

**Rocky Mountain Tooling & Machining Association**  
RMTMA Fall Conference : Manufacturing the Future  
Thursday October 8, 2020

Hartwig, Inc.  
794 Ventura St Suite A  
Aurora CO 80011

## **The Economic Future of Machine Shops**

- Machine Shops and Industry in Rockies
- Near Shoring and Reshoring Trends
- Machine Shop Productivity Trends
- Machine Shop Average Income Statement
- Machine Tool Order Trends
- Machine Shops and Machine Tools Relationship
- Machine Shop Output and Politics
- 2021 Machine Shop Economic Forecast

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**US COUNTY BUSINESS PATTERNS - 2018**

**COLORADO SHARE OF NUMBER OF MANUFACTURING JOBS**

	USA AVE	CO	Δ	RANK
TRANSPORT EQUIP (CARS/TRUCKS, AIRCRAFT, TRAINS, BOATS)	13.3%	6.7%	-6.6%	29
FOOD MANUFACTURING	13.1%	17.7%	+4.6%	12
METAL PRODUCTS (INCLUDES MACHINE SHOPS)	12.1%	10.9%	-1.2%	23
MACHINERY AG-CONSTRUCTION-MINING-INDUSTRIAL-POWER	8.9%	10.6%	+1.7%	14
CHEMICAL MANUFACTURING	6.7%	5.6%	-1.1%	26
PLASTICS AND RUBBER PRODUCTS MANUFACTURING	6.6%	3.7%	-3.0%	41
COMPUTER AND ELECTRONIC PRODUCT MANUFACTURING	6.6%	9.0%	+2.4%	16
MISCELLANEOUS MANUFACTURING	4.6%	6.7%	+2.1%	16
PRINTING AND RELATED SUPPORT ACTIVITIES	3.7%	4.6%	+0.9%	13
WOOD PRODUCT MANUFACTURING	3.5%	3.1%	-0.4%	31
NONMETALLICS (CEMENT, CERAMICS, GLASS, AND LIME)	3.3%	5.9%	+2.5%	5
PRIMARY METAL MANUFACTURING	3.2%	1.6%	-1.5%	33
FURNITURE AND RELATED PRODUCT MANUFACTURING	3.1%	3.4%	+0.3%	17
ELECTRICAL EQUIPMENT, APPLIANCE, AND COMPONENTS	2.9%	1.8%	-1.1%	31
PAPER MANUFACTURING	2.9%	0.8%	-2.1%	43
BEVERAGE AND TOBACCO PRODUCT MANUFACTURING	2.0%	5.9%	+3.9%	1
PETROLEUM AND COAL PRODUCTS MANUFACTURING	0.9%	0.6%	-0.3%	25
TEXTILE PRODUCT MILLS	0.9%	1.0%	+0.1%	13
TEXTILE MILLS	0.8%	0.1%	-0.6%	34
APPAREL MANUFACTURING	0.7%	0.2%	-0.5%	31
LEATHER AND ALLIED PRODUCT MANUFACTURING	0.2%	0.1%	-0.1%	30
TOTAL MANUFACTURING JOBS	100%	100%		

JOBS/COMPANY

RANK BY SHARE OF JOBS					USA AVE	CO	Δ
CT	MI	WA	IN	KY	138	54	-84
NE	DE	AR	ID	IA	57	38	-19
RI	NH	OK	CT	IL	26	17	-9
ND	OK	IA	SD	WY	46	40	-6
WY	LA	DE	NJ	WV	59	29	-30
OH	SC	MI	KY	TN	65	25	-40
MA	NH	ID	VT	MD	65	39	-26
RI	NV	UT	SD	NM	21	14	-7
NV	MD	MN	NJ	FL	18	13	-5
MT	OR	WV	ID	ME	29	17	-12
NM	WY	NV	WV	CO	27	25	-1
WV	IN	AL	PA	OH	91	58	-33
MS	NC	SD	UT	IN	26	15	-10
NH	MA	MS	WI	SC	62	29	-33
ME	WI	AR	LA	SC	86	41	-45
CO	MT	CA	VA	OR	24	19	-4
WY	LA	MT	ND	NM	51	49	-2
GA	MT	ME	AL	NC	18	11	-7
SC	NC	GA	RI	NH	48	10	-38
CA	NY	NC	NJ	VT	15	5	-10
ME	AR	MO	MT	TX	22	7	-15
					41	24	-17

