Manitowoc Cranes: Q4 and FY 2018 Update. Three Years In: A Lean Transformation Assessment. Also, We Bought a Crane.

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Executive Summary

- Shares of Manitowoc are up 11% YTD but down 30% since we recommended them as a buy on September 19, 2018 at $24.5/share. Shares fell over 60% in 2018 and traded under $14 in December. Manitowoc trades at 5.5x 2019 and 4.8X 2020 consensus EBITDA

- In 2018, Manitowoc continued to deliver sales growth, operational improvement, margin expansion, cash generation and working capital reduction. Absolute dollar EBITDA increased for the seventh quarter in a row and TTM Adj. EBITDA margin is 6.3% - up 157bps Y/Y. Increased raw materials in 2018 cost Manitowoc an estimated 50bps of gross margin which remained flat at 17.8%

- In March, Manitowoc successfully raised $300mn of Senior Secured Second Lien notes due 2026 priced to yield 9% to replace its high cost, 14% debt that is due in 2021. 2019 guidance assumes $30mn in interest expense down from $39 in 2018. Prior to the re-financing, Manitowoc had $140mn in cash compared to $267mn in long term debt and a Net Debt/EBITDA ratio of 1.1X. Manitowoc's balance sheet is materially improved, and a major downside risk has been reduced following the re-fi

- We are maintaining our *long term* buy on Manitowoc given its opportunities for self-help on cost initiatives, the pace of new product introductions and increased market share, even in a slow to recover crane market. Lean transformation's like the one Manitowoc is going through take time. We believe the steps management is taking will lead to gross margin expansion, high incremental margins, better working capital management and a shift in investor focus toward free cash flow generation and uses of cash in the coming quarters and years

Key Stats		
Ticker		MTW
Price	$	16.8
52wk High	$	45.0
52wk Low	$	14.5
Shares Outstanding (mn)		35.5
Market Capitalization	$	597
Debt	$	267
Cash	$	140
Enterprise Value	**$**	**724**

Recommendation
BUY Manitowoc (Ticker: MTW)

Porter Street Estimates	2018	2019	2020	2021
Revenue	$1,847	$1,925	$1,983	$2,042
Y/Y Growth		*4.2%*	*3.0%*	*3.0%*
EBITDA	**$ 116.5**	**$ 140**	**$ 155**	**$ 178**
Margin (%)	*6.3%*	*7.3%*	*7.8%*	*8.7%*
EBIT	$63	$89	$117	$141
EPS	NM	**$ 1.30**	**$ 2.00**	**$ 2.52**
P/E	NM	13	8	7

EV/EBITDA	2018	2019	2020	2021
Porter Street	6.2	5.2	4.7	4.1
Consensus	6.2	5.5	4.8	NM

Equity FCF Yield	2018	2019	2020	2021
Porter Street		10%	15%	14%

Debt/EBITDA	2018	2019	2020	2021
Porter Street	2.3	1.9	1.7	1.5

Fair Value	2018	2019	2020	2021
PE Ratio				
15	N/M	$ 19.5	$ 30.0	$ 37.8
Upside		*16%*	*78%*	*125%*
IRR		*16%*	*34%*	*31%*

Editor's Note: This report is broken into two parts: Q4 2018/ FY 2018 re-cap and an overview of where Manitowoc stands three years into their lean journey

Q4 2018 Results: Strong Operating Performance Despite Headwinds

Q4 and Full Year 2018 highlights are listed below:

- Revenue up 7% in Q4 and 17% y/y for full year 2018. Gross Margin up 40bps in fourth quarter. Excluding the increase in material costs we estimate gross margin for full year would have been 18.3% vs 17.8% which was flat versus 2017
- Orders down 22% in Q4 and up 2% in 2018. Book to bill of 1.03X for full year
- Adjusted EBITDA of $31.1mn and $116.2mn for Q4 and FY 2018. Adjusted EBITDA margin up for seventh consecutive quarter and ended year at 6.4% up 157bps Y/Y. Incremental Adj. EBITDA margin in Q4 of 27%
- Year-end cash balance of $140mn vs $267mn long term debt. Debt/EBITDA on TTM basis of 2.3X. Manitowoc has re-financed its ABL and accounts receivable facilities and in March re-financed its 2021 notes with new 9% Sr. Secured Second Lien notes due 2026. The company is guiding 2019 interest expense to be $30mn, down 27% from 2018
- Adj. EBITDA/Interest coverage of 2.97 on a TTM basis > 4.0X at new re-financed rate
- In the fourth quarter, Manitowoc took an $82.8mn goodwill impairment related to its European business. The impairment charge was a result of the decline in the stock price in 2H2018 and the difference between the equity market capitalization and net book value of assets
- Net working capital as a percentage of sales was down 3% to 18.8% on annual basis. Inventory was up $53mn on y/y basis but as a percentage of sales down 3%. Inventory turnover up to 3.3X in 2018 vs 2.7X for 2017
- Generated $17mn cash on a GAAP basis in FY 2018 and $70.4mn over last two years

Outlook/Guidance

- Manitowoc gave a wide range of guidance for 2019 which they anticipate narrowing throughout the year. At the midpoint, management expects to generate:
    - $1.9bn in revenue, $135mn Adj EBITDA (7.1% margin) and $1.0-$1.10 in EPS. Shares now trade at an implied 15X EPS and 5.3X EBITDA multiple

Successful Re-Financing Leads to Lower Cost of Capital

Manitowoc raised $300mn in Sr. Secured Second Lien notes at 9% in March. By doing so they were able to lower their interest payments by 30% and improve their cost of capital. Lowering the cost of debt by 500bps should bring the cost of equity down and we estimate Manitowoc's overall cost of capital has declined from around 15%, to 10%. The debt Manitowoc originally raised at a 14% effective interest rate in 2016 was indicative of the material risks in the business and lack of cash flow generation at the time. While 9% is still high, and credit investors are typically smarter than equity investors, we believe the real advantage of the re-fi will be with respect to covenants. Previous covenants were highly restrictive. Manitowoc has not released any updated information regarding the new issue bonds, but we believe the new covenant package should open the possibility for share-buybacks, a dividend and possible M&A.

Cost of Capital	2018	Cost of Capital	2019
Cost of Debt	14.0%	Cost of Debt	9.0%
Cost of Equity	15%	Cost of Equity	10%
% Debt	32%	% Debt	35%
% Equity	68%	% Equity	65%
WACC	**15%**	WACC	**9.7%**

Source: Porter Street Research

The re-financing saves Manitowoc around $10 million in interest per year. We estimate this savings is worth $0.28/share. On a consensus 2019 estimate (pre-refinancing) of $1.26/share in EPS – this is a significant. Finally, Manitowoc's main covenant was a fixed charge covenant which needed to be greater

than 1. With the reduced interest rate and continued improvement in Adjusted EBITDA, we estimate Adjusted EBITDA would need to fall over 60% before Manitowoc would be in breach – if the interest covenant ratio remains the same.

