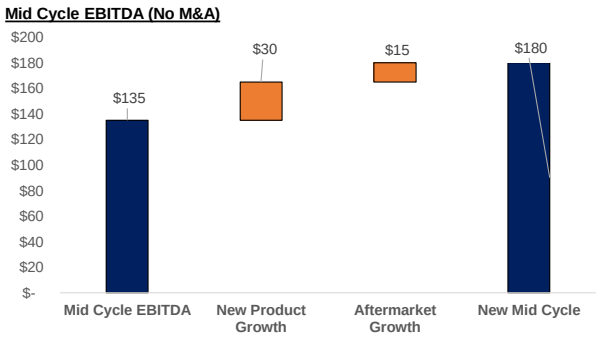
Manitowoc: Lifting Earnings Higher

Porter Street Research
By Alex Jones alex.jones@porterstreetresearch.com

Investment Thesis

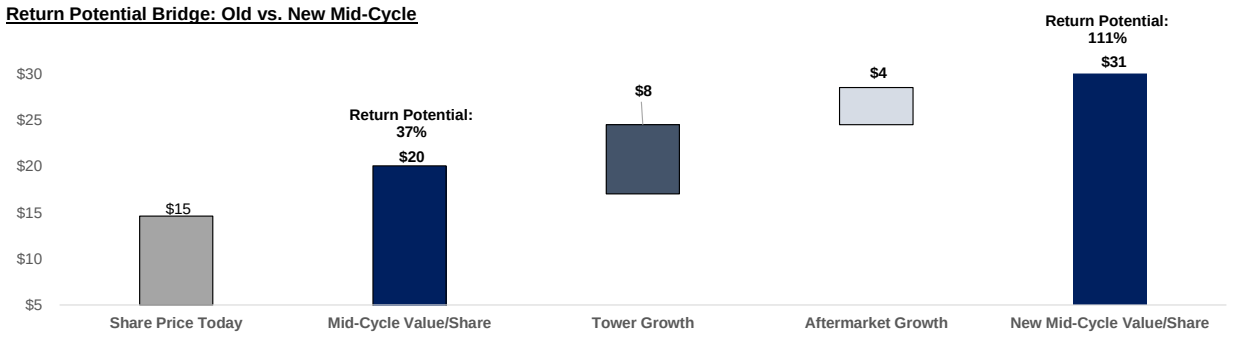
Manitowoc (Ticker: MTW) is the largest standalone manufacturer of cranes with a full suite of crane products (mobile, tower, crawler, truck) serving the construction, energy, and infrastructure end markets. The crane industry is deeply cyclical, and cranes last a long time. For the last 13 years, Manitowoc has been managing the come down from a once in a generation buildup of cranes and lifting capacity. Sales at Manitowoc peaked at $3.8bn in 2007 compared to an average of $1.8bn per year in 2018-2019. While timing as to when the cycle turns remains unclear, when it does, profitability at Manitowoc will be greater than the last few years at similar levels of revenue. Incremental margins will be higher because of a shift in mix to tower cranes and aftermarket sales which have higher gross margins. Higher gross profit and the benefits from $100mn of fixed costs taken out of the business over the last four years combined with improved working capital management driven by lean initiatives will lead to an increase in free cash flow and earnings. Finally, it is likely that Manitowoc will use its industry position and balance sheet to expand into the most attractive parts of the crane industry: service and rental by developing its own rental fleet and acquiring or partnering with companies in Europe to do so. This should have the effect of increasing Manitowoc's return on capital and supporting its valuation.





Sources: Manitowoc and Porter Street Estimates.

By leveraging its global dealer network, and introducing new products in high growth markets, Manitowoc can meet replacement demand from customers who need to keep their fleets fresh as end markets recover post Covid. Revenue growth in tower cranes driven by new product introductions targeting the US and Asian markets, new all-terrain cranes, and an increase in aftermarket revenue from cranes put into service over the last four years will deliver higher gross margins than other revenue categories. Manitowoc can reach $1.9bn of sales and generate over $180mn of EBITDA and close to $2.6 in EPS over the next 3-5 years. At $14.7/share, Manitowoc trades at less than 6X potential EPS and less than 4x EV/EBITDA. At 6X EBITDA, Manitowoc would be worth nearly $31/share over the next 3-5 years.



Sources: Capital IQ and Manitowoc. Data as of 1/21/2021.

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What is Creating an Opportunity: Lack of Crane Cycle and Covid Puts Lean Turnaround on Pause

Today, Manitowoc's share's price in a modest recovery in revenue and earnings over the next 2-3 years. Manitowoc's stalled lean transformation post spin-off in 2016, the absence of a crane cycle over the last 15 years and the lack of clarity around the timing of the next up cycle combined with a new, untested CEO who may start pursuing M&A are all weighing on the stock and sentiment.

1. Lean Turnaround and Re-Gained Product Focus All Swamped by Covid

- Manitowoc is undergoing a lean transformation that is under appreciated. Since the spinoff of its foodservice division in early 2016, Manitowoc has been led by a team of industry veterans experienced in lean manufacturing and turnarounds that have previously worked together at three other companies. Orders and revenues began to turn down in 2019 after a decade and Covid-related shutdowns led to revenue declines that has Manitowoc operating at break-even levels in 2020.
- The recent decline in revenue had the effect of swamping all the success management has had to date in re-making Manitowoc's culture, empowering employees, and improving product quality and innovation. Since taking over, Manitowoc management has removed $100mn of costs (5% of 2018 revenue), introduced 60 new products in record time, improved cash flow via margins and working capital and re-financed high-cost debt leading to lower interest expense. Incremental margins delivered under the new management team from 2016-2019 were over 40% and could reach similar levels in the next upcycle as revenue returns.

2. There Wasn't a Crane Cycle Last Cycle and There May Not Be One This Cycle

- Cranes are designed not to fail. They last a long time. Crawler cranes have average useful lives of up to 50 years with other types of cranes lasting > 15 years. It is notable that while other heavy equipment industries: agricultural equipment, heavy duty trucks, aerial work platforms, have all had noticeable replacement cycles, the crane cycle has yet to fully recover from the buildup and peak of cranes deployed in the mid-2000s. The buildup of used cranes and lifting capacity along with intense competition has weighed on orders and pricing at Manitowoc. Revenue peaked at $3.8bn in 2008, peaked again at a lower high of $2.5bn in 2013 and was just $1.85bn in 2018 - marking a series of lower highs for crane sales. Uncertainty as to the timing and drivers of a recovery let alone an inflection in crane demand weighs on investor sentiment.
- The crane industry is in the early stages of consolidating and western players have shed capacity while focusing product lines and growth in new and in demand product categories that expand the usefulness of cranes beyond traditional end markets. Long term, the demand for lifting equipment will not go away and will increase. Dealers and rental equipment company customers require new, and more technologically advanced cranes driving a consistent demand for new equipment – over time. Even in a slow return to normal, we believe sales at Manitowoc can get back to the $1.7bn to $1.9bn level reached last cycle, driven by new products and expansion into adjacent product categories targeting higher growth end markets including residential, multifamily, and commercial construction.

3. New CEO Taking Over and Attempting to Shift the Business Model Via M&A

- Manitowoc is now led by 42-year-old, first time CEO Aaron Ravenscroft. Despite having been with Manitowoc since 2016 and leading key elements of the lean transformation in Europe, he is a young CEO attempting to grow the business into new regions and lines of business. Ravenscroft has made it clear that Manitowoc will use its flexible debt structure and balance sheet to transform the business by pursuing M&A in the aftermarket to add more recurring revenue lines of business. If successful, this will have the effect of increasing the profitability of the overall enterprise and reducing the reliance on new equipment sales that will likely remain weak until the economy recovers post Covid. However,

as a first time CEO with no experience leading large M&A integrations, he will have an intense microscope on him.

Estimates and Valuation

Today, Manitowoc shares imply a moderate recovery in sales and orders while giving some credit to cost reductions taken over the last four years. At 5.7X 2022 EBITDA, Manitowoc shares are already priced for a weak recovery with little credit for growth beyond that level of sales and EBITDA. Manitowoc should generate cash in 2020 despite the rapid decline in sales in 2020. Better than expected orders in Q3 2020 and an improved outlook has raised Manitowoc's Adjusted EBITDA outlook from $40mn to $70mn for full year 2020 taking any credit related worst case scenarios off the table. The business has no debt maturities until 2026, extremely favorable debt covenants and over $400mn of liquidity to ride out the Covid led downturn.

Ticker	MTW
Price	$ 14.7
Shares Outstanding	34.5
Market Capitalization	**$ 507**
Debt	$ 307
Cash	$ 101
Enterprise Value	**$ 713**
Key Stats	
52 Week High	$ 17.5
52 Week Low	$ 7.5
Short Interest	2.7%

Cap- IQ Consensus					
	2019 (A)	**TTM**	**2020 (est.)**	**2021 (est.)**	**2022 (est.)**
Revenue	$ 1,834	$ 1,476	$ 1,449	$ 1,561	$ 1,687
Adj EBITDA	$ 146	$ 78	$ 71	$ 91	$ 125
Adj EPS	$ 1.87			$ 0.46	$ 1.13
Growth	**2019**	**2020**	**2021**	**2022**	**2022**
Revenue			*-21%*	*8%*	*8%*
EBITDA			*-51%*	*28%*	*37%*
Margin	**2019**	**2020**	**2021**	**2022**	**2022**
EBITDA	*8.0%*	*5.3%*	*4.9%*	*5.8%*	*7.4%*
Inc. Margin			*(7%)*	*19%*	*27%*
Valuation	**2019**	**2020**	**2021**	**2022**	**2022**
EV/Rev	0.4	0.5	0.5	0.5	0.4
EV/EBITDA	4.9	9.2	10.0	7.8	5.7
P/E	7.9			32.0	13.0
Net Debt/EBITDA	1.4	2.7	2.9	2.3	1.6
Adj EBITDA/Int.		2.9	2.6	3.4	4.6

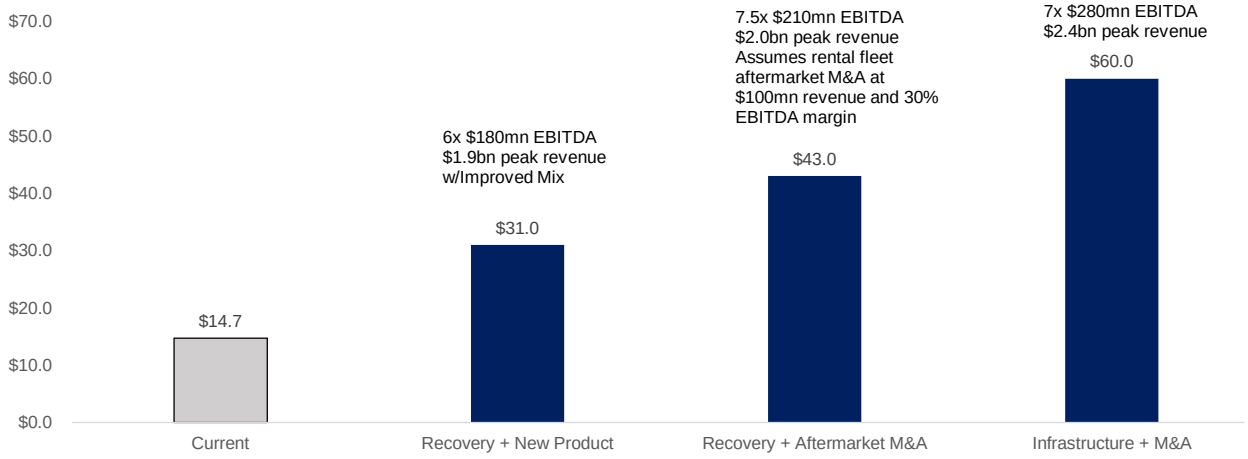
Sources: CapitalIQ and Manitowoc

Multiple Ways to Win

The downside risk in Manitowoc shares today is limited. Shares have rallied from an all-time low of under $8/share in October, to $14.6/share today on the back of better-than-expected orders in Q3 2020. The biggest risk over the next 1-2 years is a slow and uneven recovery in orders and revenue. Crane demand tends to lag economic cycles as cranes continue working during a downturn until projects are finished and take longer to recover as demand returns.