**COLORADO SHARE OF MANUFACTURING JOBS**

**STRENGTH IN FOOD, MACHINERY, ELECTRONICS, AND MISCELLANEOUS**

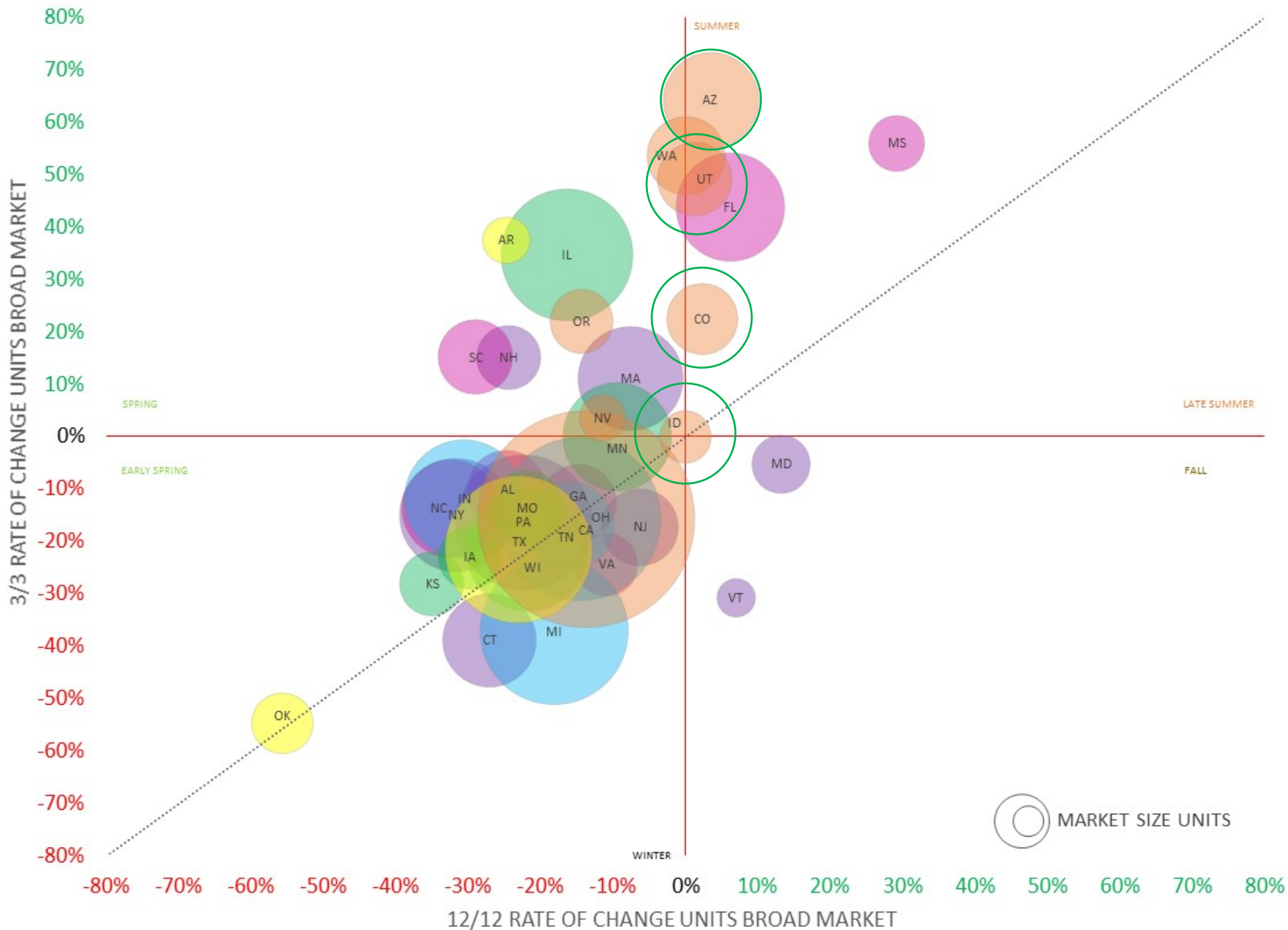
**#5 IN NONMETALLICS**

**#1 IN BEVERAGE AND TOBACCO**

**SMALLER BUSINESSES**

SOURCE: US CENSUS BUREAU





**MOUNTAIN STATES LEADING THE WAY OUT OF US MANUFACTURING RECESSION**

BROAD MARKET MACHINE TOOL ORDERS RATE OF CHANGE THROUGH AUGUST 2020

SPRING: POSITIVE 3/3 BUT NEGATIVE 12/12  
 SUMMER: POSITIVE 3/3 AND POSITIVE 12/12  
 LATE SUMMER: 3/3 IS LOWER THAN 12/12  
 FALL: POSITIVE 12/12 BUT NEGATIVE 3/3  
 WINTER: NEGATIVE 3/3 AND NEGATIVE 12/12  
 EARLY SPRING: 3/3 IS GREATER THAN 12/12

**US TRADE BALANCE, \$ BIL**

	2017	2018	2019	YEAR TO DATE AUGUST			LTM
				2019	2020	Δ	
GOODS ONLY (EXCLUDES SERVICES)							
EXPORTS	1,557	1,677	1,652	1,105	927	-178	1,475
IMPORTS	2,356	2,557	2,517	1,695	1,503	-192	2,325
BALANCE	-799	-880	-864	-590	-576	+14	-850