H&E Equipment Services Conference Call: Updated Color on Crane Market

The H&E Equipment services Q4 2018 earnings conference call commentary was consistent with what Manitowoc and competitors are saying about the crane cycle: we are off the bottom, but the recovery in Rough Terrain and Crawlers remains slow. Dollar utilization for cranes remained low within H&E's portfolio, however, overall utilization was up, and rental rates increased 2% y/y. Sales of new cranes also beat the company's internal expectations and were up 6%. Management noted that Crawler sales remain weak, despite new product introductions. However, they did note an increase in quoting activity regarding large Crawlers and large projects in the US Gulf Coast region. It remains to be seen whether those quotes turn into sales.

M&A in Crane-land: Terex Exists All Terrain Crane Business

On February 25, 2019, Terex announced that it would be selling its Demag brand of mobile, All-Terrain and Crawler cranes to Tadano for a total price of $215mn. According to Terex, it didn't believe the segment would earn its cost of capital in the next few years and the best use of capital was to sell and move on. Terex also announced that it is exiting crane production in their Oklahoma facility. The Demag segment is estimated to generate around $500mn in sales but lose money on an operating basis. The implied purchase price is at an EV/Sales ratio of 0.43 – in line with where Manitowoc trades despite the fact Manitowoc's crane segment turns a profit. Terex's remaining crane business now consists of Rough Terrain, Tower, and Pick and Carry cranes. The segment generates $250mn in sales and Terex now buckets it into an "other" category when breaking out sales by segments. The remaining businesses have a strong presence in Europe and the Middle east. On the Q4 conference call, management stated that it believes further consolidation in the crane industry could make sense.

Implications for Manitowoc:

We view the move by Terex as positive for Manitowoc. Terex has struggled with its supply chain, sourcing efforts, and quality which caused them to miss shipments in 2018. Manitowoc on the other hand didn't miss a single shipment in 2018, largely because of their lean initiatives and continues to receive praise from its customers with its renewed focus on quality. Further, management at Manitowoc has spoken at length about how it has dealt with stress on its supply chain and how it has taken lean tools applied to its own factories and transferred them to suppliers, with excellent results. In one case, Manitowoc sent three of its own people into a supplier's factory and helped them re-configure their production line. Below we include a quote from Manitowoc's Q3 2018 conference call where they highlight how they are partnering with their suppliers to insure on time part deliveries.

Barry Pennypacker:

> **"***Supply chain issues are always a headwind. It's a matter of how you deal with them. And I think this team has demonstrated that, its got enough operational prowess to deal with them effectively. I think I said in my prepared remarks and I mean it that we did not miss a single shipment nor did we shut down our production line due to our supply chain in the quarter. That's a pretty dawg on good accomplishment. And I think it goes back to the strategy that we have……**and what we did was we partnered with our suppliers and we've given them the opportunity to partner with us and tell them that you know what, if you're doing $25mn a year with us, well guarantee you that base load. We guarantee the base load, they're able to invest in their business, there able to hire the best people and their able to keep moving themselves along. When the market goes south, guess what, they're going to continue to get that $25mn worth of business. Instead of taking it back from them, moving it internally, which is this company used to be run. If you want them in the good times, suppliers to give you the level of parts and services that you need to satisfy your customers, you better be taking care of them***

when the market is down and that's been our overall strategy and our philosophy and its paying dividends now."
Source: Bloomberg

We have no view on if Manitowoc would be interested in bidding on the remaining portion of Terex's crane portfolio. At $250mn, the purchase price is small, and with a more flexible debt structure, debt capacity and less restrictive covenants post re-financing, we think Manitowoc can finance any potential deal. However, we aren't sure they want to or need to. Manitowoc's Potain Tower crane band is already the # 1 Tower crane business in the world and most of its production is centered in Europe. Adding north American Tower manufacturing capacity and expanded distribution could be a positive, but at the potential cost of diluting the Potain brand. If Manitowoc wanted to build and produce Potain cranes in the US, buying the Terex assets and converting them to Potain could be an option. However, the time and investment to do so may prove too costly.

Finally, Tadano's performance post deal remains worth watching. Tadano entered the All-Terrain crane market in 2009 and has notably taken market share from Manitowoc's Grove brand under prior management. With the addition of Crawler cranes from the Demag acquisition, Tadano now has a new product line to focus on as it becomes a more formidable opponent to Manitowoc. Below we highlight some key differences between the three companies. Tadano and Terex both have aerial platform businesses, so the revenue mixes aren't directly comparable. Overall, Manitowoc scores well on inventory and working capital metrics, but has significant opportunity for improvement in profitability and gross margin expansion compared to peers.

	Manitowoc Comparables			
	Manitowoc	**Tadano**	**Terex**	**Average**
Revenue ($bn)	**$ 1.9**	$ 1.6	$ 5.1	
Market Cap ($bn)	**$ 0.6**	$ 1.4	$ 2.4	
EV ($bn)	**$ 0.8**	$ 1.4	$ 3.5	
Gross Margin (%)	***17.8%***	*27.1%*	*19.1%*	*21.3%*
EBITDA Margin (%)	***6.3%***	*10.6%*	*7.8%*	*8.2%*
Inventory Turnover	**3.3**	2.3	3.4	3.0
WC as % Sales	**19%**	NM	23%	21%
PE	**14.0**	17.0	22.0	17.7
EV/EBITDA	**5.7**	6.4	8.6	6.9
EV/Revenue	**0.41**	0.87	0.68	0.65

Source: Manitowoc, SEC Filings, Porter Street Research.

2018 in Review

2018 was a good year for Manitowoc the business and a terrible year for Manitowoc the stock. Revenue grew 17%, margins expanded over 150 basis points, working capital as a percentage of sales was reduced by 3% and leverage by almost a full turn as the business generated positive cash flow. As a reward for the improved operating performance, the market took Manitowoc's stock down 60%.

The wall of worries Manitowoc had to climb in 2018 and as we enter 2019 are many: tariff concerns and materials cost inflation remain, Europe is slowing, and the crane cycle remains highly unpredictable and slow in its recovery. We acknowledge that demand for cranes and lifting equipment is economically sensitive and highly unpredictable. While off the bottom, the lack of identifiable and reliable macro and industry specific data points make assessing the crane cycle difficult if not impossible. A slowdown in the Euro area, where Manitowoc generates over 40% of its revenue is a clear and obvious risk. On the Q4 2018 conference call, Manitowoc management announced that while the restructuring efforts in the US are complete, they are only beginning in Europe. As a result, 2019 will bring another year of restructuring charges and messy financials. While this is the right step for the business long term, the announcement may have taken some investors by surprise.