We view Manitowoc as a slow money investment: we believe it is cheap today on normalized levels that may take time to achieve. However, we also believe that Manitowoc is timely as there are a series of events that could unfold in the next 6-18 months that can lead to a change in investor sentiment and a re-rating of the stock price ahead of the change in fundamentals as the market begins to discount brighter prospects than today and beyond what Manitowoc had achieved in recent cycles. The chart below lays out three potential scenarios: our base case recovery scenario, a scenario where Manitowoc creates an in-house crane rental fleet and service business via M&A, and a combination of all the above plus a tailwind from infrastructure spending in the US.

Potential Manitowoc Share Price in a Recovery: Multiple Ways to Win



Sources: Capital IQ and Manitowoc.

1. Countercyclical M&A and Shift in Business Model to Improve Returns on Capital

Prior and current management has made clear that Manitowoc is going to do M&A and find ways to grow in-organically to diversify revenue away from selling cranes. The goal is to increase the percentage of aftermarket revenue from 18-20% currently, toward 25-30% and increase the portion of revenue that is recurring. To do so, we think in select regions (Europe/Germany) and product lines (tower cranes), Manitowoc is likely to acquire or partner with existing equipment dealers to capture more parts and service revenue and create an in-house rental fleet. Any acquisition or partnership should allow Manitowoc to benefit from the most profitable segments of the cranes industry including rental, parts and services in addition to the added benefit of more control over certain product lines growth and production.

Having laid out our base case of $1.9bn in sales, $180mn of EBITDA and $2.6 in EPS, we believe it is likely that Manitowoc will execute M&A in the next 6-18 months. We believe a business model shift that could include an owned rental fleet and more stable and recurring revenue combined with a cyclical equipment manufacturer can lead to faster revenue growth, higher margins and higher absolute EBITDA and free cash flow generation this cycle. We also believe any M&A into higher margin segments of the crane industry will improve Manitowoc's return on invested capital from 8% last cycle to an average of over 15% helping to support a higher valuation. Accounting for the acquired revenue, EBITDA and the debt used to do a deal, we see Manitowoc capable of generating $210mn of EBITDA pro forma. At 7.5x EBITDA, assigning a higher multiple to account for higher margins and better free cash flow generation, we think shares are worth $43/share.

Mid Cycle Revenue Potential (Aftermarket M&A)

Mid Cycle EBITDA Potential (Aftermarket M&A)

Sources: Capital IQ and Manitowoc

2. Infrastructure Package in the US That Includes Buy America Provisions

The passing of an infrastructure bill in the US would have a profound impact on Manitowoc's business, particularly its crawler crane and rough terrain product lines which have been the most depressed over the last decade. Regardless of who eventually is President in January, we see a favorable outcome for Manitowoc. Both candidates have discussed making infrastructure a priority. Further, both candidates support Buy America provisions on large, federally funded projects where equipment may need to be made in America by American workers. Crawlers and most rough terrain cranes, which are used heavily in infrastructure in the US, are both made in Pennsylvania at Manitowoc's Shady Grove facility. The opportunity to displace aggressive competitors in rough terrain cranes, especially Tadano, a Japanese company, could led to a massive revenue and gross profit upside potential for Manitowoc. In a homerun scenario where there is a large-scale infrastructure package and a recovery in Manitowoc's end markets, we think that combined with a new aftermarket deal, Manitowoc's crane revenue can approach $2.3bn on an annual basis. Crawler cranes are Manitowoc's lowest volume but highest dollar revenue and margin products. Anything that stimulates demand for Crawlers can help Manitowoc increase absorption in Shady Grove and increase absolute gross dollar profit and EBITDA. At $2.3bn of revenue, we think Manitowoc can generate nearly $280mn of peak EBITDA. This is a true upside scenario and think shares are worth > $60/share in this low probability, high upside scenario.

Activism to Participate in Industry Consolidation: A Catalyst for Sale of the Company

Finally, we believe that this should be Manitowoc's last cycle as an independent publicly traded company absent any strategic shift to use the company and its lean culture as a platform to expand in-organically outside of the crane industry. While we fully believe Manitowoc will be a more profitable and better run enterprise going forward, we are not sure it will ever get the type of valuation it deserves throughout a cycle as a public company focused solely on the crane industry. The inevitable boom bust of the crane cycles is not going away. Even as Manitowoc expands its business towards more aftermarket and rental revenue, we think the only way Manitowoc survives and truly thrives long term is as a private company or as a division of a larger, diversified company with a lower cost of capital. Manitowoc needs a lower cost of capital and the ability to invest counter cyclically compared to today to compete long term. As part of a larger company, private or public Manitowoc will be better positioned to ride out the downside of a cycle. In our view, Manitowoc is worth more to a larger private or public company where cash flow can be managed and harvested over a cycle. As of August, Manitowoc has a new, 42-year-old CEO, Aaron Ravenscroft. While we expect them to do some M&A and grow sales, we think every move they make should be to make them more attractive to a large acquirer. If new management fails to execute over the next 12-24 months, we think Manitowoc will become a target of an activist investor who would help encourage a potential sale.

Introduction and Overview

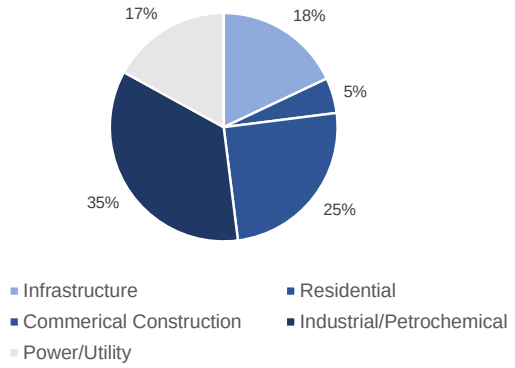
Below is an overview of the major crane types Manitowoc produces, technical product features and estimates of how much each piece of equipment costs to buy new.

Crane Type	All Terrain	Rough Terrain	Tower	Lattic Boom Crawler	Boom Trucks
Manitowoc Brand	Grove	Grove	Potain	Manitowoc	National
					
Est. % of Sales	**35-40%**		**35%-40**	**5-10%**	**20%**
Max Lift Capacity (Tons)	600	130	80	1500	150
Price New (Range)	$500k - $3mn+	$250k - $1mn+	$300k - $1mn+	$800k - $2.5mn+	$300k - $800k+
Average Life	15+	15+	30+	50+	15+
Rental Duration	Short-Term	Short-Term	Long-Term	Long-Term	Short-Term
End Markets	Pet. Chem Railroad/Highways Office Towers Apartments Condo Commerica/Resi	Secondary Equipment Sewer/water Pet Chem Maintenance for Public Infrastructure Other Resi.	Power Plans Residential Apartment Skyscrapper High Rise Office Tower Condos	Highways/Bridges Public Infra. Stadiums/Garages Power Generation Pet. Chems Industrial/Marine	Highways Railroad Apartment Other residential Public infra. Support
Est. Rental Rate/Month	$12-25k/month	$12-15k/month	$10-15k/month	$20-30k/month	$8-10k/month

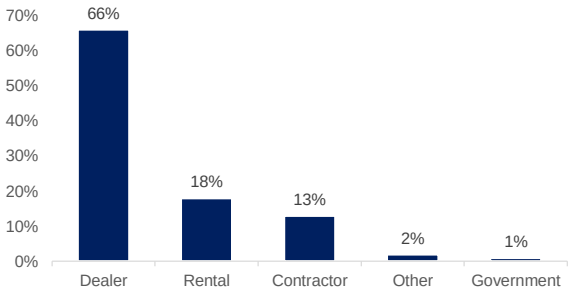
Source: Manitowoc, Coast Crane, Goldman Sachs, Google.

One of Manitowoc's key competitive advantages is its global dealer network which allows them broad based distribution to various end market and customers. By supporting its distribution and rental partners with parts, support and financing, Manitowoc can reach a broad global network of customers. However, compared to other heavy equipment industries, the crane dealer and distribution network is highly fragmented. As the aftermarket portion of the business is often not exclusive, OEM's like Manitowoc do not have captive dealer networks who sell only their products, a key value proposition for companies like John Deere and Caterpillar. By end market, infrastructure and industrial and petrochemical were Manitowoc's largest end market exposures as of 2017. Manitowoc estimates it has roughly 15-20% exposure to the broad energy industry across the upstream, downstream and renewables segments. Crawler cranes are used extensively in the installation of wind turbines, for example. Overall, Manitowoc's disclosures on end market sales, exposure and customers are very weak and often outdated. 2017 is the most recent data available.

End Market Sales as of 2017

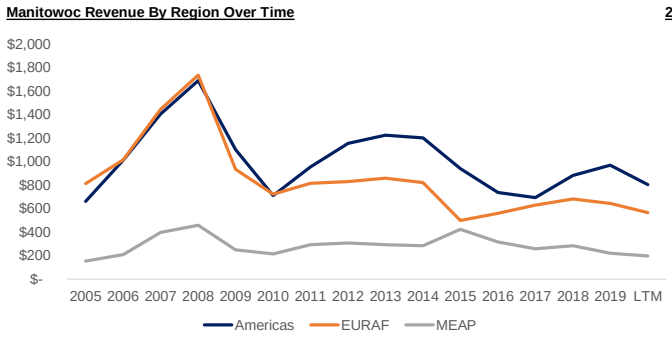


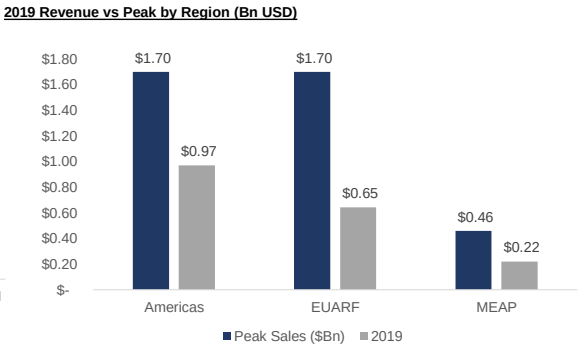
End Customer as of 2017



Source: Manitowoc, Goldman Sachs.

Manitowoc's business is global and just 46% of sales are from North America with 41% in Europe and 13% in the Middle East and Asia on a trailing twelve-month basis. As the chart below demonstrates, Manitowoc's European revenue was much higher previously as was the Middle East/Asia. In fact, as of 2019, only the Americas has reached above 50% of their prior peak sales.



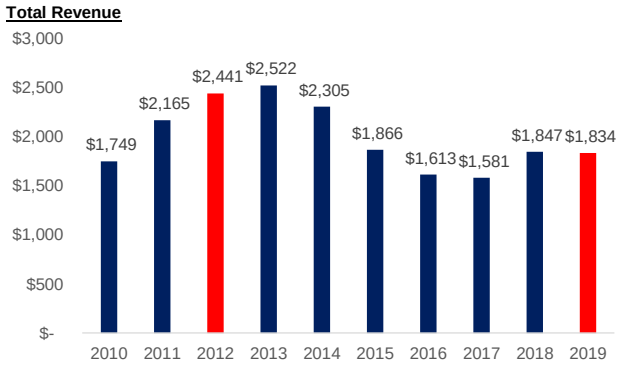


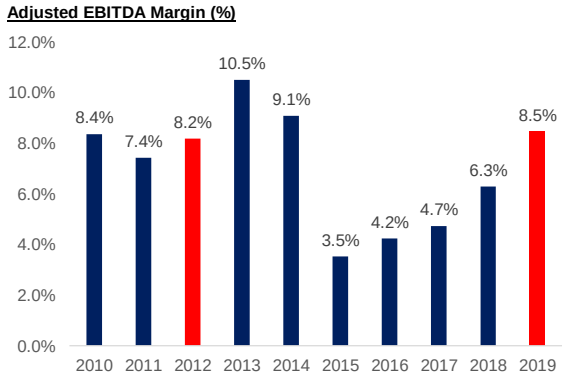
Sources: Capital IQ and Manitowoc.