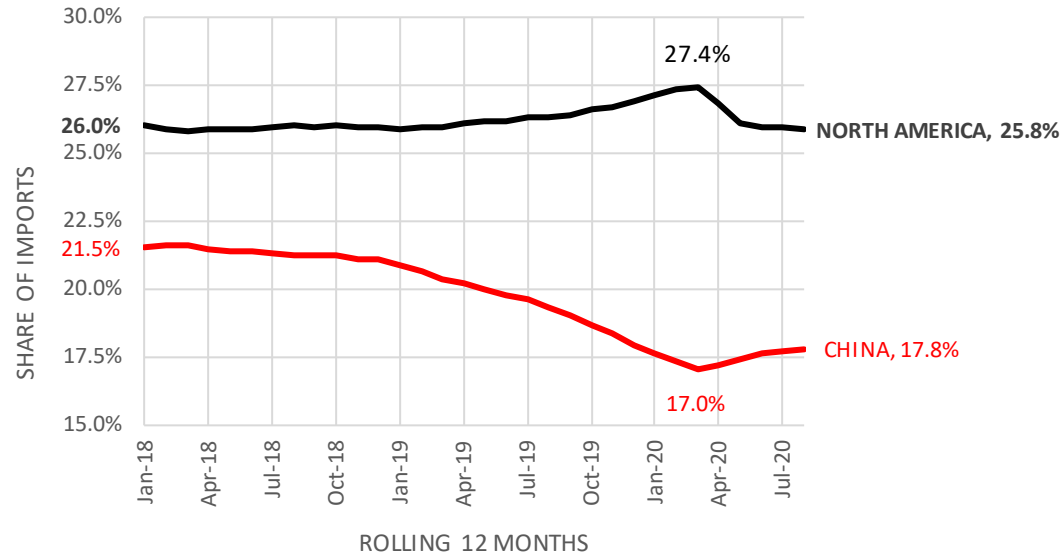
**SHARE OF IMPORTS BY COUNTRY**

<b>CHINA</b>	<b>21.4%</b>	<b>21.1%</b>	<b>17.9%</b>	<b>17.8%</b>	<b>17.5%</b>	<b>-0.3%</b>	<b>17.8%</b>
MEXICO	13.3%	13.5%	14.2%	14.2%	13.5%	-0.7%	13.8%
CANADA	12.7%	12.5%	12.7%	12.5%	11.5%	-1.0%	12.1%
<b>NORTH AMERICA</b>	<b>26.0%</b>	<b>25.9%</b>	<b>26.9%</b>	<b>26.7%</b>	<b>25.0%</b>	<b>-1.7%</b>	<b>25.8%</b>
JAPAN	5.8%	5.6%	5.7%	5.8%	5.0%	-0.8%	5.2%
GERMANY	5.0%	4.9%	5.1%	5.1%	4.9%	-0.2%	4.9%
SOUTH KOREA	3.0%	2.9%	3.1%	3.1%	3.2%	+0.1%	3.2%
TOP 6 IMPORT COUNTRIES	61.2%	60.4%	58.7%	58.4%	55.5%	-2.9%	56.9%
ALL OTHER COUNTRIES	38.8%	39.6%	41.3%	41.6%	44.5%	+2.9%	43.1%

SOURCE: US CENSUS BUREAU

**NEAR SHORING IS REAL**

**UNTIL COVID THE SHARE OF US IMPORTS FROM CHINA HAD BEEN DECREASING WHILE SHARE FROM CANADA AND MEXICO INCREASED**



**BUT WHAT ABOUT RESHORING?**



**US TRADE BALANCE 2019, \$ BIL**

	# HTS-6 CODES	IMPORTS	EXPORTS	BALANCE
ELECTRICAL/ELECTRONIC, TV AND SOUND	265	346	173	-173
VEHICLES OTHER THAN RAILWAY	87	305	134	-171
MACHINERY AND MECHANICAL APPLIANCES	516	371	206	-165
TEST/MEASURE AND SURGICAL INSTRUMENTS	144	95	91	-5
CLOCKS AND WATCHES	49	5	2	-3
MUSICAL INSTRUMENTS	17	1	1	-1
SHIPS AND BOATS	17	2	2	0
RAILWAY AND ROLLING STOCK	22	2	3	1
ARMS AND AMMUNITION	18	3	6	3
AIRCRAFT AND SPACECRAFT	16	35	136	101
<b>TOTAL ELECTRICAL-MECHANICAL GOODS</b>	<b>1,151</b>	<b>1,166</b>	<b>755</b>	<b>-412</b>

SOURCE: US CENSUS BUREAU  
GENERAL IMPORT VALUE AND FAS EXPORT VALUE

**ELECTRICAL-MECHANICAL GOODS ONLY**

**\$173 BILLION** DEFICIT (42% OF \$412 BIL) IN ELECTRICAL AND ELECTRONICS  
**\$171 BILLION** IN AUTOS AND TRUCKS (VEHICLES OTHER THAN RAIL)  
**\$165 BILLION** IN MACHINERY AND MECHANICAL PRODUCTS – **SEE BELOW**

INCLUDING A **\$101 BILLION TRADE SURPLUS** FOR AIRCRAFT

**MACHINERY AND MECHANICAL PRODUCTS INCLUDES**

JET ENGINE PARTS, REFRIDGERATORS, AIR CONDITIONERS,  
EXCAVATORS, HAND TOOLS, MOTOR PARTS, VALVES, COMPRESSORS,  
GEARS, FANS, RUBBER/PLASTIC MOLDS, CRANES