Because of all the negative headlines we expect investor interest in Manitowoc to continue to *decrease*. Manitowoc is a perfect stock to hate on Wall Street. It lacks any of the typical characteristics short term-oriented investors look for: there are no obvious catalysts, it operates in a non-transparent, difficult to follow and unpredictable markets and it isn't easy to model which makes assessing potential earnings revisions to trade off difficult. To us it appears as if Wall Street and the buyside community read "cranes" "tariffs" "steel" "unpredictable cycle" "re-financing risk", put Manitowoc in the "Too Hard and Not Now" pile, and move on. Two long time shareholders (notably > 5% holders Carl Icahn and Southpoint Capital) did just that in 2018 and hit the sell button with Southpoint exiting their position entirely.

Below we lay out what we consider to be "known" risks and headwinds Manitowoc faces and compare them to what we believe are overlooked and less obvious tailwinds:

Known Headwinds

- Continued weakness in European economy
- Additional cash costs associated with European restructuring and capacity rationalization
- Decelerating and worsening order trends
- Continued material and labor cost inflation hurting gross margin improvement

Overlooked Tailwinds

- 2019 will lap tough comparisons on material costs. Manitowoc raised prices three times in 2018 on key products that will start flowing through in 2019
- New, higher priced products: 6 new cranes to be released at Bauma in April
- Possibility of a bi-partisan infrastructure bill in US improving demand, especially for Crawlers
- Continued improvement in reducing working capital, increasing inventory turnover and freeing up cash
- Lower SG&A/fixed cost basis because of the European facilities re-organizing and restructuring

Failure to Hit 2020 Margin Goals

As of now it appears unlikely Manitowoc's management is going to deliver on their initial goal of 10x20 – or, 10% EBITA margins by 2020. 2018 Adj. EBITDA margin was 6.3% and consensus estimates call for EBITDA margins of 7.7% in 2020. PSR estimates EBITDA margins can be closer to 9% by 2020 – but either way – 10% is no longer an anchor the market appears to be using. The 10x20 margin goal was laid out by management in late 2015 and early 2016 pre-spin off. Implicit in the goal was a mix assumption with respect to volumes and margins related to Crawler cranes (est. 30%-40% of sales) and Rough Terrain cranes (est. 15-25% sales). Unfortunately, after making that prediction, in early 2016 crane demand cratered and what appeared achievable suddenly became more difficult.

Even if 10% in 2020 isn't achievable, the more time we spend on Manitowoc, the more we believe that in the next upcycle, it will prove conservative. We see no reason why Manitowoc can not operate at a 12-15% operating margin or higher than previous highs reached in the early 1990s and 2000s. As we discuss later in the report, when (not IF) the crane cycle does turn, and orders begin to accelerate, we believe that over a full cycle Manitowoc will be more profitable, more efficient and generate cash than ever before.

All that said, we acknowledge that the near-term upside in shares may be limited or non-existent. While disappointing, we believe risks related to permeant impairment of capital have been removed following the re-financing and shares today simply bake in a *long-term* outlook that is too negative. When we publish buy recommendations with a 3-5-year time horizon, we mean it.

Three Years In: Where is Manitowoc On Its Lean Journey

Management at Manitowoc is three years into their journey of using lean as the strategy to reshape each aspect of the business. The difference between using lean techniques in manufacturing, having a lean culture and using lean as your business strategy to guide everything your company does are many. As we pointed out in our original report (*https://www.porterstreetresearch.com/reports-1*) Manitowoc has made good progress and thus far followed the playbook used during a lean transformation:

- Reduce headcount before the transition to lean and Kaizen events begin
- Clear out excess inventory
- Reduce square footage, free up capacity and re-design processes to create flow
- Reduce set up and processing times
- Use freed up cash and resources because of reduced cycle times to re-invest into R&D and introduce new product teams that integrate sales, engineering and production teams

While three years isn't enough time to evaluate a true lean transformation, it is enough time to evaluate if Manitowoc is heading in the right direction and if they are investing in the right areas for further improvement. Below we highlight key areas of improvement, where we are focusing our attention compared to other investors and additional areas where we think Manitowoc's business can improve. Finally, we also highlight specific areas where traditional ways of evaluating a business will be distorted by the transition to lean and how that will eventually correct itself.

Wall Street Focus Areas

- Orders, backlog, revenue growth, EBITDA margins

Wall Street and most short-term oriented investors are very good at predicating near term financials and valuing companies over short time frames – 6-12 months. However, we believe that as time horizons stretch to beyond 6-12 months, to 3-5 years and beyond, they do less of a good job as there are fewer and fewer investors or companies that have this kind of time horizon. We bring this up as the investments Manitowoc is making will take time, but if executed, will pay off in ways that are wildly undervalued. In the short term, Wall Street tends to focus not only on the absolute figures that are reported, but also the rate of change in each figure. In the case of Manitowoc, we think Wall Street is concerned with (and recently disappointed in) Manitowoc's orders, backlog, revenue and EBITDA margins. Acceleration in the rate of change of orders in any one quarter = positive, deceleration, regardless of the absolute level or progress = a negative. We understand why investors may want to think that way, but we believe that focus is too narrow and shortsighted. Instead, we chose to focus on the higher-level concepts and principles employed during a lean transformation and how they will flow through the financial and operating performance over time.

Porter Street Focus Areas

Taking a long-term view, not only of Manitowoc's strategy, but from our understanding of what a company goes through during a lean transformation, we tend to focus on the list below. In the following sections we expand on some of them in more detail:

1. Working Capital Management:
    - Inventory turns, receivables collection, working capital as a % of sales
2. New Product Offerings, Rate of Product Introductions, Revenue and Orders:
    - Emphasis on new product introductions and use of lean as the strategy to deliver value to customers. Building products customers want and ask for. Emphasis on getting product to customers faster to market with higher quality. Increased and regained market share.