Manitowoc Lean Turnaround and Restructuring Efforts Not Fully Appreciated

In 2015, Manitowoc was a 100-year-old business that made cranes and kitchen equipment. Following the spin-off its foodservice division in late 2015 (now publicly traded Wellbit, Ticker: WBT) Manitowoc cranes was on the brink of bankruptcy and issued debt at 12.75%, the highest interest rate for a company in the S&P 500 at the time. New management led by Barry Pennypacker (CEO) and David Antonuik (CFO) were hired in late 2015 to lead the new crane company. Current CEO Aaron Ravenscroft was hired in early March 2016. The trio, along with Les Middleton, have worked together on and off for 20 years with multiple successful lean turnarounds including time at Wabtec and Gardner Denver. Under new management and the use of the Manitowoc Way, Manitowoc has become leaner, more efficient and re-set the business for crane demand today and going forward. Below is a list of key accomplishments achieved under new management,

- Removed $100mn of fixed costs from the business lowering break even revenue from $1.6bn to $1.2bn
- Consolidated factories, sold assets and built a business suitable for > $2.5bn in cranes sales compared to the historical footprint built to handle close to $5bn
- Pre-Covid reduced working capital as a % of sales (ex-cash) from 16.5% to 12%
- Increased inventory turns from 2.7x to 3.3x and decreased the cash conversion cycle by 18 days
- Introduced 60 new products. Used reconfigured factory lay outs and automation to cut lead time and new product development from 2 years to 6 months. Simplified product lines and filled gaps in product portfolio using Voice of the Customer analysis
- Introduced common software including diagnostics for use across all brands
- From 2016-2019 sales increased by $220mn while Adjusted EBIT increased by $87mn, a 40% incremental margin which is well above peers which are closer to 25%. In most recent down cycle, Manitowoc cost control and pricing initiatives has led do decremental margins of 15% vs 25% guided
- Delivered the same Adjusted EBITDA margin in 2019 as in 2012 with $600mn less revenue





Sources: Capital IQ and Manitowoc.

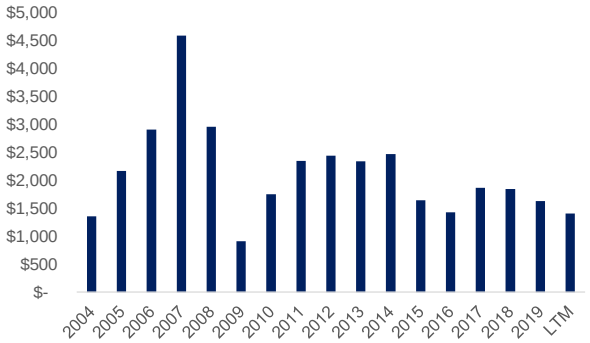
Without this transformation and change of leadership over the last five years, Manitowoc would have gone bankrupt. Despite the efforts of management, the crane cycle remains highly unpredictable and Manitowoc is still working to manage and reset the business for the level of demand today compared to the last 30 years. We believe that many of the changes implemented and costs taken out of the business over the last five years remain under appreciated and fundamentally misunderstood by the market. Slowing orders in 2019 and COVID swamped any impact that Barry and his team produced. However, we believe the efforts will be recognized as the end markets and demand comes back in the form of higher incremental margins and improved free cash flow generation.

We have highlighted in previous reports insights into the specifics of the lean turnaround and how it has changed Manitowoc's culture and business for the better. Please e-mail for those.

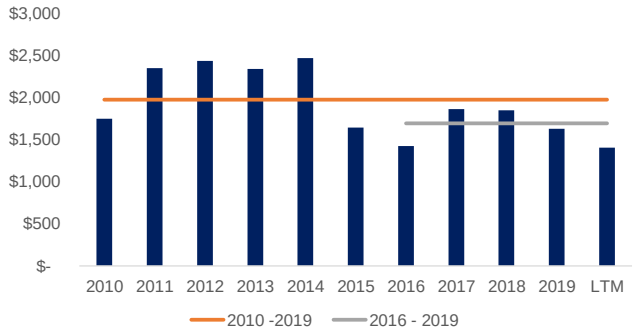
Crane Cycles are Dead. Long Live Cranes. Why an Aftermarket Deal Needs to Happen

While Manitowoc management has done an excellent job with what they can control, the biggest issue facing Manitowoc over the last 15 years is that there has not been a crane cycle. Manitowoc and analysts on the sell and buyside have tried to track the sensitivity of crane sales to various macro and economic factors to predict order and revenue cycles. The takeaway was that it is nearly impossible to conclude with any certainty what drives crane cycles and when. What we can observe is that Manitowoc and the industry rode a once in a generation wave from 2004-2008 which saw Manitowoc's orders climb to over $4bn in 2008 compared to just $1.7bn in 2019. At the time, Manitowoc was a global organization with capacity and infrastructure to handle $5bn a year in crane sales. That peak will never be reached again. As shown below the average order level since 2010 is about $2bn and in the 2016-2019 period, which we think is representative of current demand, the average is only $1.7bn. The potential for lower steady state or mid cycle revenue going forward matters, as we believe Manitowoc's move into new lines of business focused on the aftermarket or rental industry isn't just a good use of capital, it is necessary if Manitowoc is going to build upon the progress it has made in its lean turnaround and thrive long term.

Orders: 2004 - 2019



Orders and Average Orders: 2010 -2019 and 2016-2019

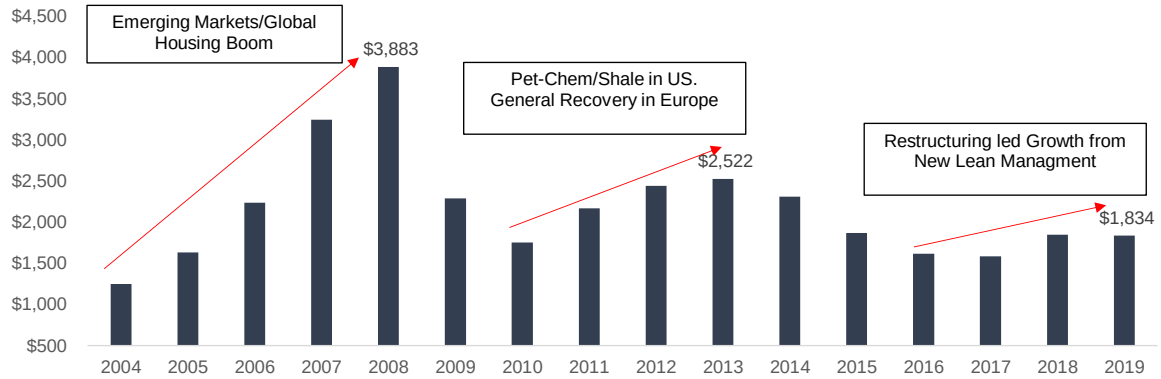


Sources: Capital IQ and Manitowoc.

The challenge in analyzing a deeply cyclical business such as Manitowoc is estimating what a normal level of revenue and orders is. As we will demonstrate, crane cycles and typical replacement cycles appear to have broken down which makes estimating a "normal" level of sales over a cycle difficult.

From 2004-2008, Manitowoc's revenue nearly quadrupled led by the emerging markets construction and global housing boom. Manitowoc was firing on all cylinders. However, since 2009, there has been two mini cycles, and each has been categorized by lower highs and lower lows in sales. From 2010-2013, sales rebounded, and Manitowoc benefited from the early days of the Shale Revolution in the US with increased cap-ex spent on drilling, pipeline, petrochemical and infrastructure related assets. Sales declined in 2013-2016 as Tadano, a Japanese competitor, aggressively began to take market share in the US in Manitowoc's high-volume mobile crane categories. Prior management lost their way as the business was bloated and filled with overhead from running a global operation set up to produce $5bn in revenue per year that was generating half of that. The period from late 2015-2019 was marked by a recovery and culture change led by the current management team who used lean to re-gain their leadership in quality, design, and new product introductions to start taking back market share in key categories. Even as new management has re-gained market share and put the company in a position to regain its standing as the top player in the industry, there was significant damage to Manitowoc's reputation from the 2012-2016 period.

Total Revenue



Source: Manitowoc

We identify three things that contributed to weaker crane demand over the last two mini cycles since 2009.

1. Nature of the Equipment Itself

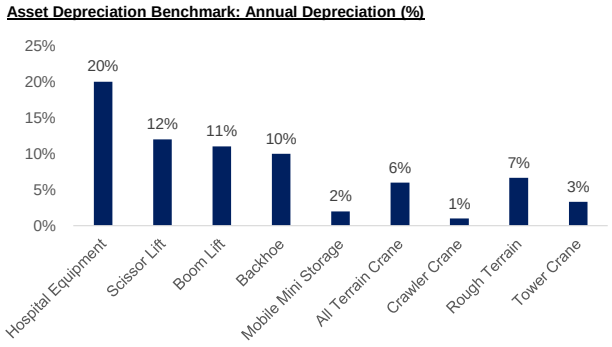
- Cranes last a long time and the buildup of units and capacity from prior peak is still being worked down.

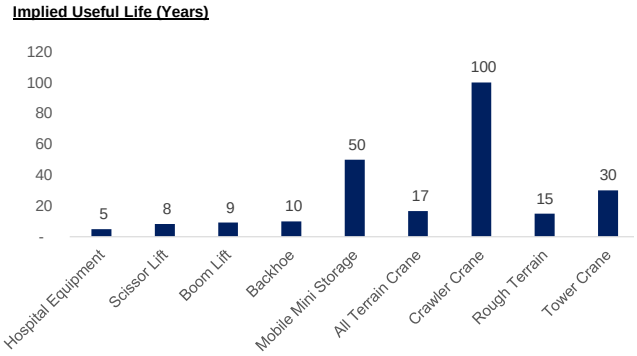
2. Increase in Competition from Foreign Competitors

3. Changing Regulations and the Impact on Used Equipment Channel

1. Cranes Have Long Useful Lives

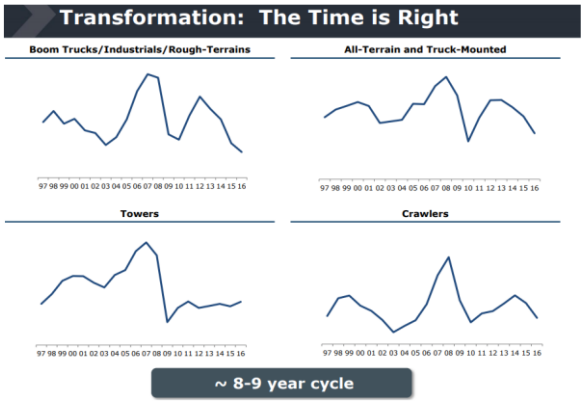
Cranes are essential equipment, full of steel, metal and electronics that are designed not to fail. Tower cranes suspended hundreds of feet in the air attached to structures for weeks or months at a time cannot fail. While their durability is good for the world at large – safety first – it is a double-edged sword for crane manufacturers. On the one hand, durable and reliable cranes support strong re-sale and used equipment values which support pricing of new equipment sales. On the other, there is only so much incremental innovation in any round of new cranes. While better, faster, and newer crane technology is required by some customers, for many, a lightly used or older, cheaper crane can do the job. It takes time to work down a crane and stimulate demand for new ones. Compared to other lifting equipment and heavy equipment used in construction or heavy industry that are "in the dirt", cranes have long lives. The charts below summarize the findings of a study conducted by consulting firm Oliver Wyman for Essex Crane Rental, a large Manitowoc crawler crane dealer, that is now part of Coast Cranes/Maxim. As the charts demonstrate, crawler cranes have exceptionally long rental lives and minimal depreciation. The same goes for all terrain cranes (25 years) while rough terrain cranes tend to wear out the fastest, they too have long useful lives.

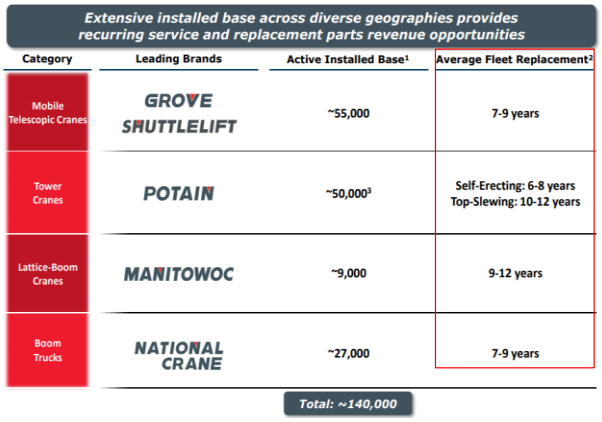




Source: Essex Crane Rentals

The challenge of overcoming long useful lives and a buildup in used equipment is clear in the decline of Manitowoc's revenue over the last 15 years. Manitowoc is not forthcoming with data on unit sales but the two tables below from Manitowoc's investor day in 2016 are helpful. One shows charts of estimated unit sales by product type as of 2016. Unit volumes are highly cyclical and were very depressed heading into 2016. The second chart, on the right, shows Manitowoc's installed base of cranes. As of 2019, Manitowoc had an installed base of over 149,000 cranes built up over the last two decades plus – an increase of 9,000 units net of those cranes that are out of service since 2016.