**US TRADE BALANCE 2019 BY HTS 6-DIGIT SIMPLIFIED, \$ BIL**

SOURCE: US CENSUS BUREAU

**TOP 50 ELECTRO-MECHANICAL CATEGORIES BY IMPORT VALUE, HAVING 20% OR LESS EXPORT TO IMPORT RATIO**

RED IS GENERAL IMPORT AND GREEN IS FAS EXPORT VALUE

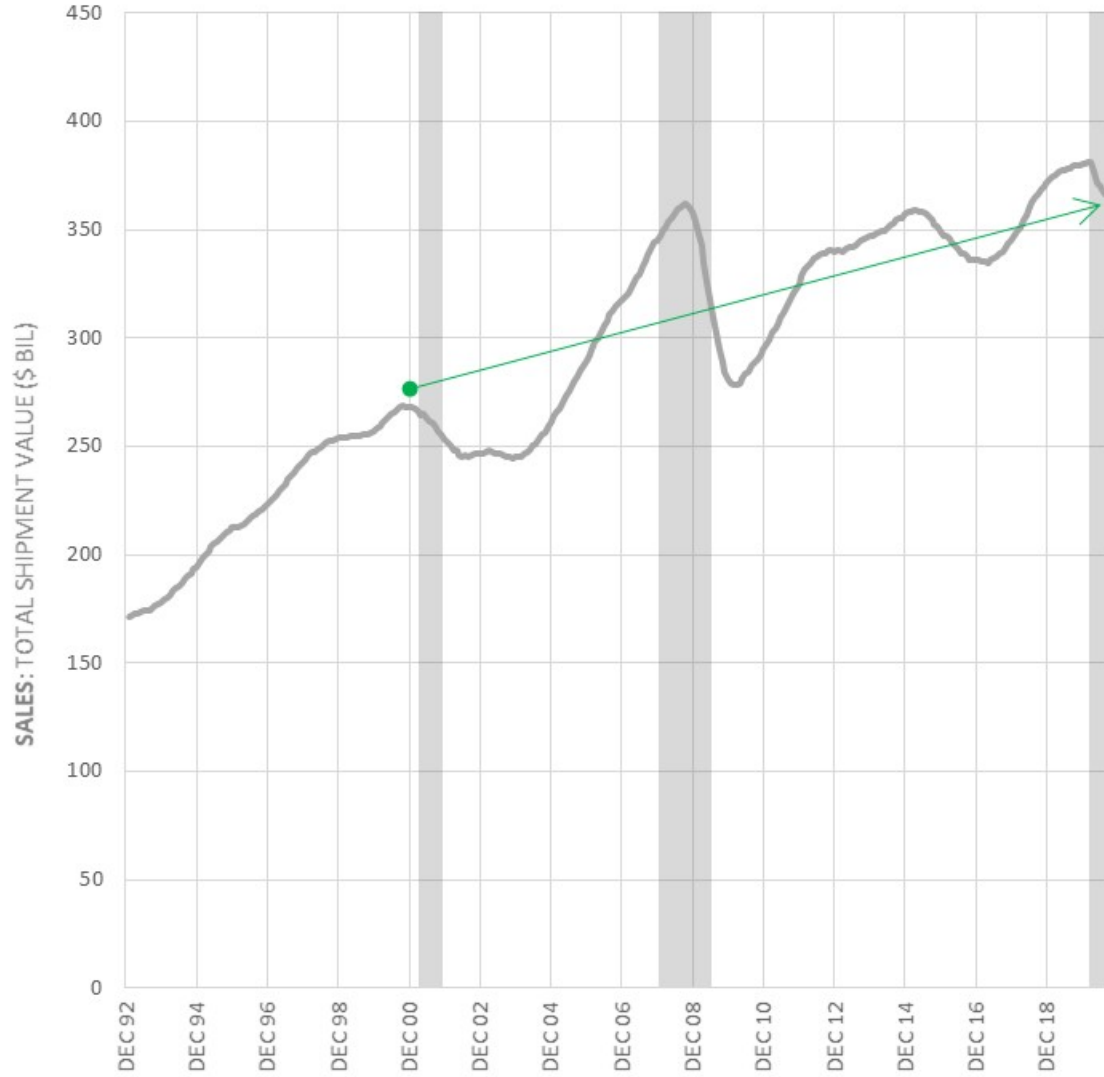


**THERE ARE 154 HTS 6-DIGIT ELECTRO-MECHANICAL CATEGORIES WITH 20% OR LESS EXPORT TO IMPORT RATIO**

**THE TOP 50 CATEGORIES SHOWN HERE ARE \$297 OF \$412 BIL (72%) OF THE ELECTRO-MECHANICAL TRADE DEFICIT**



**NAICS 332 METAL PRODUCTS MANUFACTURING  
INCLUDES MACHINE SHOPS**



**INCREASING SALES  
\$268 to \$366 BIL**

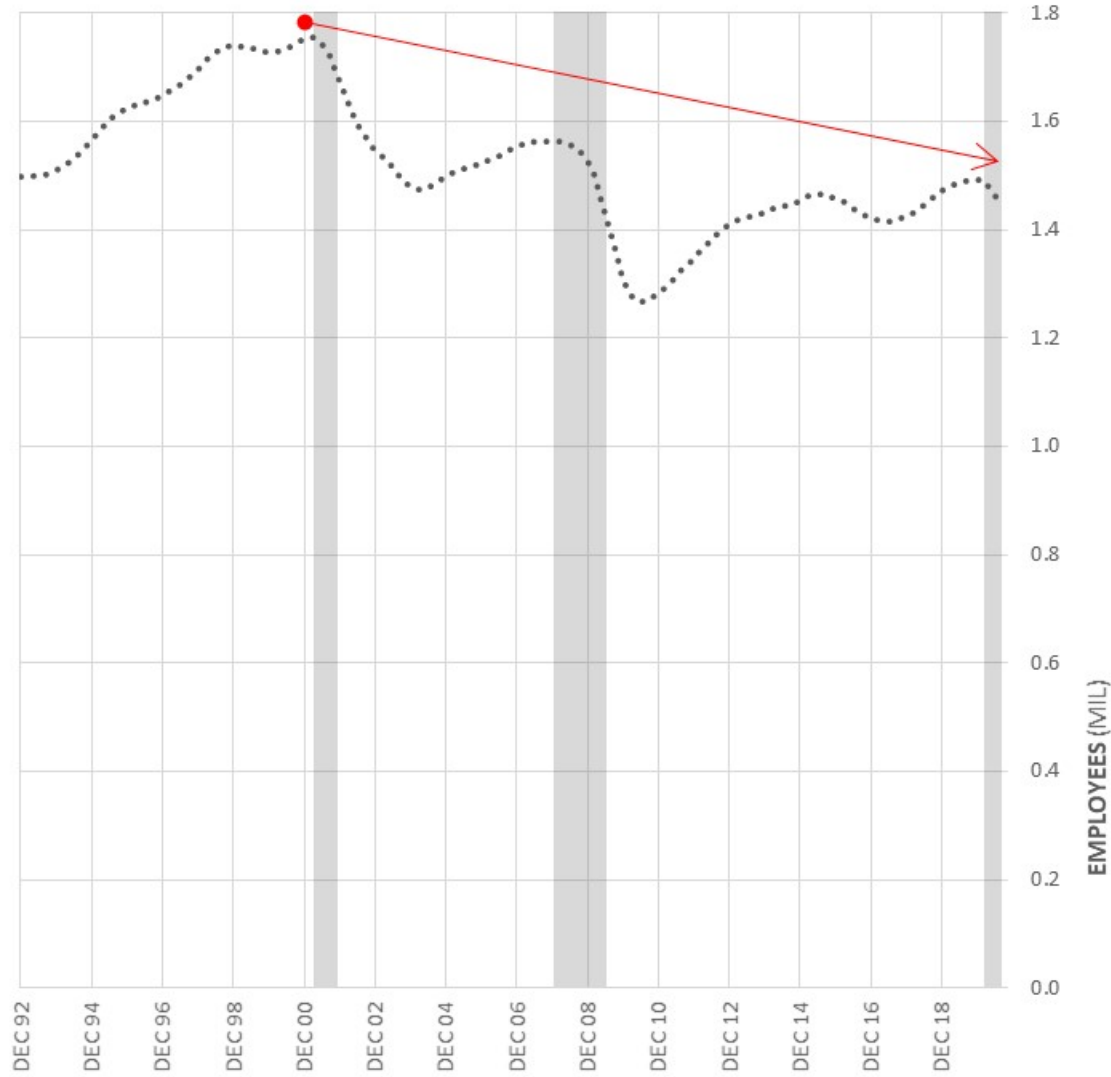
**+1.6% CAGR  
+\$98 BIL**

NAICS 332 INCLUDES SUBCATEGORIES: **MACHINE SHOPS**, FORGING/STAMPING, SAW BLADES, STRUCTURAL METALS, BOILER/TANK, HARDWARE, SPRING/WIRE, HEAT TREATING, VALVES AND SMALL ARMS