3. Margin Expansion and Cost Discipline

- Gross margin and operating expansion from overhead reduction, reduced cycle times and higher priced products

4. Cash Flow Generation and Balance Sheet Repair

- Ability to fund investments in R&D, cap-ex and working capital while maintaining liquidity

1. Working Capital Management: Re-Set the Business, Find the Cash

One of the first things management did at Manitowoc was re-set the business for where demand is today. During the 2008 peak, Manitowoc did over $3.8bn in sales and had over 4.5mn square feet in manufacturing capacity. Over the last ten years, revenue has averaged $2.0bn/year with a high of $2.5bn in 2013 and a low of $1.6bn in 2017. Closing factories, reducing capacity and cutting headcount was job number one as Manitowoc prepared to switch from traditional batch and que to lean manufacturing. As it is typically best to make large workforce reduction before implementing lean, management did just that, reducing headcount by 30%. The largest reduction came from Manitowoc's closing of its 500,000 sq. foot Manitowoc, Wisconsin facilities and the consolidation of Crawler production from Manitowoc to the 1.3mn sq. foot Shady Grove facility.

The table below highlights Manitowoc's current manufacturing facilities.

Manitowoc Manufacturing Facilities

Facility Location	Type of Facility	Sq. Footage	Owned/Leased	Production Type
Americas				
Shady Grove, PA	Manufacturing/Office	1,330,000	Owned	Crawlers, RT, Mobile
Port Washington, WI	Manufacturing	81,029	Owned	Crawler Treads
EURAF				
Wilhelmshaven, Germany	Manufacturing/Off./Storage	410,000	Owned/Leased	All-Terrain
Niella Tanaro, Italy	Manufacturing	370,016	Owned	Tower
Fanzeres, Portugal	Manufacturing	362,891	Owned	
Moulins, France	Manufacturing/Office	355,000	Owned	Tower
Charlieu, France	Manufacturing/Office	323,000	Owned	Tower
Baltar, Portugal	Manufacturing/Office	241,876	Owned	Tower
MEAP				
Zhangjiagang, China	Manufacturing	800,000	Owned	Tower
Pune, India	Manufacturing/Office	195,364	Leased	Tower
Americas	1,411,029	31.6%		
EURAF	2,062,783	46.2%		
MEAP	995,364	22.3%		
Total Manufacturing Sq. Footage	**4,469,176**	**100.0%**		

Source: Manitowoc

Manitowoc will focus on restructuring and consolidating its European manufacturing footprint in 2019. Below we estimate how much restructuring Manitowoc could potentially undertake, how much capacity could be reduced and how much additional fixed cost could be taken out of the business. Before we do that, the below on the following page highlights how successful management has been at reducing capacity in two instances. The company was able to re-deploy the entire Crawler production line from 538k sq. feet in Wisconsin to just 230k sq feet in Shady Grove, PA. In a more recent effort, because of Kaizen activities in China, Manitowoc freed up 48,000 square feet in their massive 800,000 sq. foot Zhangjiagang facility.

Capacity Reduction So Far	
Manitowoc, WI	538,000
Current within Shady Grove	230,000
% Reduction	***-57%***
Kaizen in Zhangjiagan	
Freed up 48,000 sq feet: % reduction	***-6%***

Potential European Tower Rationalization	Sq. Footage	Average
Current Global Tower Sq Footage	1,815,000	330,557
# of European Facilities	5	
% Target Square Footage Reduction	*-40%*	726,000
New required Sq Footage	1,089,000	363,000
Facilites to Consolidate	2	

Source: Manitowoc

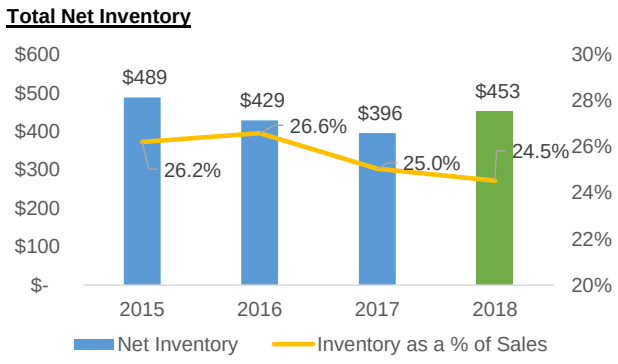
Over 45% of Manitowoc's manufacturing square footage is in Europe and centered around the Tower Crane and All-Terrain product portfolios. There are six facilities spread across Germany, Italy, France and Portugal. We estimate that that Manitowoc could potentially reduce square footage in the Tower facilities by up to 40%. At an extreme, the company could rationalize up to two facilities. Executive Vice President of Cranes Aaron Rosencroft, who worked with CEO Barry Pennypacker at Wabtec and Gardner Denver is currently living in France. We would not be surprised if something along these lines of rationalization and optimization we suggested is what he is working on. Over time, we think this could result in as much as $20mn in SG&A or fixed costs permanently removed from the business.

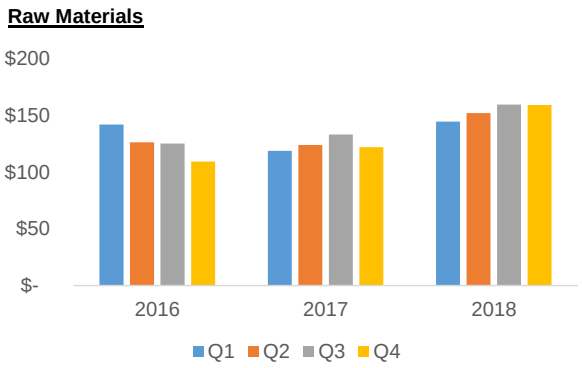
U.S Restructuring	
Time	3 Years
Non-Cash Charge	$ 100
Cash/Restructuring Expense	$ 64
SG&A as a % Sales of Start	11.5%
SG&A as a % of Sales: Current	9.8%
Annual Reduction in Fixed Costs	**$ 30**

European Restructuring Potential	
Time	2 Years
Non-Cash Charge (Q4 2018)	$ 83
Cash/Restructuring Expense	$ 26
SG&A as a % Sales of Start	9.8%
SG&A as a % of Sales: Potential	8.7%
Annual Reduction in Fixed Costs	**$ 20**

Source: SEC Filings, Bloomberg, Porter Street Research Estimates.
Note: Management has guided to $13mn in restructuring expense for 2019. The two-year potential and dollar figures are PSR's estimates, not any stated or published guidance.

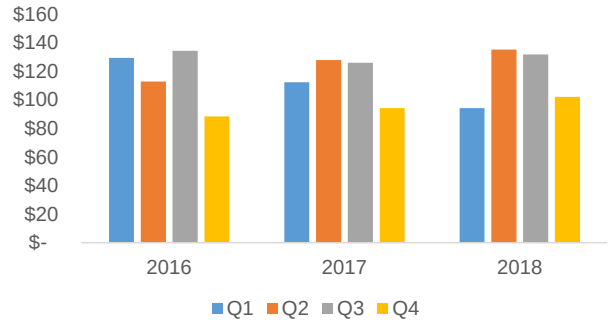
After restructuring and re-setting the business, the second thing management did was free up cash and floor space by reducing inventory.