Source: Manitowoc

The two slides above indicate that a typical crane cycle is 8-9 years, depending on the product line. However, if we look at Manitowoc's revenue over the last two decades, it is not clear that replacement cycle analysis appears valid. In fact, overall, the industry is having a difficult time absorbing all the cranes produced over the last 20 years. Manitowoc provides limited if any data based on unit sales, volumes, and mix, which makes estimating trends over time difficult – the above charts are about the best analysts can use. However, there is some data worth evaluating to highlight some of the challenges and opportunities Manitowoc faces.

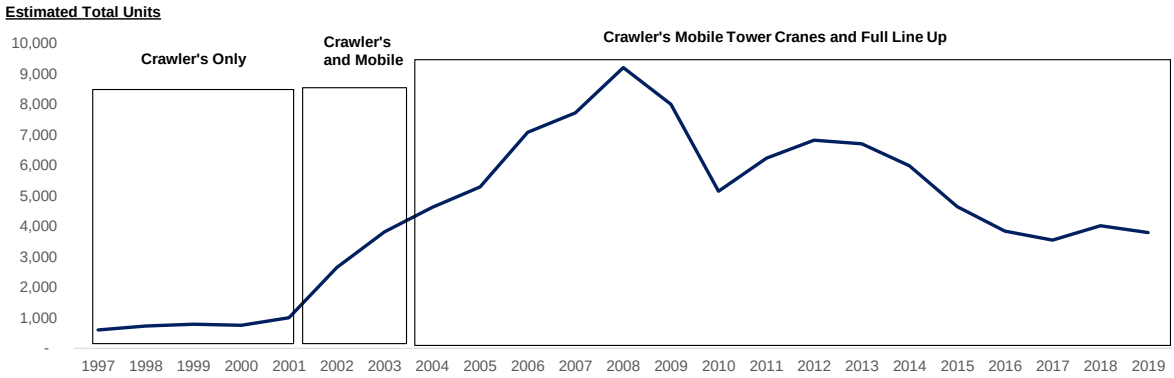
First, we know that Manitowoc sells five basic types of cranes and have an approximate estimate of mix based on our own work and third-party analysis. Using the estimates of installed base that the company provides, we estimated what the weighted average useful life of Manitowoc's fleet is and then applied what implied demand was for total units based on that 25 year figure. It is important to note that as part of Manitowoc's history, it acquired all its major brands outside of flagship Manitowoc crawler brand over time. We adjust our estimates to account of this fact and believe analysts who assume a constant mix of crane types will vastly overestimate what a normalized level of crane units sold is.

Installed Base Units		%	Useful Life	Wtd Average
Mobile	57,000	38.3%	20	8
Tower	53,500	35.9%	30	11
Crawler	10,000	6.7%	50	3
Truck	28,500	19.1%	15	3
Total	**149,000**			25

Year	Implied Replacement Demand 25 Yr	Est Actual Units	Difference
2016	5600	3818	-1782
2017	5760	3526	-2234
2018	5860	3988	-1872
2019	6045	3765	-2280

Source: Manitowoc, Porter Street estimates.

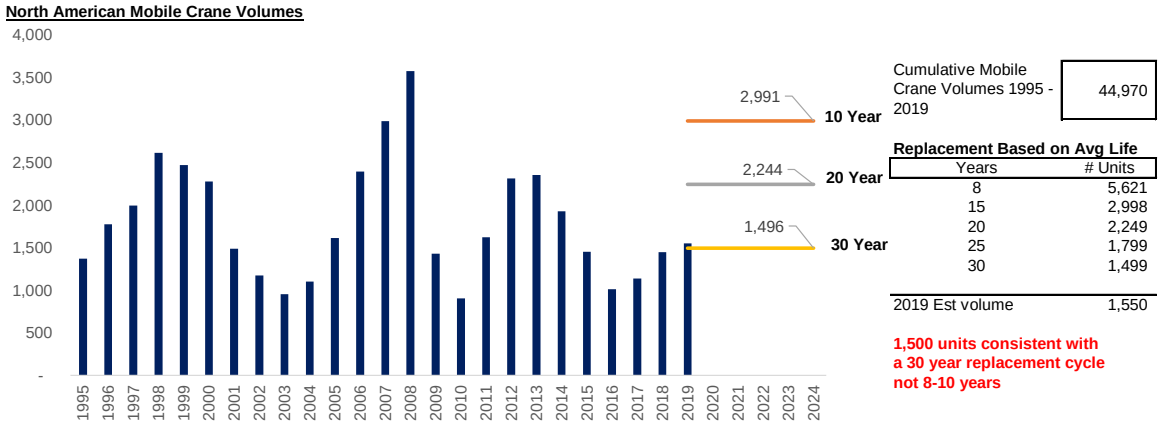
We then took this data and adjusted for inflation over time, including price deflation to account for pricing pressure in certain product lines (crawler cranes in the US, for example over the last five years) to arrive at an estimate of how many cranes per year Manitowoc has sold. At an average price, weighted by mix, of $400,000 per crane we think Manitowoc sold about 3,750 cranes in 2019 to produce $1.5bn of crane revenue. If we are anywhere near the ballpark it is clear that over the last few years Manitowoc was been selling a lot fewer cranes than implied by replacement analysis.



Sources: Capital IQ and Manitowoc. Porter Street estimates.

Second, to further demonstrate the challenges Manitowoc and the industry has faced, we use a specific example of mobile cranes in North America where we have good data on unit volumes from Tadano. From a peak of over 3,500 cranes sold in 2008, demand was estimated at just 1,500 mobile units in 2019. From 1995 to 2019, the cumulative installed base of mobile cranes in North America was about 45,000. At 1,500 cranes per year of demand on a base of 45,000 cranes, that implies a 30-year replacement cycle – not the 8-9 years that is frequently sighted by Manitowoc. To be clear, the 8-9 years as a replacement cycle is not incorrect, but there are two potential takeaways:

1. Used equipment tends to build up and stay in use over time a lot longer than people expect
2. Demand in recent years is lower and has been lower today than it was historically

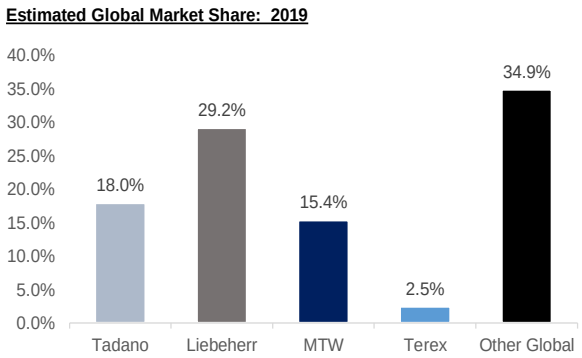


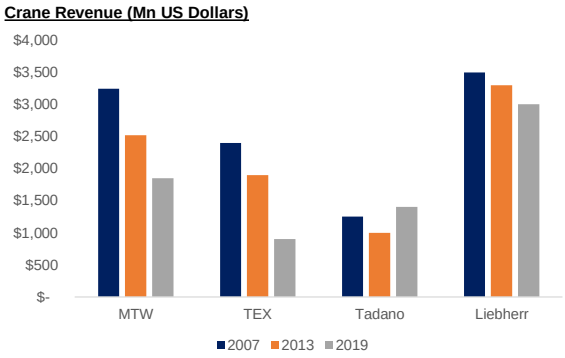
Source: Tadano and Porter Street estimates.

The value of this analysis is not to show that replacement cycle analysis for cranes is useless, but rather to show the crane cycle is much longer than many investors think, and expectations need to be adjusted accordingly. On the one hand, the above can be interpreted as bullish – there is likely to be an increase in demand for mobile cranes over the next 3-5 years as the large base of cranes put in service since 1995 eventually gets worked down. However, we believe the value in the demonstration is to show how challenging and competitive the industry is and how much capacity was built up over the last 15-20 years. ***The big takeaway for us is that this analysis demonstrates Manitowoc's strategy to pursue new avenues for growth in the aftermarket and rental business not only makes sense but are essential for the long-term health of the business.***

2. Increased Competition from Foreign Competitors

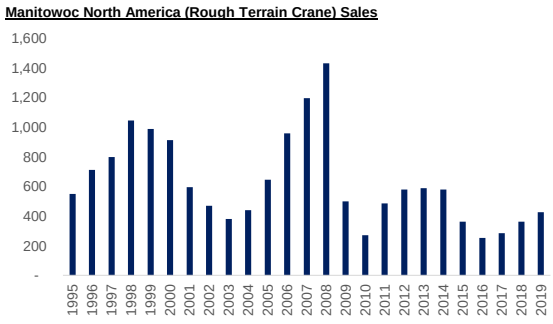
The global crane industry is estimated to generate over $40bn in revenue per year. The segments of the market where Manitowoc competes towers, crawlers, mobile and truck cranes is smaller, at around $12bn. That market is global and dominated by three large players: Liebherr, part of the privately owned German conglomerate, Manitowoc, a publicly traded company in the US and Tadano, a public company in Japan. As noted above, Manitowoc is the only company with product lines in each category. Liebherr does not have a truck mounted line and Tadano, notably, does not have a tower crane products line.

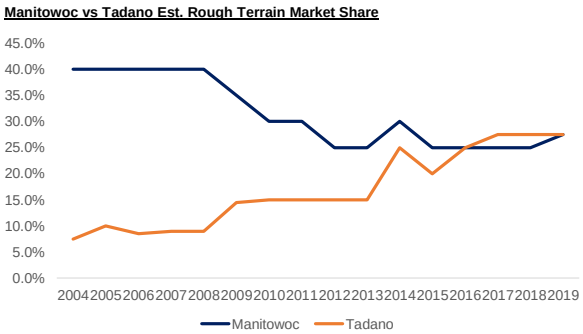




Sources: Capital IQ, Manitowoc, Terex, Tadano.

The sub segments of the crane industry Manitowoc competes in are competetive and global. Cranes are high enough value in many cases to be shipped so transportation costs are not necessarily a barrier to entry. However, for the most part the industry is regional. In the strong enviornment leading up to 2007-2008, Manitowoc was the largest independent crane company in the world. The business was truly global and built to handle $5bn worth of crane sales. As demand subsided post 2008, prior management at Manitowoc did a terrible job handling the come down. The company lost focus, quality slipped and new product introdutions lagged. In addition to the buildup of excess cranes, Manitowoc lost their way in terms of product innovation and quality. This, along with several key executives leaving to join Tadano, a formidable Japanese competitor, has led to a large market share loss in key product segments, notably rough terrain mobile cranes in the US. The self-inflicted product design and quality issues during that 2012-2016 period has seriously impacted Manitowoc's performance, reputation, and market share.





Sources: Tadano, Goldman Sachs and Porter Street estimates.

Tadano has done an excellent job introducing high quality mobile cranes into the US and Canadian markets with an emphasis on the energy industry, formerly a staple for Manitowoc. According to management, Manitowoc did over $1bn in rough terrain cranes, compared to less than half that today and as of 2016, had lost 20 points of market share. From 2015-2019, Tadano's US revenue grew from

$265mn to $480mn, however their EBIT grew just $10mn from $25mn to $35mn over the same period. Tadano's aggressive market share plan was subsidized by their global operations and dominant position in Japan where they also make aerial work platforms and smaller truck cranes. Foreign cranes are now 70% of the cranes sold into the US led primarily by Tadano and Liebherr in Germany. Chinese crane manufacturers including Sany and Zoomlion are in their early days of entering, further pressuring incumbents like Manitowoc. Irrational pricing by foreign competitors who are heavily subsidized by their home countries hurts industry volumes and prices. The average price of a crawler crane in the US had declined 20% over the last five years as a result. All this to say that the competitive landscape is more intense today than in the past and Manitowoc now faces large, well established competitors who also benefiting from a weak currency to aggressively sell cranes outside of their home markets. While Manitowoc has the benefit of being a customer of the two largest crane rental companies in the US: ALL Cranes and Maxim, the intense competitive pressure lead by irrational competition will likely continue to weigh on demand relative to history. Despite the challenges, there a few bright spots. As a result of improved quality led by lean initiatives, Manitowoc has regained about 10 points of market share in rough terrain cranes, according to management.