SOURCE: FEDERAL RESERVE



**NAICS 332 METAL PRODUCTS MANUFACTURING  
INCLUDES MACHINE SHOPS**



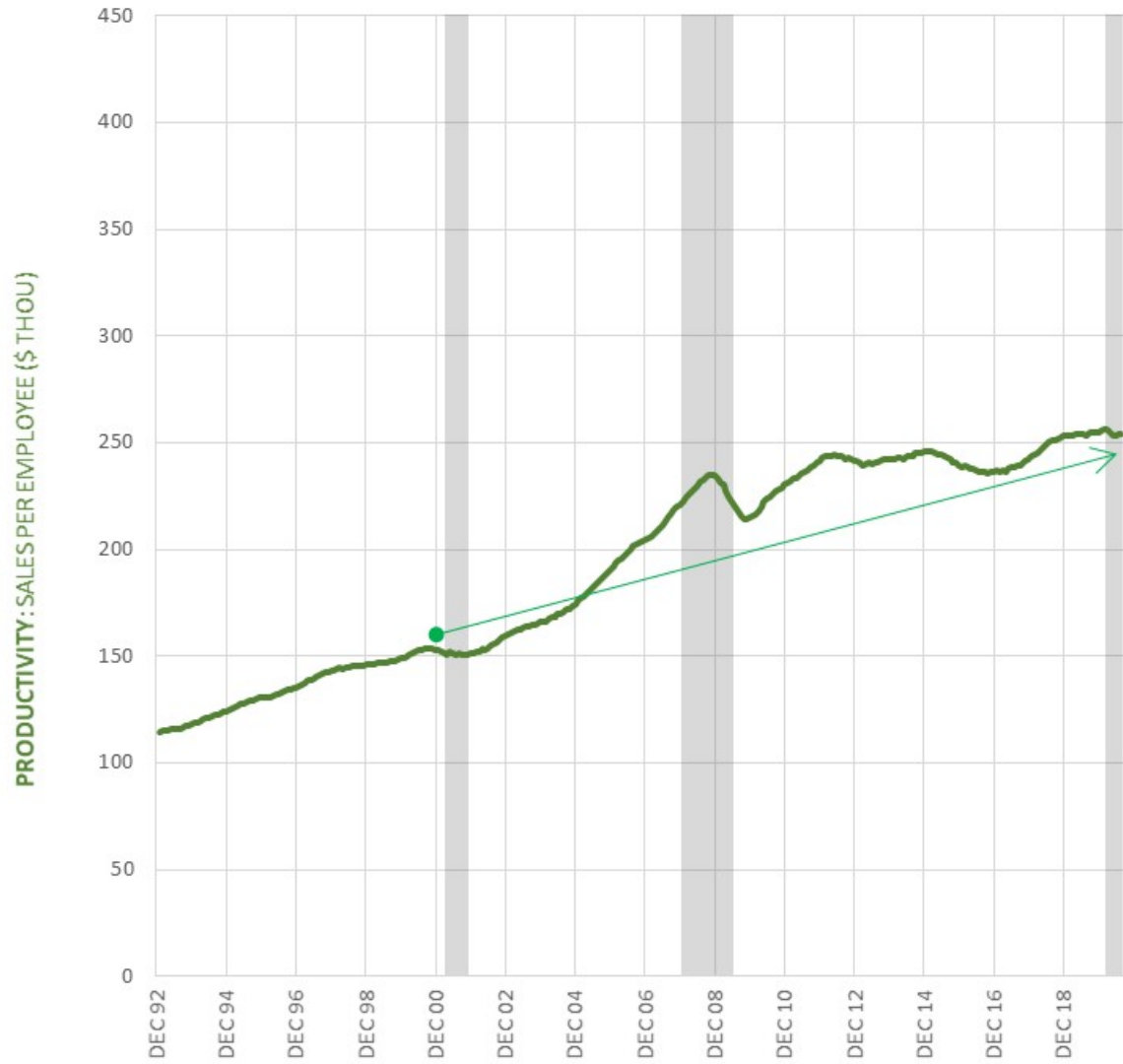
**DECREASING EMPLOYMENT  
1.75 to 1.44 MIL**

**-1.0% CAGR  
-310 THOU**

NAICS 332 INCLUDES SUBCATEGORIES: **MACHINE SHOPS**, FORGING/STAMPING, SAW BLADES, STRUCTURAL METALS, BOILER/TANK, HARDWARE, SPRING/WIRE, HEAT TREATING, VALVES AND SMALL ARMS

SOURCE: FEDERAL RESERVE

**NAICS 332 METAL PRODUCTS MANUFACTURING  
INCLUDES MACHINE SHOPS**



**INCREASING PRODUCTIVITY  
\$153 to \$254 THOUS/EMPLOYEE**

**+2.6% CAGR  
+\$100 THOU**

NAICS 332 INCLUDES SUBCATEGORIES: **MACHINE SHOPS**, FORGING/STAMPING, SAW BLADES, STRUCTURAL METALS, BOILER/TANK, HARDWARE, SPRING/WIRE, HEAT TREATING, VALVES AND SMALL ARMS

SOURCE: FEDERAL RESERVE

PER PER PER  
 ALL PROD PROD  
 EES EES HR  
 % (\$000) (\$000) (\$)

**THE AVERAGE US MACHINE SHOP**

SALES	100.0%	175.8	224.2	120.11	INVOICED <b>\$224 THOU</b> /PRODUCTION EMPLOYEE
COST OF MATERIALS	27.5%	48.3	61.6	32.99	
PRODUCTION WAGES	21.9%	38.5	49.1	26.29	PAID <b>\$26.29</b> /HOUR FOR PRODUCTION EMPLOYEES
CONTRACT WORK	5.1%	8.9	11.4	6.09	
OTHER COST OF SALES	2.6%	4.5	5.8	3.10	
TOTAL COST OF SALES	57.0%	100.2	127.8	68.46	
GROSS PROFIT, EXCLUDING OVERHEAD	43.0%	75.6	96.4	51.64	ATTAINED <b>43%</b> GROSS MARGIN (EXCLUDING OVERHEAD)
NON-PRODUCTION WAGES & ALL FRINGES	8.9%	15.7	20.0	10.72	FRINGES/BENEFITS FOR PRODUCTION EMPLOYEES ARE HERE
BUILDING RENT	1.8%	3.2	4.1	2.21	
EQUIPMENT RENT	0.4%	0.8	1.0	0.54	
OTHER OPERATING EXPENSES	8.9%	15.7	20.0	10.71	
TOTAL OPERATING EXPENSES	20.1%	35.4	45.1	24.17	PAID <b>20.1%</b> OF SALES FOR OPERATING EXPENSES
CASH OPERATING PROFIT	22.9%	40.2	51.3	27.47	EARNED <b>22.9%</b> CASH OPERATING PROFIT (LIKE EBITDA) BEFORE CAPITAL INVESTMENT, INTEREST AND INCOME TAX
2016 ANNUAL SURVEY RESULTS	%				
CAPITAL INVESTMENT MACHINERY	4.2%				IN 2016 INVESTED <b>4.2%</b> OF SALES INTO NEW MACHINERY
CAPITAL INVESTMENT BUILDINGS	0.6%				
CAPITAL INVESTMENT AUTOS/TRUCKS	0.3%				
CAPITAL INVESTMENT COMPUTERS	0.2%				
TOTAL CAPITAL INVESTMENT	5.3%				
CASH OPERATING PROFIT AFTER INVESTMENT	17.6%				