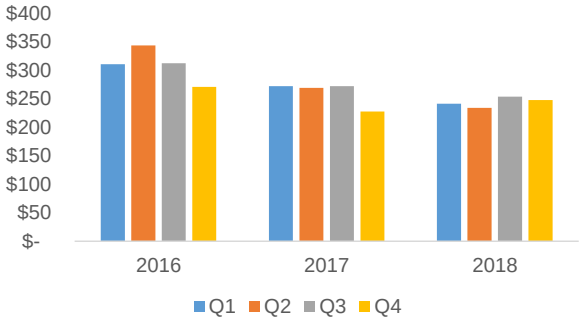


Source: Manitowoc, SEC Filings, Porter Street Research.

Work In Progress



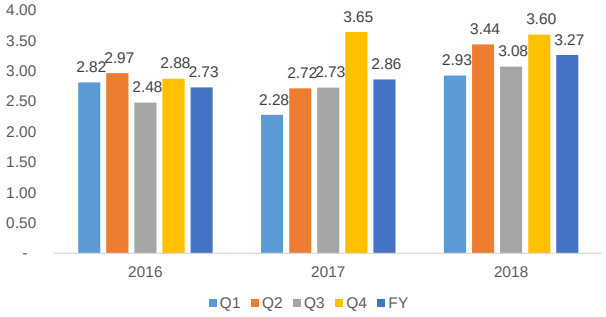
Finished Goods



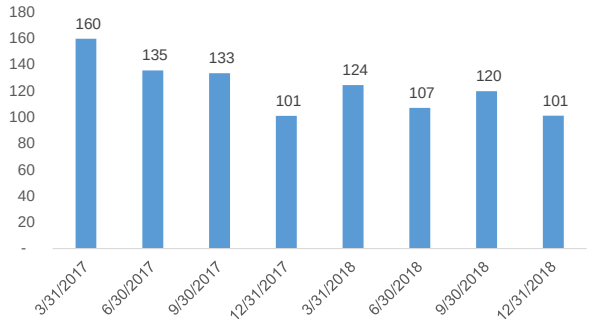
Source: Manitowoc, SEC Filings, Porter Street Research.

From 2015 to 2017, inventory was reduced by $80mn. While inventories grew in 2018, as a percentage of sales, inventory has been reduced to 24.5% from a high of 26.6% in 2016. The largest percentage reduction in inventory has come from finished goods inventory which indicates Manitowoc has done a better job creating flow and matching production with demand. Raw materials inventory has continued to increase at a faster rate relative to the other categories. This is for two reasons 1: This is where Manitowoc keeps inventory designated for its aftermarket parts and service business. This slower moving inventory is offset by higher margins. However, its presence likely understates the true progress Manitowoc is making in reducing inventories, lead times and improving turnover. 2: The increase in materials costs in 2018 is likely leading to some upward revision in carrying value which we view as temporary.

Inventory Turnover (Annualized)

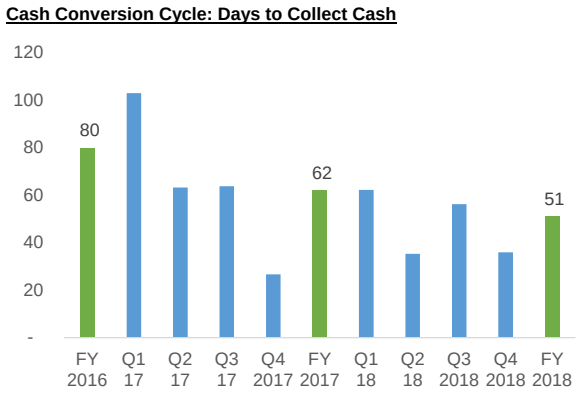


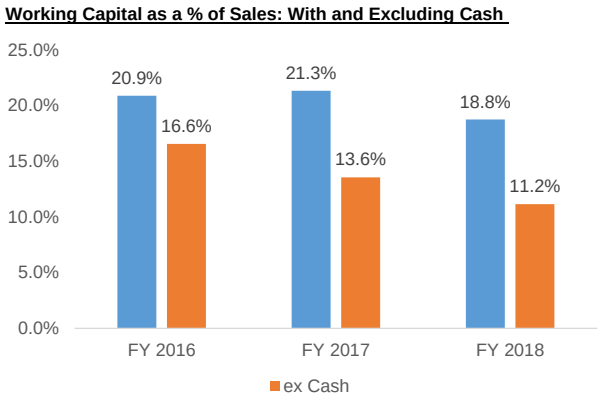
Days of Inventory On Hand



Source: Manitowoc, SEC Filings, Porter Street Research.

Management's stated goal is to improve inventory turns by 0.5X turns/year. We view this as one of the most important variables to watch to verify if Manitowoc is making progress towards its Lean objectives. Days of Inventory have dropped on a quarterly and year over year basis and ended 2018 at 112 days for the FY 2018, down from 134 in FY 2016. Below we show Manitowoc's cash conversion cycle and demonstrate how the company has improved cash collection driven by improved receivables collection in addition to reducing inventory. Finally, working capital as a percent of sales has decreased from 21% in 2016 to 18.8% in 2018. Excluding cash in the calculation of net working capital, the reduction is more dramatic. While order growth, momentum and margins are important, we think the true test of how Manitowoc is performing operationally shows up in these working capital and cash flow metrics. True progress in terms the use of standard work, takt time and better flow of production from design through final product will show up in these numbers first.

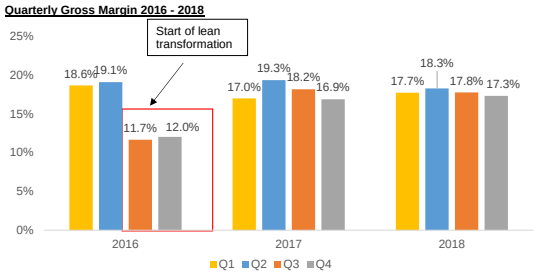


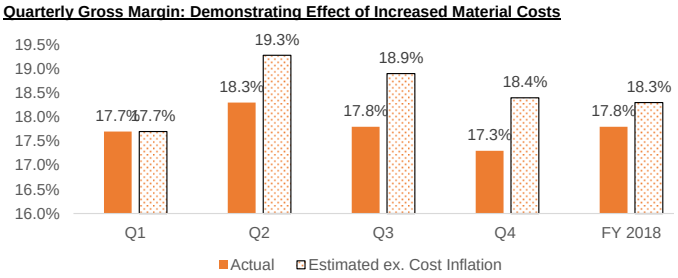


Source: Manitowoc, SEC Filings, Porter Street Research.