3. Changing Regulations and the Impact on Used Equipment Channel

Due to a change in regulations designed to limit exhaust from diesel engines used in cranes and other heavy equipment, the value of pre 2015 used equipment has increased. The lower cost to operate and run the machines increased their appeal and led to a demand for lightly used equipment compared to new. Also, post 2015 cranes, which have tier 4 engines and the most advanced technology, run on ultra-low sulfur diesel which limits their appeal in certain emerging markets who do not have access to the fuel. By limiting the number of outlets for used equipment, the useful life of equipment in developed countries is now extended compared to the past, limiting demand for new, replacement equipment. This was a big challenge for Manitowoc and the industry in 2014-2019, however, some of these trends have reversed. In Brazil, for example, Petrobras can make low sulfur fuel for use in newer engines which will provide an outlet for newer equipment to be sold as used equipment in Latin America, for example.

Aftermarket Provides Opportunity to Increase Returns on Capital and Earnings Power

For the trailing twelve-month period, 20% of Manitowoc's revenues was generated from their aftermarket business. There are two main components to this business. The first part is Manitowoc's traditional aftermarket offering where they provide replacement parts and services to customers and dealers to fix and upgrade their cranes. This typically falls under Manitowoc's CraneCare division. The second part is Manitowoc's ENCORE program, which takes used cranes and refurbishes them. Also lumped in the aftermarket is revenue generated from arranging financing for customers with third party lenders as well as setting up cranes and designing lifts for customers. Aftermarket revenue as a percentage of revenue has been stable at 18-20% for the last decade. While not disclosed, we believe gross margins are nearly 50-75% greater than that of the OEM side: in the 30-40% range. This higher margin revenue stream provides a counterbalance to the deeply cyclical OEM revenue and adds stability to Manitowoc's cash flow and operating income. We believe Manitowoc's aftermarket business revenue, in the $300mn range, can cover their annual interest payments of $27mn per year. This stable stream of profits provides confidence in Manitowoc's financial healthy during periods of extreme stress like those witnessed during the first half of 2020.

Over the last five years Manitowoc has been redesigning parts of both the OEM and aftermarket businesses to work together more closely. As the new cranes Manitowoc has put into the market over the last five years begin to require service, we expect there to be an organic increase in aftermarket revenue. The following quotes from Manitowoc's former CEO, Barry Pennypacker describes some of steps Manitowoc is taking to capture more value in the aftermarket business during the design process:

> **"*I talked a lot about the aftermarket. I think there's a huge opportunity for us going forward to increase the aftermarket, but the aftermarket isn't something you can just go out and command. You'll see out here today, when we manufacture a crane, we use a lot of purchased parts. A lot of purchased parts that are branded by people that are not Manitowoc. As we go forward, particualarly in our innovation effort, we've got to put the hook in at the sales. We've got to come up with innovative products that increase the return on invested capital for our customer but that are proprietary to us. And today, you'll see that new crane – that we developed in six months….and on that particular machine, we build in an aftermarket stream for the future*"**
> Source: Bloomberg

The challenge that Manitowoc faces is that because of their sales model, which relies on a global network of dealers, Manitowoc loses out on some of the highest margin segments of the crane industry: service and replacement parts. Manitowoc supplies some parts to dealers and generates revenue from them. However, many parts and components of a crane like ropes and other replacement parts, tend to be commoditized and white labeled by third parties. Further, by outsourcing the setup, service, and operation of the crane to dealer partners and rental companies, it is hard for Manitowoc to compete in all other, more profitable areas of the aftermarket. For example, while a tower crane can rent for $15,000 -20,000 per month, the fee associated with setting up and erecting a tower crane can be > $60,000 – a revenue stream Manitowoc does not fully participate in.

We think Manitowoc has the potential to use its industry position within certain product lines to increase the overall stability and profitability of its busines by entering parts of the aftermarket and rental industry it currently has no presence. On Manitowoc's Q3 2020 earnings call, CEO Aaron Ravenscroft took the first step towards addressing how, specifically Manitowoc would do this and how they are framing the opportunity within the European tower crane market. Using the chart on the following page as an example, the European tower crane market is worth about $4bn and Manitowoc only competes in about 30% of that – a $1bn or so opportunity. We estimate Manitowoc has a 30-40% market share where it does compete, however, there is nearly $3bn of potential revenue that Manitowoc does not address that presents high margin opportunities. The charts below help illustrate this as well as our estimate of the profit pool within the crane industry left for Manitowoc to penetrate.

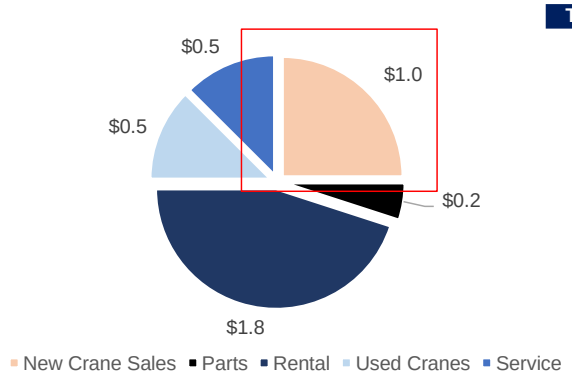
When thinking about what makes the aftermarket business attractive, it helps to think about how revenue is generated over the life of the crane. Manitowoc management has commented in the past that a 1 to 1 relationship between equipment sales and aftermarket sales over the life of a product is considered attractive. For a new, $500,000 tower crane, for example, Manitowoc benefits from the sale of the crane but currently only competes for around 10% of the remaining $500,000 in revenue generated over the 15-20 year life of a crane. Of the estimated $475,000 in total gross profit generated from the sale of a single $500,000 tower crane – over its useful life, Manitowoc competes for just 43% of that – leaving an additional 57% for someone else.

EU Tower Crane Overivew by Revenue Segment

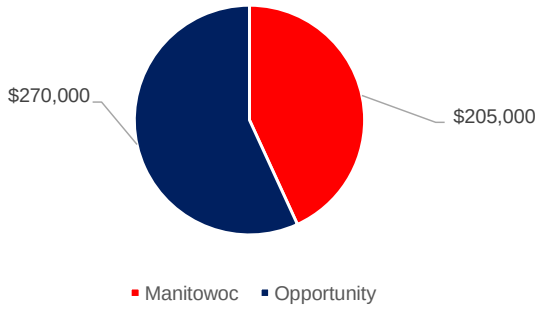
	Size ($Bn)		% of Total
New Crane Sales	$	1.0	25%
Parts	$	0.2	5%
Rental	$	1.8	45%
Used Cranes	$	0.5	13%
Service	$	0.5	13%
EU Tower Crane Market ($Bn)	**$**	**4.0**	

Profit Pools: Sell Cranes vs. All Other Activities

Sell Tower Crane		All Other: Service, Parts	
Revenue	$ 500,000	Other Revenue	$ 500,000
Gross Margin	35%	Gross Margin	60%
Gross Profit	**$ 175,000**	**Gross Profit**	**$ 300,000**
		MTW Capture	10%
		Gross Profit	***$ 30,000***



Total Profit Pool Opportunity: Total Gross Profit Over Life of a Crane



Source: Manitowoc and Porter Street Estimates

How Would an Expanded Aftermarket and Rental Business Work?

Management's stated goal is to increase Manitowoc's aftermarket and recurring revenue business to 25%-30% of revenue on a consolidated basis. They need M&A to get there. Below are three ways Manitowoc may look to expand its aftermarket business and the potential effect on Manitowoc's unit economics and combined business going forward.

1. Acquire Private Dealer and Equipment Rental Companies in Europe and Enter the German Market

2. Create a Series of Joint Ventures Partnering with Dealers and Receive the Rights to Enter Other Parts of Europe (Germany) and the UK As a Dealer and Rental Equipment Provider

3. Buy Uperio the Largest Potain Dealer in the World

Part of our speculation about how this may play out is because it is that it is not speculation. Manitowoc management has stated their intention to enter Germany. In March 2020, former CEO Barry Pennypacker said the following about the opportunity to have an owned rental fleet in Germany.

> ***"On an inorganic standpoint, I mean, there is a lot of margin that's out there for people who are servicing and out there turning wrenches. And, in some cases, renting the cranes themselves. We have a very intense effort underway in Germany to build a rental fleet in Germany. We don't currently have any customers that rent in Germany. Germany and Europe are the largest tower crane markets. We have zero presence there. However, our competitor – or the nice Germans have done a very good job and have taken a very aggressive approach in France. So why shouldn't we fight back and do the same thing in Germany?"***
> *Berry Pennypacker, Credit Suisse Conference*
> Source: Capital IQ

On the Q3 2020 call, management revealed that it began trialing a program where they rent tower cranes directly to large construction companies. An important distinction between some European and US markets is that in Europe, companies tend to rent and or buy used as opposed to buying new equipment.

Two things stand out that make any inorganic growth in the aftermarket on Manitowoc's part difficult. First and most obvious is that any move by Manitowoc to act as a dealer or rental/service provider in a region could be interpreted as direct threat to their customers. Second, Manitowoc would have to enter the market by buying vs. building. The benefits of an existing dealer/rental business are that the infrastructure to operate, sell, distribute, and rent the cranes is in place. Manitowoc does not want to have to invest and build this on their own. That means in practice, any large or transformative deals would require Manitowoc to use its scale and balance sheet – something it has the flexibility to do. Many of the potential targets and or JV partners Manitowoc is targeting are private, small, family run and or regional companies. Manitowoc's ability to use its balance sheet and to provide cranes for rental will allow any combined entity to expand much faster and become closer to the customer than the acquired companies could grow on their own.

As a baseline for how the new business lines could operate, below is an overview of a selection of dealer and rental equipment businesses and their unit economics, including absolute revenue and margins. Essex Crane rentals, which is now a part of Coast Cranes/Maxim, was a large Manitowoc crawler crane dealer that earned 15% EBITDA margins on average as a subscale, small cap public company. HEES Equipment is one of Manitowoc's largest dealers in the US representing rough terrain and crawler cranes and United Rentals, URI, is one of the largest diversified rental companies in the world. While public data is outdated, according to SEC filings from the year 2000, Maxim Crane Works produced 30% EBITDA margins when it was a much smaller company than it is today.

The most direct example of a business we think Manitowoc could end up buying, partnering with, or developing a similar business model to is Uperio. Through the combination of Arcomet (a Belgian company) and Matebat (a French company), Uperio is one of the largest Potain crane and tower crane dealers in France and all of Europe.

Matebat: Legacy Financials			
	2017	*2018*	*2019*
Total Revenue	**€ 83.2**	**€ 93.6**	**€ 113.5**
Gross Profit	€ 66.6	€ 72.5	€ 85.4
SG&A	€ 14.2	€ 15.0	€ 17.8
D&A	€ 8.1	€ 7.9	€ 9.2
Other Op-Ex	€ 40.1	€ 41.2	€ 46.2
Operating Income	€ 4.3	€ 8.4	€ 12.2
EBITDA	**€ 12.3**	**€ 16.3**	**€ 21.4**
Gross Profit (%)	80%	77%	75%
SG&A	17%	16%	16%
Other Op-Ex	48%	44%	41%
D&A	10%	8%	8%
EBIT	5%	9%	11%
EBITDA	**15%**	**17%**	**19%**
Post Tax EBIT	€ 3.5	€ 6.8	€ 9.9
ROIC	**7.5%**	**17.1%**	**20.0%**

Sources: Manitowoc, CapitalIQ

Sample Rental Business Economics			
	Revenue	**Gross Margin (%)**	**EBITDA (%)**
Essex Rental	$ 100	45-50%	15%
Crawler Crane Rentals			
Matebat/Arcomet	$ 225	80%	15-20%
Tower Cranes Europe			
HEES Rental	$ 766	35-40%	13-17%
RT/Crawler's US			
URI Rentals	$ 9,000	40-45%	25-30%
Diversifed Rentals			
Averages		**50%**	**19%**
MTW Est. Mid Cycle		**19.0%**	**8.0%**

Financial data for Matebat (Uperio) was available historically despite being a private company and we look at years 2017-2019 as representative of the unit economics of an owned rental fleet with service business could be. What we see is a business with high gross margins, but high operating expense. EBITDA margins > 15% are more than twice Manitowoc's mid cycle margins and we estimate Matebat was able to earn a 20% return on capital.