**2018 ANNUAL SURVEY OF MANUFACTURERS**

NAICS 33271: MACHINE SHOPS

US CENSUS BUREAU

	% OF SALES	% OF COST
COST OF MATERIALS	27.5%	35.6%
PRODUCTION WAGES	21.9%	28.4%
NON-PRODUCTION WAGES AND ALL FRINGES	8.9%	11.6%
CONTRACT WORK	5.1%	6.6%
ALL OTHER OPERATING EXPENSES	4.3%	5.6%
BUILDING RENT	1.8%	2.4%
RESALES	1.3%	1.6%
REPAIR AND MAINTENANCE	1.2%	1.5%
TEMPORARY STAFF	1.1%	1.4%
ELECTRICITY	1.0%	1.3%
TAX AND LICENSE FEES	0.6%	0.8%
PROFESSIONAL SERVICES	0.6%	0.8%
EQUIPMENT RENT	0.4%	0.6%
FUELS	0.3%	0.4%
REFUSE REMOVAL	0.2%	0.3%
COMPUTER HARDWARE	0.2%	0.3%
COMMUNICATION SERVICES	0.2%	0.3%
COMPUTER SOFTWARE	0.2%	0.2%
ADVERTISING AND PROMOTION	0.2%	0.2%
OTHER COMPUTER SERVICES	0.1%	0.1%
<b>TOTAL EXPENSES</b>	<b>77.1%</b>	<b>100.0%</b>

**THE AVERAGE US MACHINE SHOP**

PAID **27.5%** OF SALES AND **35.6%** OF COSTS ON **MATERIALS**

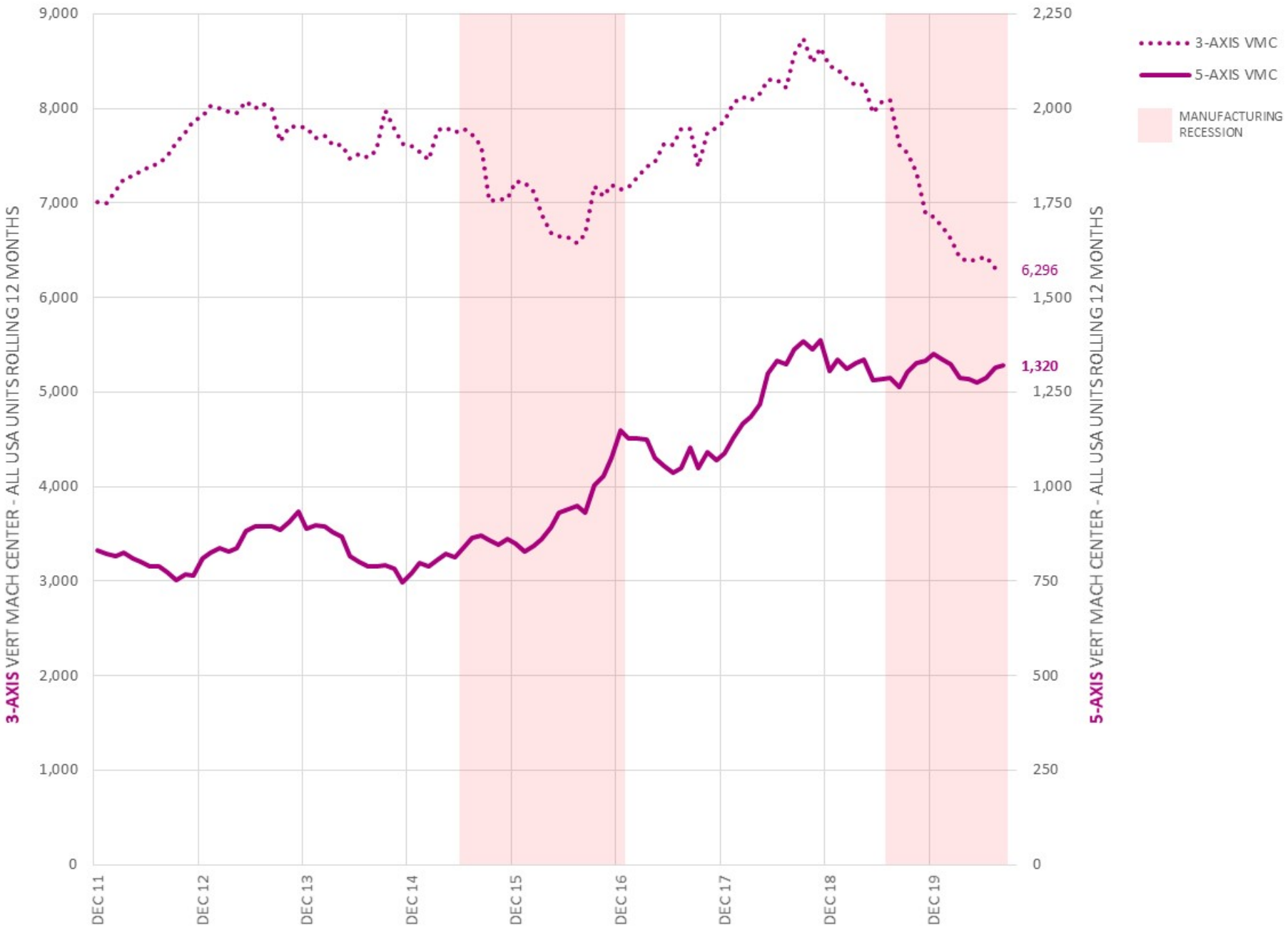
**CAPITAL INVESTMENT MACHINERY (4.2% OF SALES) WOULD GO HERE**