One of the challenges, and risks of undertaking a lean transformation is that reported financials, particularly the income statement, will appear worse, before they get better. For a public company, this can be a challenge. As Manitowoc reduced inventory, all the of the fixed costs that had been capitalized into inventory needed to reverse as the inventory was sold. The effect of this was a large increase in cost of goods, lower gross margins and a negative flow through to operating earnings. The chart below shows when Manitowoc began to act. In the third and fourth quarter of 2016, as Manitowoc began reducing inventory, gross margin contracted significantly. (*Manitowoc became a standalone company in Q1 2016*.) However, as we point out later, on page 14, cash flow held up fine.

Finally, below we highlight Manitowoc's 2018 quarterly gross margins: the actual figures and figures that we have adjusted which account for the increase in material costs the company called out. These are real costs that have not gone away. But we wanted to include this exhibit simply to demonstrate that on an underlying basis, we believe Manitowoc is making progress on improving its cost structure despite the tremendous headwinds from raw material costs.



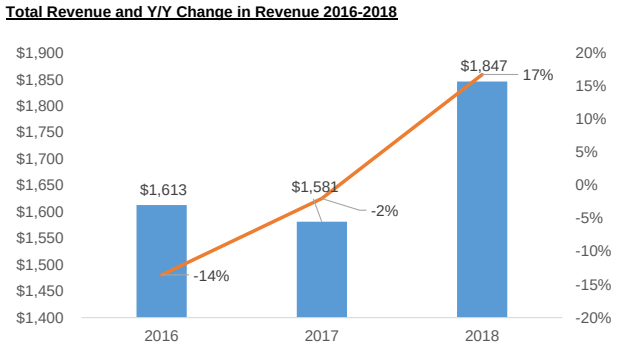


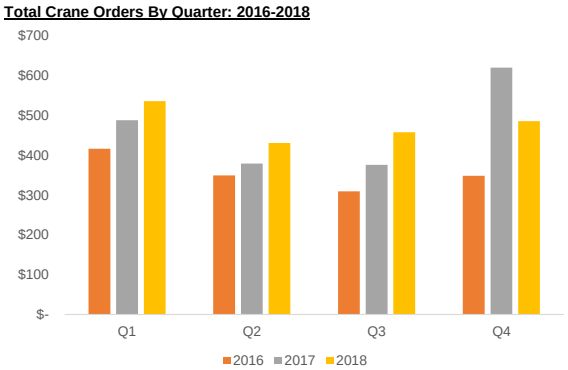
Source: Manitowoc, SEC Filings, Porter Street Research

2. Revenue, Orders and New Product Development

One of the first things Management at Manitowoc had to do was fix its problems with quality and change the way it introduced products to market. While typically thought of as a "manufacturing thing", done correctly, lean allows a company to be more competitive in every aspect of its business, including new product development. Over the last three years, Manitowoc has released 41 new products and as an indication of quality, warranty charges have been reduced by 70%. 2018 was a "gap" year for major crane trade shows. As such, Manitowoc decided to hold their own in June 2018 to show off their new products. Manitowoc estimated around 400 people would attend. Instead, over 800 customers and dealer representatives visited Manitowoc's Shady Grove facility. In 2017, Manitowoc released 17 new products and importantly, the time it took to develop them has been cut drastically from up to 3 years, down just 2-6 months in some cases. The company also has simplified designs and limited product lines in some cases. For example, the company took their self-erecting tower crane line from 7 to 2 models. They simplified designs, added new features, used common components and focused on products with the

largest segments of the market by lift capacity. Instead of designing products across the entire capacity spectrum, Manitowoc narrowed product introductions to where there is a known demand. By directly integrating customer feedback into new product lines at the same time making sure engineering was linked with production, Manitowoc has been able to drastically reduce product development lead times.





Source: Manitowoc, SEC Filings, Porter Street Research.

Lean is what makes these achievements possible. The improvements on the factory floor from improved flow, reduced overhead, set up time and capacity has allowed Manitowoc to continue investing resources and change how products are introduced into the market. By reducing cycle times from 1-2 years down to 6-9 months in some cases Manitowoc has an edge with dealers and customers. The ability to get the market first and establish a leadership with new features and product lines – that the customers are asking for is what can lead to increased market share, something Manitowoc has lost in some segments in recent years. Manitowoc looks forward to continuing to demonstrate its progress when it unveils 6 new products at the Bauma Crane show in Germany in early April 2019.

Laying the Groundwork for Next Up-Cycle

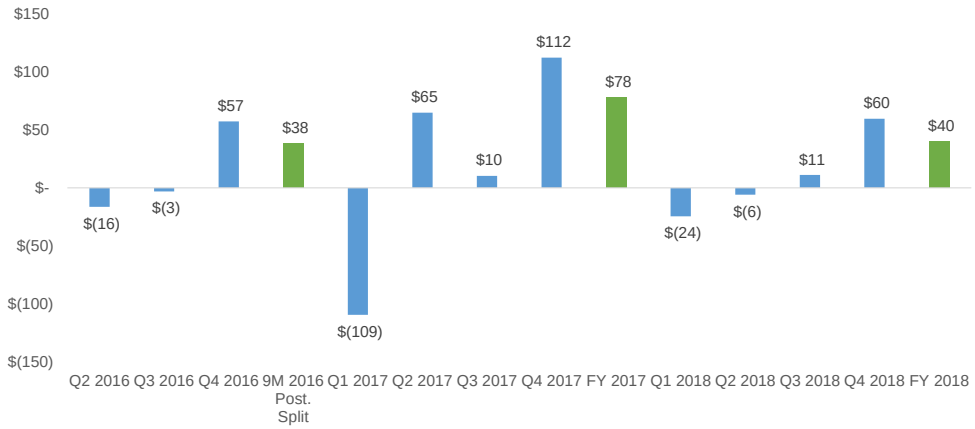
Manitowoc hired Peter Ruck in 2018. Ruck is an experienced business development and corporate development leader. He, like current Manitowoc management has a background in implementing lean techniques across an organization, primarily in a sales and business development capacity. Mr. Ruck previously worked at Danaher and most recently at IDEX. According to the 2018 proxy statement, Mr. Ruck was awarded a combination of options and restricted stock units currently worth over $1.6 million dollars. We believe he was hired to help Manitowoc grow. At its peak Manitowoc was almost twice as large as it is today based on revenue. Despite the recent and expected square footage reduction, we believe the lean initiatives managing has undertaken will allow Manitowoc to do as much business as it has in the past with significant less labor, overhead and square footage.