Unit Economics of a Potential Owned Rental Fleet

If Manitowoc can directly utilize and owned rental fleet and capture rental revenue from customers, we believe the economics of the overall business can improve. Below shows our best guess at what the economics of renting a single crane could look like and how that would work for Manitowoc if they owned a fleet of cranes for rent and generated additional service and parts revenue. For a service and rental company the split between rental revenue and other revenue can be as much as 50/50 with a large portion of revenue generated from service and labor which is the highest margin.

Crane/Rental Model		
Cost of Crane	$	750,000
Life of Equipment Yrs		15
Depreciation Rate		7%
Op-Ex % Revenue		50%
Years Owned		2
Revenue/Year	$	144,000
Income Tax		15%
Rental Rate/Month	$	15,000
Per Year	$	180,000
Utilization		80%

Year	Revenue	AT CF
1	$ 144,000	$68,700
2	$ 144,000	$68,700
3	$ 144,000	$68,700
4	$ 144,000	$68,700
5	$ 144,000	$68,700
6	$ 144,000	$68,700
7	$ 144,000	$68,700
8	$ 144,000	$68,700

Depreciation Schedule			
Year		Crane Value	EBITDA
1	$	700,000	$72,000
2	$	650,000	$72,000
3	$	600,000	$72,000
4	$	550,000	$72,000
5	$	500,000	$72,000
6	$	450,000	$72,000
7	$	400,000	$72,000
8	$	350,000	$72,000

Sources: Manitowoc, CapitalIQ

Single Crane Economics		
Cost of Crane	$	750,000
Years Owned		2.00
Rental Cash Flow (2yrs)	$	137,400
Re-Sale Value (Depr. Value)	$	650,000
Net Cost of Crane	$	(100,000)
Total Cash Flow	$	37,400
Net Cost	$	100,000
ROIC		**37%**

Crane Fleet/Dealer Economics		
Cranes in Fleet		250
EBITDA/Crane	$	72,000
EBITDA Total Rental	$	18,000,000
Aft. Tax FCF/Year	$	17,175,000
Rev/Year Rental/Year	**$**	**36,000,000**
EBITDA/Year Rental	$	18,000,000
Total Revenue	$	102,857,143
Total EBITDA	$	34,714,286

Sources: Manitowoc, CapitalIQ

In addition to revenue and EBITDA generated from renting the cranes, as mentioned above, a dealer can earn $60-$80k each time a crane is set up on site. Adding in additional revenue from parts and services and giving some cost savings from being part of a large organization, we think 30-40% EBITDA margins are achievable. If Manitowoc undertakes a deal to buy or partner with rental, equipment and service providers in Europe and then develop a rental fleet, they can eventually generate close to $30-40mmn/year in incremental EBITDA. Should Manitowoc try and buy Uperio, we think a deal in the $300-400mn would be required. To do so, Manitowoc would likely have to raise equity in addition to debt financing. While we wont rule it out, we don't see it likely at this time.

Finally, we would note that this kind of moving is not unheard of in the crane industry. Liebherr, who has a direct sales model, has bought in its tower crane dealer and service partners over the last few years in Australia and the US. In the US, through Morrow, Liebherr owns a large rental fleet or tower cranes and benefits from the associated rental, parts and service revenue. We highlight this as the move Manitowoc is considering is not that original, has precedent and is where the industry appears to be heading.

Aftermarket Deal Helps Manitowoc Improve its Return on Invested Capital

Given the volatility in the crane cycle we think Manitowoc's decision to add more aftermarket and other higher margin, recurring revenue streams is necessary. It is also a good use of capital. As the above demonstrates, we think the rental and aftermarket business can earn > 20% returns on invested capital and EBITDA margins 2-3x Manitowoc's current mid cycle margins. Manitowoc's return on invested capital peaked at around 14% in 2009 and was just 8% over this most recent cycle. The challenge for Manitowoc today is that its cost of capital, with 9% debt is high, likely in the 12% range assuming a 15% cost of equity. However, we would note Manitowoc's incremental cost of capital is lower. Should Manitowoc use its available debt capacity to take on additional debt to fund any M&A and or cap-ex to develop a rental fleet, incremental debt can be borrowed at 3-4% under is asset based revolver. The opportunity for Manitowoc to acquire assets and expand into business lines that have higher EBITDA margins, more recurring revenue and have returns on invested capital greater than 20% relative to a sub 5% cost of capital is attractive. This would help drive Manitowoc's overall return on capital back above 10% and improve Manitowoc's absolute level of free cash flow and the stability of earnings. Below we attempt to show Manitowoc's return on invested capital without and with a potential aftermarket deal. We also account for a lower cost of capital post 2022. The point is to demonstrate how the improvement in return on capital and lower cost of capital can support Manitowoc's valuation.

Invested Capital: With and Without Aftermarket M&A

Base Case: No M&A	2019	2020	2021	2022	2023	2024
NOPAT	$ 110	$ 33	$ 55	$ 79	$ 101	$ 139
Total Invested Capital	$ 811	$ 789	$ 812	$ 833	$ 854	$ 874
ROIC	**14%**	**4%**	**7%**	**9%**	**12%**	**16%**
Average (2021-2024)				*11%*	*11%*	*11%*

With M&A ($100mn Rev)

	2019	2020	2021	2022	2023	2024
NOPAT	$ 110	$ 33	$ 55	$ 114	$ 139	$ 182
Incremental. NOPAT				$ 35	$ 39	$ 42
Pro Forma IC	$ 811	$ 789	$ 812	$ 908	$ 929	$ 949
ROIC			**7%**	**13%**	**15%**	**19%**
Average (2022 - 2024)				16%	16%	16%

ROIC vs. Cost of Capital	
2016 - 2019 Average ROIC	8.0%
Base Case Avg. ROIC No M&	11%
Avg. ROIC With AM M&A	16%
2020 WACC	12%
2022 WACC	10%
(Lower WACC w/inc. borrowing at 4%)	

2024 Valuation w/M&A	
Invested Capital (2024)	$ 949
Avg ROIC/WACC	1.6
Value	$ 1,475
Net Debt	$ 100
Equity Value	$ 1,375
Value Per Share	$ 40
Upside (%)	**171%**

W/O M&A 12% WACC	
$	874
0.9	
$	801
$	21
$	780
$	23
	54%

Sources: Manitowoc, CapitalIQ

New Management Can Continue to Deliver on Lean Journey

Above and in the Appendix, we detail progress that management has made to turnaround Manitowoc's business, regain market share, and re-set the business for the level of demand in the crane industry going forward. As the economy recovers and orders begin to accelerate eventually post Covid, we believe the benefits from mix, favorable pricing actions and cost reductions will lead to improved gross margins.

First, an underappreciated aspect of Manitowoc's new product introductions and turnaround over the last five years has been their focus on pricing: not only increasing prices to cover costs and earn adequate

margins but holding firm on pricing and increasing the base prices for cranes on new product that customers are willing to pay for. This quote below provides some evidence of this:

> ***"I think a substantial portion of our margin expansion from this point forward is going to be through the product itself. I think as we continue to innovate the industry and be able to give our customers cranes that can be more productive on the job site, we can charge more for that. So that's – I think pricing is really something that we are focused on. This company never has been focused on pricing, but we are extremely focused on we maintain price. At a minimum, we need price to offset cost increase. And that's what we're currently telling everyone and we're concentrating on. But as far as the rest of the margin expansion, it comes from the product and it comes for productivity in our plants"***
> *Source: CapitalIQ*

From 2016 to 2019, under new management, revenue increased by $221mn dollars while Adjusted EBIT increased by $87mn, a 40% incremental margin driven by price increases and cost reductions. Towards the end of 2018 Manitowoc instituted 2-3 price hikes across the product lines while also increasing prices in 2019 on select models. Manitowoc has removed $100mn of fixed costs and taken nearly $100mn worth of charges to restructure the business. The benefit from price increases is clear from Manitowoc's increase in gross margins and most recently, during the downturn, how well gross margins held up. Coming off the bottom we expect revenue to be drive mostly by volume, however, as taking price in a weak demand environment will be challenging. That said, the absolute level of pricing should support gross margins going forward.

New Product Introductions Provide Opportunity to Grow and Take Market Share in New Markets

Manitowoc has develoepd over 60 new products under current management while spending over $200mn in R&D over the last five years. Using the Manitowoc Way and lean, production and design times have been reduced dramatically from 3 years, down to 2-6 months in some cases. Manitowoc has also rationalized product lines with an emphasis on increasing products at capacites in line with market demand. For example, management reduced a line of self erecting tower cranes from 7 to 2 sizes, all with common components to increase output and speed up manufacturing. The benefits of new products can result in increased sales, higher gross margins but also help Manitowoc reduce costs. Since the self-erecting cranes have 70% common parts, the company can reduce inventory, cut lead times, and reduce the number of people and time it takes to assemble the cranes. This product simplification benefits customers and directly translates into lower costs.

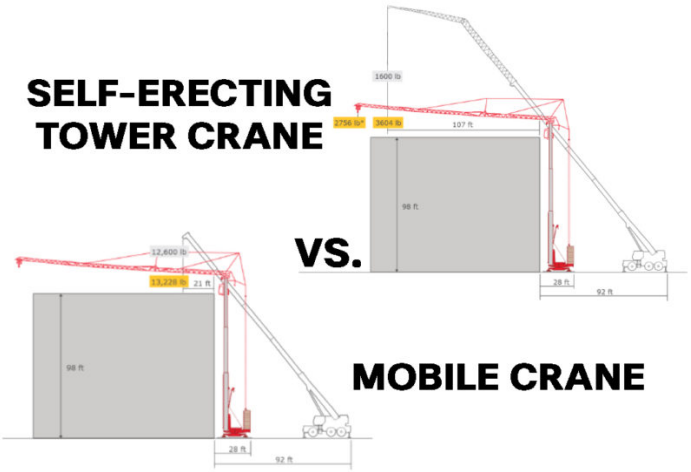
There are three areas were we see potential for Manitowoc to expand product lines and take market share versus competition. First, there are two segements within its tower cranes division that we think Manitowoc has an underappreciated opportunity to take market share and grow revenue. We view these areas of growth as essential. Growth in tower cranes can help to offset that any lost revenue in mobile cranes and deliver higher growth, higher margin revenue to Manitowoc that is under appreciated. Second, Manitowoc has not updated the design of its large capacity alll terrain cranes in over a decade. As a result of the Tadano/Demag merger, there is an opportunity for Manitowoc to take market share in key all terrain growth categories as Demag struggles under Tadano's leadership and the weight of a recent financial restructring.

Two areas for growth in tower cranes are discussed below:

1. Self-Erecting Tower Cranes in the US

Manitowoc unveiled a new line of Potain self-erecting tower cranes at CONEXPO in 2020 designed specifically to penetrate the US market. While popular in Europe, due to different travel, electrical and

safety configurations, self-erecting cranes are not popular in the US – yet. For most jobs a self-erecting crane can perform, customers will typically use a small rough or all-terrain crane in addition to boom trucks, truck mounted or other aerial work platforms. The potential markets served by the products self-erectors are looking to replace in the US is worth over $10 billion per year. Importantly, self-erecting tower cranes provide Manitowoc exposure to higher growth industries including residential and multifamily housing as well as light industrial and commercial construction where they currently have little presence. From discussions with dealers and customer anecdotes it is clear there are many benefits to self-erecting cranes. Reduced set up time and fewer required workers allowed jobs to be completed faster and cost less than traditional equipment. The cranes are easy to move, US road compliant, can be shipped in one container from France and can transfer the entire crane in one load as opposed to multiple. Below is a visual snapshot of some of the benefits of self-erectors vs. typical mobile cranes. Self-erecting towers are used in homebuilding and 3-8 story construction projects in North America: small apartments, industrial, warehouse etc. Their reach and small footprint increase jobsite efficiency. Finally, the return on investment for self-erectors is excellent with rental rates implying pay backs on new equipment purchases of 1-2 years – almost unheard of for tower cranes.