Finally, as we think about the long-term potential for Manitowoc and how lean can make their products more competitive, a recent quote on the Q4 2018 conference call was representative of the opportunity that exists in China. Even during the 2008 peak, China was never a huge market for Manitowoc. Currently we estimate Manitowoc generates over $100mn in sales or about 6% of all sales. However, Manitowoc is specifically designing and releasing a new series of Potain Tower cranes targeting this 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. Even if Manitowoc can tap 5-10% of this multiple billion-dollar market on the back increased quality, product features and speed to market, the incremental revenue and margin are meaningful and underappreciated.

4. Follow the Cash and Secure the Balance Sheet

With the income statement a mess because of the distortions caused by traditional standard cost accounting, the only real measure that matters to see if Manitowoc is making progress is cash. Manitowoc increased operating cash flow (Cash from Operations) by over 100% from FY 2017 to the first 9 months has a standalone company in 2016. We highlight the first 9 months of cash generation in 2016 as this was the time when Manitowoc was liquidating inventory, but also reporting depressed operating earnings figures because of gross margin compression. Cash generation was positive again in 2018, although less than 2017 as Manitowoc invested to in inventory to meet increased revenues, which were up 17% y/y.

Cash Flow From Operations: Q2 2016 - 2018



Source: SEC Filings, Manitowoc, Porter Street Research

We expect cash generation to continue to improve. In 2019, we estimate Manitowoc will generate $56mn in cash flow before working capital. That translates into a 10% equity free cash flow yield.

FCF Reconciliation	12/31/2019	12/30/2020	12/30/2021	12/30/2022
EBIT	$ 89	$ 117	$ 141	$ 164
Depreciation	$ 38	$ 38	$ 38	$ 38
Amortization	$ 0.4	$ 0.4	$ 0.4	$ 0.4
EBITDA	$ 127	$ 155	$ 179	$ 202
Adj EBITDA	$ 140	$ 155	$ 179	$ 202
Use of Cash				
Cap-Ex	$ (35)	$ (36)	$ (37)	$ (38)
CFO pre WC- Cap-Ex	$ 92	$ 119	$ 141	$ 163
Interest	$ (30)	$ (27)	$ (27)	$ (27)
Cash Taxes	$ (6)	$ (9)	$ (12)	$ (14)
FCF Pre Working. Cap.	***$ 56***	***$ 83***	***$ 103***	***$ 122***
Change in Working Capital	$ (13)	$ (18)	$ (23)	$ (28)
FCF post Change in WC	***$ 43***	***$ 65***	***$ 80***	***$ 94***
Pension Contribution	$ (8)	$ (8)	$ (8)	$ (8)
Excess Free Cash	**$ 35**	**$ 57**	**$ 72**	**$ 86**
EBITDA	$ 127	$ 155	$ 179	$ 202
EBITDA- Cap-Ex	$ 92	$ 119	$ 141	$ 163
EBITDA- Int - Capex Pre WC	$ 56	$ 83	$ 103	$ 122

FCF to EV Yield	12/31/2019	12/30/2020	12/30/2021	12/30/2022
EBITDA- Cap-Ex	12.3%	16.0%	19.0%	21.9%
FCF Pre Change in WC	7.5%	11.1%	13.8%	16.4%

FCF to Equity Yield	12/31/2019	12/30/2020	12/30/2021	12/30/2022
EBITDA- Cap-Ex	16.1%	20.9%	24.9%	28.7%
FCF Pre Change in WC	9.8%	14.5%	18.1%	21.5%

Source: SEC Filings, Manitowoc, Porter Street Research

Improved Cash Flow, Balance Sheet and NOLs Make Manitowoc Attractive as an LBO Candidate

At today's valuation Manitowoc would make an attractive LBO or acquisition candidate. The company has significant tax assets and NOLs that will limit cash taxes going forward. While the revenue outlook remains highly uncertain, the credit markets appear accommodative at this point in the cycle. Below we lay out what the potential returns could be from an LBO. We present two overly simplified cases, one which follows our base case forecasts and another that effectively assumes there is a recession at some point along the way. One thing to note that we don't account for is that during a recession, Manitowoc would be able to raise cash by lowering its investment in working capital to generate cash and benefit from an increasing variable cost base which would help with debt paydown during a stressed environment. Also, as we show below, improved inventory turnover fees up additional cash as well. A buyout isn't our base case, but at today's share price a smart and patient buyer could buy the entire enterprise for a fair price, keep the current management in place, look for possible consolidation and M&A opportunities and re-enter the public markets are a much higher valuation than today.

Hypothetical LBO Math		Adj. For Cash
Purchase Price	$ 1,200	$ 1,060
Per Share	*$ 34*	
2019 Adj. EBITDA	$ 130	
Multiple	9	8
Sponsor Equity	$ 600	
Sr. Sec 2026 Notes	$ 300	
Term Loan L+ 600	$ 300	
Total Debt	**$ 600**	
Total Leverage	4.6	
Cash	$ 140	
Net Leverage	3.5	
Cap Structure		
Equity	50%	
Debt	50%	

Upside/Downside	Base Case	Low Case
Enter Equity	$ 600	$ 600
Enter Multiple	9	9
Exit		
Multiple	6	6
EV	$ 1,300	$ 794
Debt	$ 164	$ 522
Equity Value	$ 1,136	$ 273
Equity Multiple	1.9	0.5
Five Year IRR	*24%*	*8%*

Source: Porter Street Research Estimates
Note: Base case is shown. Low for reference

Case: Base	2019	2020	2021	2022	2023
Revenue					
Base	*$ 1,925*	*$ 1,983*	*$ 2,042*	*$ 2,103*	*$ 2,167*
Low	$ 1,925	$ 1,954	$ 1,563	$ 1,719	$ 1,891
EBITDA	**$ 144**	**$ 169**	**$ 194**	**$ 210**	**$ 217**
Base Margin (%)	7.5%	8.5%	9.5%	10.0%	10.0%
Low Margin (%)	7.5%	8.0%	3.0%	5.0%	7.0%
EBIT	$ 106	$ 131	$ 156	$ 172	$ 179
Interest	$ (51)	$ (49)	$ (46)	$ (41)	$ (34)
Cash Tax	$ (6)	$ (9)	$ (12)	$ (14)	$ (16)
Change in WC	$ (25)	$ (30)	$ (35)	$ (40)	$ (40)
FCF for Pay Down	**$ 24**	**$ 42**	**$ 63**	**$ 77**	**$ 88**
Start Debt	**$ 600**				
Sr. Notes	$ 300	$ 300	$ 300	$ 300	$ 300
Term Loan L+ 600	$ 300	$ 276	$ 233	$ 170	$ 93
Pay Down TL	$ (24)	$ (42)	$ (63)	$ (77)	$ (88)
End TL	$ 276	$ 233	$ 170	$ 93	$ 4
Cash	$ 140	$ 140	$ 140	$ 140	$ 140
Total End Net Debt	**$ 436**	**$ 393**	**$ 330**	**$ 253**	**$ 164**

Credit Metrics					
Base	**2019**	**2020**	**2021**	**2022**	**2023**
Net Debt/EBITDA	3.0	2.3	1.7	1.2	0.8
EBITDA/Interest	2.8	3.4	4.2	5.2	6.3
EBIT/Interest	2.1	2.7	3.4	4.2	5.2
Low					
Net Debt/EBITDA	3.0	2.6	10.1	6.0	3.9
EBITDA/Interest	2.8	3.2	1.0	1.7	2.4
EBIT/Interest	2.1	2.4	0.2	0.9	1.7

Inventory Turnover Benefit

Below we present a simplified analysis demonstrating the power of improved inventory turnover and an additional source of cash that we believe few investors are thinking about, but should.

Inventory Turnover Analysis					
Example 1: Lean - Turnover Improves 0.5 Turns/Year					
	2017	**2018**	**2019**	**2020**	**2021**
Sales	$ 1,581	$ 1,847	$ 1,925	$ 1,983	$ 2,042
COGS		$ 1,519	$ 1,572	$ 1,613	$ 1,661
Gross Margin (%)		*17.8%*	*18.3%*	*18.7%*	*18.7%*
Average Inventory	$ 454	$ 465	$ 417	$ 378	$ 348
$ Investment in Inventory		$ 11	$ (47)	$ (39)	$ (29)
Freed up Cash from Faster Turnover			*$ 47*	*$ 39*	*$ 29*
Cumulative Freed up Cash			**$ 47**	**$ 87**	**$ 116**
Inventory as a % of Sales	28.7%	25.2%	21.7%	19.1%	17.1%
Inventory Turnover	*2.86*	*3.27*	*3.77*	*4.27*	*4.77*
Improvement in Turnover (Turns)		0.41	0.50	0.50	0.50
Example 2 Static: Assume 2018 Inventory Turnover					
Inventory Turnover		3.3	3.3	3.3	3.3
Average Inventory	$ 454	$ 465	$ 476	$ 489	$ 503
$ Investment in Inventory		$ 11	$ 12	$ 12	$ 15
Cumulative Working Capital Need		**$ 11**	**$ 23**	**$ 35**	**$ 49**

Source: Manitowoc, Porter Street Estimates

The purpose of the inventory turnover analysis is to demonstrate the potential improvement in cash flow from improving inventory turnover. Manitowoc management has started a goal of improving inventory turns by 0.5x/year. They fell short in 2018 but have made good progress since 2016. As the above demonstrates, if lean initiatives continue to succeed and turnover can improve by 0.5X/year, Manitowoc could be able to operate with much less absolute dollar inventory – freeing up the cash to invest elsewhere or pay down debt. While the above is just an example, and not a forecast, the difference between improving inventory turn over and static is striking. Over a four-year period, the lean focused firm can generate an additional $116mn in cash flow versus the "static" example, which results in a use of $49mn. We are hesitant to call the above a forecast but do want to include is as we believe one of the powers of lean is unlocking cash in ways investors and Wall Street typically don't anticipate – or reward.

Upside/Downside? What is Risk Reward for Manitowoc From Here

With all the potential macro uncertainty, we admit that the near-term upside in Manitowoc shares could be limited. The below lays out what we think fair value of shares is today and what it could be over the next few years.

Fair Value	**2018**	**2019**	**2020**	**2021**
PE Ratio				
15	N/M	$ 19.5	$ 30.0	$ 37.8
Upside		*16%*	*78%*	*125%*
IRR		*16%*	*34%*	*31%*

Source: Porter Street Research Estimates.

Even though we acknowledge that during a recession, shares could spend some time around $10/share or 50% lower - our conviction remains that at some point during the next upcycle Manitowoc will emerge a more profitable business than ever before because of lean. The table below lays out what we believe is possible as "Mid-Cycle" during the next up-cycle for Manitowoc. At over $4.5/share in earnings we think a share price in the $50-$70 range at some point in the next 3-5 years is reasonable. Compared to $16.5 today – we see tremendous value in shares of Manitowoc.

	Manitowoc Lean Evolution Potential			
	2016	**2018**	**2020est**	**Mid-Cycle**
Sales	$ 1,613	$ 1,847	$ 1,983	**$ 2,150**
EBITDA	$ 69	$ 117	$ 155	**$ 269**
EBIT	$ 23	$ 63	$ 117	**$ 226**
EPS	NM	$ 0.45	$ 2.00	**$ 4.55**
PE	NM	37.4	8.4	**3.7**
FCF Pre WC	NM	$ 39	$ 83	**$ 185**
% Current Market Cap		*7%*	*14%*	***31%***
Margins				
Gross	*15.7%*	*18.3%*	*18.7%*	***21.0%***
EBITDA	*4.2%*	*6.3%*	*7.8%*	***12.5%***
EBIT	*1.4%*	*3.4%*	*5.9%*	***10.5%***
As a % of Sales				
Inventory	26.6%	24.5%	22.5%	**17.0%**
Working Capital	20.9%	18.8%	16.5%	**15.0%**
WC ex. Cash	16.6%	11.2%	10.5%	**10.0%**
Inventory Turnover	2.73	3.27	4.30	**> 5.0**
Cash Conversion (Days)	80	51	45	**30**

Source: Porter Street Research Estimates

Appendix: We Bought a (Model) Crane

Picture of MDT 389 model Tower Crane taken at original PSR headquarters

To continue our due diligence efforts, we bought a crane. A model Potain MDT 389 tower crane. Potain cranes are the bestselling Tower Cranes in the world, however, 80% of the installed base is in Europe. For us, “going to the Gemba” and trying to observe one in real life has proved difficult. The skyline of Washington, DC, is filled with tower cranes, most are Terex - though there are a few refurbished Potain cranes that have been painted white and blue. There is one original Potain tower at the Ballston Mall Development, in Arlington, Virginia and we recently spent a few minutes observing it while meeting a friend for lunch. Short of staring at the construction site all day, we figured the model would be a great way to observe the crane and see how all the pieces fit together. While only a model, it is valuable to see the cranes design and the moving pieces that need to be manufactured and assembled.