Source: All State Crane and Rigging

By adding value to customers and providing tangible time and money saving benefits, we think self-erecting tower cranes will continue to grow in popularity in the US. We think this is massive opportunity that remains entirely underappreciated by the market. While we expect competition to come, the most important thing is that the market's Manitowoc is addressing are large and the key driver going forward is adoption. Typically, in the crane industry operators and rental companies are very brand specific and almost never change brands and the barriers to entry to new customers are extremely high. That is not the case with self-erectors as the equipment is brand new and can lead to growth opportunities that remain under penetrated. One risk that may slow adoption is the required operator certification, but we believe dealer partners and rental company will eventually see the benefits of self-erectors and invest in staff accordingly.

2. Market Share Gains in Asia with Cranes Designed for Asian Market

Even during the 2008 peak, China was never a large market for Manitowoc and it remains unclear how much revenue Manitowoc generates there. However, Manitowoc has over 500,000 square feet of capacity in a facility outside of Shanghai that remains underutilized and a large fixed cost center for the company. To address its revenue issues in Asia, Manitowoc is specifically designing and releasing a new series of Potain tower cranes targeting the Asian and Chinese market. 80% of the market for cranes in China is not addressable by Manitowoc and of the remaining market, around 10% is controlled directly by

large international construction companies who tend to high-grade their equipment and source primarily from Europe – this is where Manitowoc competes. According to management, the 10% of the addressable market in China is equal to almost the entire European addressable tower crane market. Despite the incredible fixed asset investment that has taken place in China it remains the world's second largest economy with significant growth needs. Therefore, it makes sense that Manitowoc is investing time to take advantage of this market for increased distribution and penetration. Even if Manitowoc can tap 5-10% of this multiple billion-dollar market on the back increased quality, product features for local markets and speed to market, the incremental revenue and margin are meaningful.

Below summarizes the potential we see for Manitowoc to take share in grow in tower cranes. First, we look at the China/Asia tower crane potential. The overall tower crane market is estimated to be about $4bn and over half of that is in Europe. If the Asian and Chinese markets where Manitowoc can compete is equivalent, we think Manitowoc can grow to take 5-10% market share overtime and added closer to $75-$100mn of revenue and $20-$60mn of gross profit. The opportunity is much larger for self-erecting tower cranes in the US. Overall, we estimate that the North American aerial work platform and light construction equipment industry is worth over $10bn in the US. Over the next few years if Manitowoc can take just 1-2% market share, we think it can generate an incremental $50-100mn of revenue and $30-$40mn of gross profit per year. At between $250 and $400,000 per crane, that is between 200- 400 units – a number we believe Manitowoc, through its dealer channel in the US can easily achieve. Of note, tower cranes are the highest margin product in Manitowoc's portfolio. Data is limited – and dated, by before Manitowoc bought Potain in 2001, Potain generated over 320mn Euro in revenue at a 40% gross profit margin. Manitowoc's overall gross profit margin has not been above 20% in years and we believe that incremental revenue from higher gross margin segments in tower cranes is under appreciated by the market.

China + US Tower Crane Potential				
Estimated Asia Tower Crane Market ($bn)			$	2.00
Potential MTW Market Share		Inc. Revenue		Inc. Gross Profit
	2.5%	$ 50		$ 18
	5.0%	$ 100		$ 35
	10.0%	$ 200		$ 70
	Average	$ 117		$ 41

US Self Erecting Tower Crane		
Size of Market for AWP/Construction Equipment		$10 Billion
	Market Share	Revenue
	1%	$ 100
	Inc. Revenue	Inc. Gross Profit
	$ 100	$ 35

Source: Manitowoc

3. Opportunities in All Terrain Cranes

Manitowoc has not released a new large capacity all terrain crane in almost 20 years. We believe there are opportunities for Manitowoc to invest and release in demand, 7+ axle all terrain cranes. The timing is perfect for Manitowoc as the merger between Tadano and Demag creates an opportunity in Europe for them to take market share. Tadano bought Demag from Terex in 2019. Demag then entered a period of administration in Europe. The challenge of integrating two quite different cultures is weighing on new product introductions and customer adoption. If Manitowoc can develop cranes to address the issues Demag is facing we think there is opportunity going forward to pick up new customers they otherwise wouldn't be able to.

Earnings Power of Manitowoc Under Appreciated

The challenge of estimating what Manitowoc will earn is that revenue and orders have been so volatile historically. Revenue for the trailing twelve-month period was $1.56bn compared to orders of $1.4bn and 2020 revenue should be around $1.45bn. Any way we slice it, using an average of many different periods, we get to an average of about $2bn as "normalized" revenue for a crane cycle. Prior management had said about $1.8-$2.0bn was normal with capacity to go up to $2.5bn. In our view, anything above $2.0bn in revenue would require a large-scale infrastructure package in the US to drive volumes and demand for crawlers and rough terrain cranes. In the next upcycle under new management we expect Manitowoc to be aggressive about building and growing market share across the globe. One of the bright spots of Manitowoc's Q3 2020 earnings was its order cadence. The surprise growth in orders and revenue was a result of large orders for mobile cranes in the middle east as well as Asia. Lost in the fact Manitowoc is much smaller than it was is that it is still a large, global business, with established dealer and customer relationships globally. However, as discussed above, we believe there are two areas within the Tower crane and all-terrain crane segments where Manitowoc has an ability to grow and take market share that remains under appreciated.

Inflation Adj. Sales

Normalized Revenue		
2004 - 2018	$	2,174
Average 2003 - 2010	$	2,156
Average 2011 - 2016	$	2,154
Average 2014-2019	$	1,844
Ex High/Low Avg	$	2,010
TTM Revenue	$	1,569
Average of Above	$	2,041

Source: Manitowoc

Our base case, as demonstrated above, is for a return to the $1.9bn level of revenue this cycle in the next 3-5 years driven by new products and aftermarket growth, offset by oil and gas and market share declines and a weak recover in drilling activity relative to the last decade. The key drivers of higher earnings this cycle are higher gross margins, driven by an increase in tower crane/aftermarket revenue and a lower fixed cost structure today, than in the previous cycle. Below lays out in more detail how Manitowoc has been able to remove costs and where. SG&A had been reduced from $209 in 2015 to just $167mn in 2019. Trailing twelve-month op-ex is just $210mn and down considerably from 2018 and 2019 levels. We believe Manitowoc will need to add some incremental SG&A as they grow and additional expense will be needed for incentive compensation, but overall, the rate of growth in fixed overhead will be much less than revenue growth. Finally, Manitowoc has taken nearly $100mn in restructuring and one-time charges since 2015. These charges distort Manitowoc's reported financials and make the company, and investors rely on Adjusted Earnings figures. With much of the restructuring behind them, we think Manitowoc's numbers going forward will be cleaner and easier to follow.

Manitowoc Cost Structure: Reduction in Fixed Costs and One Time Charges: 2016 - TTM Q3 2020								
	2015	**2016**	**2017**	**2018**	**2019**	**3/31/2020**	**6/30/2020**	**9/30/2020**
Revenue	$ 1,866	$ 1,613	$ 1,581	$ 1,847	$ 1,834	$ 329	$ 328	$ 356
Gross Profit	$ 332	$ 253	$ 282	$ 328	$ 344	$ 63	$ 48	$ 65
Implied SG&A	$ 278	$ 282	$ 240	$ 220	$ 200	$ 48	$ 41	$ 51
Fixed Corp Expense			$ 33	$ 38	$ 31	$ 9	$ 9	$ 8
Total Op-Ex			$ 273	$ 258	$ 231	$ 57	$ 50	$ 59
TTM Op-Ex				$ 258	$ 231	$ 226	$ 210	$ 210
ESG&A	$ 317	$ 281	$ 251	$ 252	$ 235	$ 56	$ 50	$ 52
Depreciation	$ 51	$ 46	$ 38	$ 36	$ 37	$ 9	$ 9	$ 9
R&D	$ 58	$ 45	$ 38	$ 35	$ 31	$ 7	$ 7	$ 6
SG&A Only	**$ 209**	**$ 191**	**$ 175**	**$ 180**	**$ 167**	**$ 40**	**$ 34**	**$ 37**
D&A Reduction (From 2015)		$ (5)	$ (13)	$ (15)	$ (14)			
R&D Reduction (From 2015)		$ (6)	$ (13)	$ (15)	$ (20)			
SG&A Reduction (From 2015)		$ (18)	$ (34)	$ (28)	$ (42)			
Total Cost Outs Cumulative		**$ (29)**	**$ (59)**	**$ (58)**	**$ (75)**			
Total One Time Charges	$ 9	$ 23	$ 27	$ 12	$ 10	$ 2	$ -	$ 4
Cumluative 1 Time Charge		**$ 33**	**$ 60**	**$ 72**	**$ 82**	**$ 83**	**$ 83**	**$ 87**

Source: Manitowoc

To estimate Manitowoc's earnings power, we look at Manitowoc's mid cycle revenue potential with the previous cycle's cost structure and compare that to what we think revenue and costs will be this cycle. We start on the left by showing the simple uplift in earnings potential this cycle by applying today's cost structure and the benefits in earnings power form lower fixed costs and interest. Then, applying our forecast for incremental revenue from the tower cranes, we demonstrate the uplift in earnings potential this cycle in the past. These projections do not require any heroic assumptions, just simply a recovery over the next 3-5 years like last cycle with some upside benefit from new product category growth. If these estimates are in the range of what is possible, we think Manitowoc is trading for less than 5X EPS and 4X EBITDA with a 20% FCF yield. This is far too cheap for a business of this potential.

Mid Cycle With Curent Op-Ex/Interest		**w/Last Cycle Costs**
Mid Cycle Revenue	$ 1,750	$ 1,750
Gross Profit	$ 315	$ 306
Gross Margin	18.0%	17.5%
ESG&A	$ 225	$ 235
EBIT	$ 90	$ 71
Interest	$ 27	$ 40
Pre Tax Inc.	$ 63	$ 31
Tax (21%)	$ 13	$ 7
Net Income	$ 50	$ 25
EPS	**$ 1.44**	**$ 0.72**
EBITDA	$ 126	$ 107
Adj	$ 6	$ 6
Adj. EBITDA	**$ 132**	**$ 113**
Valuation		
PE	10.2	20.6
EV/EBITDA	5.4	6.3

NEW Up Cycle	**Incremental Tower + Aftermarket Growth**	
Inc. Revenue	$ 150	$ 1,900
Tower/AM Gross Margin	35%	
Inc. Gross Profit	$ 53	
New Total Gross Profit		**$ 368**
NEW Gross Margin		19.3%
ESG&A		$ 225
EBIT		$ 143
Interest		$ 27
Pre Tax Inc.		$ 116
Tax (21%)		$ 24
Net Income		$ 91
EPS		**$ 2.6**
EBITDA		$ 178.5
Adj		$ 5.0
Adj. EBITDA		**$ 183.5**
PE		5.6
EV/EBITDA		3.9
FCF		$ 101
FCF Yield		20%

Source: Manitowoc, CapitalIQ and PSR estimates

This Should be Manitowoc's Last Cycle as a Standalone Crane Company

We believe that the crane industry needs to continue consolidate, and Manitowoc should participate. We can envision a scenario where Manitowoc is worth more to a larger acquirer looking for a new global product category for growth. The opportunity to eliminate costs, lower Manitowoc's cost of capital and re-invest where needed will allow Manitowoc to compete more effectively than as a standalone company. Liebherr enjoys many of these benefits and Tadano shows no signs of turning back in terms of aggressively expanding. An acquirer is more likely to allow Manitowoc to ride out the ups and downs of the inevitable crane cycle and invest countercyclically, something Manitowoc, as a levered public company, is constrained to do.

There are two benefits to being acquired or part of a larger company:

1. Reduce Fixed Costs Further

- Manitowoc has cut almost all it can from its fixed cost base if the business is going to grow. That said, there are additional operating costs associated with being a public company (real estate, corporate overhead, legal, accounting, management, and board salaries/executive compensation) that can be removed by an acquirer. Further, as part of a larger company, Manitowoc could consolidate and re-configure parts of its global manufacturing base it may be hesitant to do today.

2. Lower Cost of Capital

- Manitowoc's cost of borrowing is high. A larger, more stable, and mature company could retire and re-finance Manitowoc's 9% debt and replace it with lower cost, longer maturity 3-4% debt.

- This lower cost of capital would allow Manitowoc the ability to invest where needed but also the ability to ride out ups and downs of the crane cycle. An acquirer could also choose to harvest cash in the boom times and simple invest in other parts of their business.

Manitowoc could be a good strategic fit for a variety of larger construction and heavy equipment companies. A company that is looking at add a new product line for growth and diversification would be a good fit. One obvious potential suitor for Manitowoc is Oshkosh. Two members of Manitowoc's board have ties to Oshkosh, the Wisconsin based diversified equipment manufacturer that makes a variety of lifting equipment as well as fire trucks and specialty vehicles. Oshkosh's former CEO, Robert Bohn has served on Manitowoc's board since 2014 and Oshkosh's current COO and President, John Pfeifer has served on the board since 2016. Our sense is the executives with ties to Oshkosh have a firsthand appreciation of the Manitowoc Way and the benefits that new management has brough over the last five years. If they are interested in having Aaron Ravenscroft eventually lead the large Oshkosh organization, we think buying Manitowoc would be a great way to do that. In terms of fit, Manitowoc has gross margins that are in-line and potentially greater than Oshkosh. The ability to leverage Manitowoc's sales on a larger revenue base means Manitowoc would be accretive to Oshkosh. Oshkosh's cost of borrowing is just 4% and net debt/EBITDA is less than 0.5x, Oshkosh could easily pay >$1bn for Manitowoc and finance a large portion with low cost, long term debt. Below demonstrates our guess as to what costs can be eliminated by an acquirer as well as what the earnings and free cash flow potential would be.

Opportunity for Cost Savings to Acquirer		2019	To Eliminate	
Cash-Opex	$	113		
Fixed Corp Exp.	$	34	75%	$ 25.8
Total	**$**	**147**		
Executive Comp.	$	8	100%	$ 8.0
Total Cost Out Potential				**$ 33.8**

Refinancing Potential		Rate	Interest
Current Debt	$300mn	9.0%	$ 27.0
NEW	$300mn	4.0%	$ 12.0

Profitability Through Cycle for Acquirer						
Revenue	$ 1,400	$ 1,550	$ 1,700	$ 1,850	$ 2,000	$ 2,250
Old SG&A	$ 235	$ 235	$ 235	$ 235	$ 235	$ 235
New SG&A	$ 186	$ 186	$ 186	$ 186	$ 186	$ 186
% of Sales	13.3%	12.0%	10.9%	10.0%	9.3%	8.3%
Gross Margin	15.5%	16.5%	18.0%	19.3%	20.0%	21.5%
Gross Profit	$ 217	$ 256	$ 306	$ 356	$ 400	$ 484
EBIT	$ 31	$ 70	$ 120	$ 170	$ 214	$ 298
NEW Interest	**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 12**	**$ 12**
Tax	$ 4	$ 12	$ 23	$ 33	$ 42	$ 60
Net Income	$ 15	$ 46	$ 85	$ 125	$ 160	$ 226
Annual Savings	$ 58	$ 58	$ 58	$ 58	$ 58	$ 58
Est FCF/Year	**$ 15**	**$ 30**	**$ 68**	**$ 107**	**$ 140**	**$ 203**
% Current Market Cap	**4%**	**7%**	**16%**	**25%**	**32%**	**47%**
M&A Value						
EV/Sales						
1	$ 1,400	$ 1,550	$ 1,700	$ 1,850	$ 2,000	$ 2,250
Equity Value	$ 1,250	$ 1,400	$ 1,550	$ 1,700	$ 1,850	$ 2,100
Per Share Value	$ 35	$ 39	$ 44	$ 48	$ 52	$ 59

Sources: CapitalIQ, Manitowoc and PSR estimates.

Risks: Competition is Intense Despite Early Days of Industry Consolidation

Manitowoc has formidable competitors and as the return on capital analysis above demonstrated, selling cranes is a cost of capital type business on average. Tadano has taken a remarkably aggressive and smart approach to expanding in the US. In 2016, Tadano hired former Manitowoc executives and aggressively took market share away from Manitowoc's Grove brand of rough terrain cranes. This was coming off a period in 2014-2016 where under previous management, Manitowoc has serious and embarrassing quality issues. This period, when oil, gas and petrochemical demand was booming in North America seriously impacted Manitowoc's brand perception in mobile cranes. Manitowoc lost an estimated 20% market share – mostly to Tadano during this period. Tadano has made no secret of its global ambitions. A notable challenge for Tadano is they do not have a tower crane brand. It would not be a surprise if they eventually acquire Terex's remaining, subscale tower cranes business. Liebherr is the largest crane company in the world at around $3bn in crane revenue. The crane divisions are party of the large Liebherr family of heavy equipment and industrial businesses that total over $10bn/year in revenue. As a private, Germany company, Liebherr has a low cost of capital and receives support as a favored supplier and bidder to the Germany government. There is also risk of further Chinese penetration into the US. Zoomlion and Sany are both irrational competitors with global ambition. China, through its One Belt, One Road initiatives has aggressively expanded globally through out Africa, India and the Middle east providing financing for large scale projects which often use local, Chinese equipment.

	Market Capitalization	Enterprise Value	Revenue	Gross Margin (%)	LTM EBITDA (%)	LTM EV/EBITDA	EV/Revenue
Tadano	$ 1,060	$ 1,192	$ 2,104	22.6%	5.7%	10.0	0.60
Manitex	$ 95	$ 132	$ 185	17.3%	1.6%	17.0	0.70
Liehberr (Private)							
Tower Cranes			$ 750				
Mobile Cranes			$ 2,997				
Total			**$ 3,747**				
Terex Demag Sale *(Crawler/AT Crane)*		$ 250	$ 625				0.40
Average			$ 1,665	20%	4%		0.57
Manitowoc	***$ 390***	***$ 596***	***$ 1,476***	***17.4%***	***5.3%***	***7.7***	***0.40***

Revenue	US	Europe	Asia/Other
Manitowoc	***53%***	***35%***	***12%***
Tadano	22%	11%	44%
Liebherr	21%	51%	28%
Manitex	53%	16%	31%

Sources: CapitalIQ, Manitowoc, Liebherr, Tadano and PSR estimates.

Beyond competition, the biggest near term risk facing Manitowoc is that economy remains weak post Covid-19 for an extended period. Most large projects that require cranes are not shutdown right away during a downturn. As projects roll off in 2020 and 2021 we expect that demand and orders and Manitowoc could remain muted for a period of 12-18 months as cranes tend to lag the upcycle in activity.

Conclusion

The core of our thesis on Manitowoc is that operational turnarounds, particularly in high cyclical businesses can be mis-priced. The market and Wall Street tend to need to see overwhelming evidence of a sustained turnaround before getting excited. Manitowoc's first attempt at a turnaround stalled out because of the economy and Covid-19 downturn. Any improvements that Manitowoc management made were swamped by the rapid decline in revenue. That doesn't mean the improvements aren't real, but rather they are masked by the decline in revenue. We have chosen to focus on the underlying drivers of business transformation and whether the conditions exist that will allow for an eventual inflection in profitability and cash flow. Our view is that even at a lower level of sales over a full cycle, Manitowoc's business can be run more efficiently and more profitably. The improved operating performance will lead to greater market share, higher margins, improved returns on capital and cash flow. This should lead to improved sentiment and an increase in the share price. Finally, we believe that Manitowoc has the opportunity to increase the profitability and earnings power of the business by expanding into more profitable segments of the industry. If not successful, Manitowoc has strategic value and the collection of assets have value in some form to a larger company.

Appendix and Projections

PSR Base Case Projections	2019	TTM	2020	2021	2022	2023	2024	2025
Revenue	$ 1,834	$ 1,476	$ 1,448	$ 1,527	$ 1,634	$ 1,700	$ 1,871	$ 1,950
Y/Y								
COGS	$ 1,490	$ 1,219	$ 1,196	$ 1,252	$ 1,334	$ 1,377	$ 1,506	$ 1,560
Gross Profit	$ 344	$ 257	$ 245	$ 275	$ 301	$ 323	$ 365	$ 390
Gross Margin	*18.8%*	*17.4%*	*17.0%*	*18.0%*	*18.4%*	*19.0%*	*19.5%*	*20.0%*
Depreciation	$ 37	37	$ 36	$ 36	$ 36	$ 36	$ 36	$ 37
R&D	$ 31	25	$ 25	$ 30	$ 30	$ 30	$ 30	$ 32
SG&A	$ 167	164	$ 150	$ 147	$ 151	$ 150	$ 152	$ 152
Stock Comp			$ 2	$ 5	$ 6	$ 7	$ 8	$ 9
ESG&A Total	**$ 235**	**201**	**$ 213**	**$ 218**	**$ 223**	**$ 223**	**$ 226**	**$ 230**
Fixed Corp Expense	$ 31	36.4	$ 32	$ 33	$ 34	$ 35	$ 36	$ 37
Other Op-Ex Variable	$ 203	$ 164	$ 181	$ 185	$ 189	$ 188	$ 190	$ 193
Restructuring/Other	$ 10	5	$ 5	$ 3				
Operating Income	**$ 99**	**$ 51**	**$ 27**	**$ 54**	**$ 78**	**$ 101**	**$ 139**	**$ 160**
Operating Margin			1.9%	3.6%	4.8%	5.9%	7.4%	8.2%
Inc. Operating Margin				*88%*	*33%*	*24%*	*26%*	*11%*
Interest	$ (33)	$ (31)	$ (29)	$ (27)	$ (27)	$ (27)	$ (27)	$ (27)
Pre-Tax Income	$ 67	$ 20	$ (2)	$ 27	$ 51	$ 74	$ 112	$ 133
Tax	$ 12		$ (0)	$ 6	$ 11	$ 15	$ 23	$ 28
Net Income	$ 55		$ (1)	$ 22	$ 40	$ 58	$ 88	$ 105
Shares	$ 35		34.5	34.5	34.5	34.5	34.5	34.5
EPS	**$ 1.58**		**$ (0.04)**	**$ 0.63**	**$ 1.16**	**$ 1.68**	**$ 2.56**	**$ 3.05**

Proft and Cash Flow	2019	TTM	2020	2021	2022	2023	2024	2025
Gross Profit	$ 344	$ 257	$ 245	$ 275	$ 301	$ 323	$ 365	$ 390
Adj EBITDA	$ 136	$ 88	$ 68	$ 90	$ 114	$ 137	$ 175	$ 197
Cash Interest	$ (33)	$ (31)	$ (29)	$ (27)	$ (27)	$ (27)	$ (27)	$ (27)
Cash Tax	$ -	$ -	$ 4	$ (2)	$ (5)	$ (8)	$ (13)	$ (17)
Gross Cash Flow	$ 103		$ 35	$ 61	$ 82	$ 101	$ 135	$ 153
Cap-Ex	$ 35		$ (25)	$ (35)	$ (35)	$ (35)	$ (35)	$ (35)
Working Capital			$ (30)	$ (15)	$ (16)	$ (17)	$ (19)	$ (20)
Pension			$ (10)	$ (12)	$ (12)	$ (12)	$ (12)	$ (12)
FCF	$ 59		$ (30)	$ (1)	$ 19	$ 37	$ 69	$ 87

Valuation	2020	2021	2022	2023	2024	2025
EV/EBITDA	10.5	7.9	6.3	5.2	4.1	3.6
FCF Yield		(0%)	4%	7%	14%	17%
PE		23.4	12.7	8.7	5.7	4.8

Cash and Leverage		2020	2021	2022	2023	2024	2025
Start Cash	$ 140	$ 199	$ 166	$ 165	$ 183	$ 220	$ 289
End Cash	$ 199	$ 166	$ 165	$ 183	$ 220	$ 289	$ 376
Gross Debt	$ 300	$ 310	$ 310	$ 310	$ 310	$ 310	$ 310
Net Debt	$ 101	$ 144	$ 145	$ 127	$ 90	$ 21	$ (66)
		2020	**2021**	**2022**	**2023**	**2024**	**2025**
TTM Adj EBITDA	$ 154.0	$ 88	$ 74	$ 90	$ 114	$ 137	$ 175	$ 197
Debt/Adj. EBITDA	1.9		4.2	3.4	2.7	2.3	1.8	1.6
ND/Adj. EBITDA	0.7		1.9	1.6	1.1	0.7	0.1	(0.3)