DO YOU INVEST ENOUGH IN **SALES AND MARKETING?**

INVESTED **36.9%** OF SALES AND **47.9%** OF COSTS ON **PEOPLE**

PEOPLE RELATED EXPENSES ONLY





**5-AXIS VMC HAS GROWN THROUGH TWO MANUFACTURING RECESSIONS**

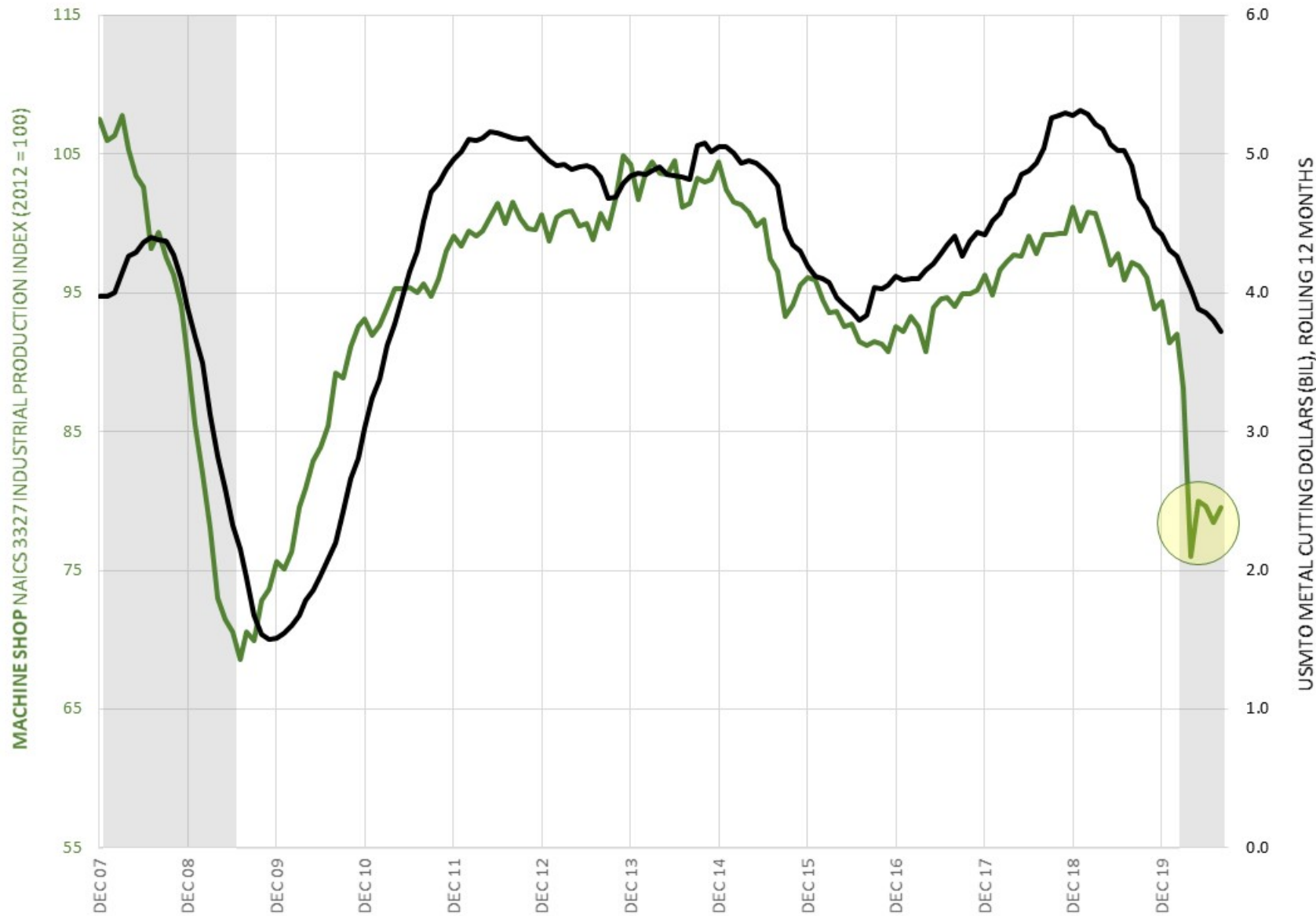
SOURCE: THE ASSOCIATION FOR MANUFACTURING TECHNOLOGY





**HIGH TECHNOLOGY IS 21% OF UNITS  
BUT 42% OF DOLLARS**



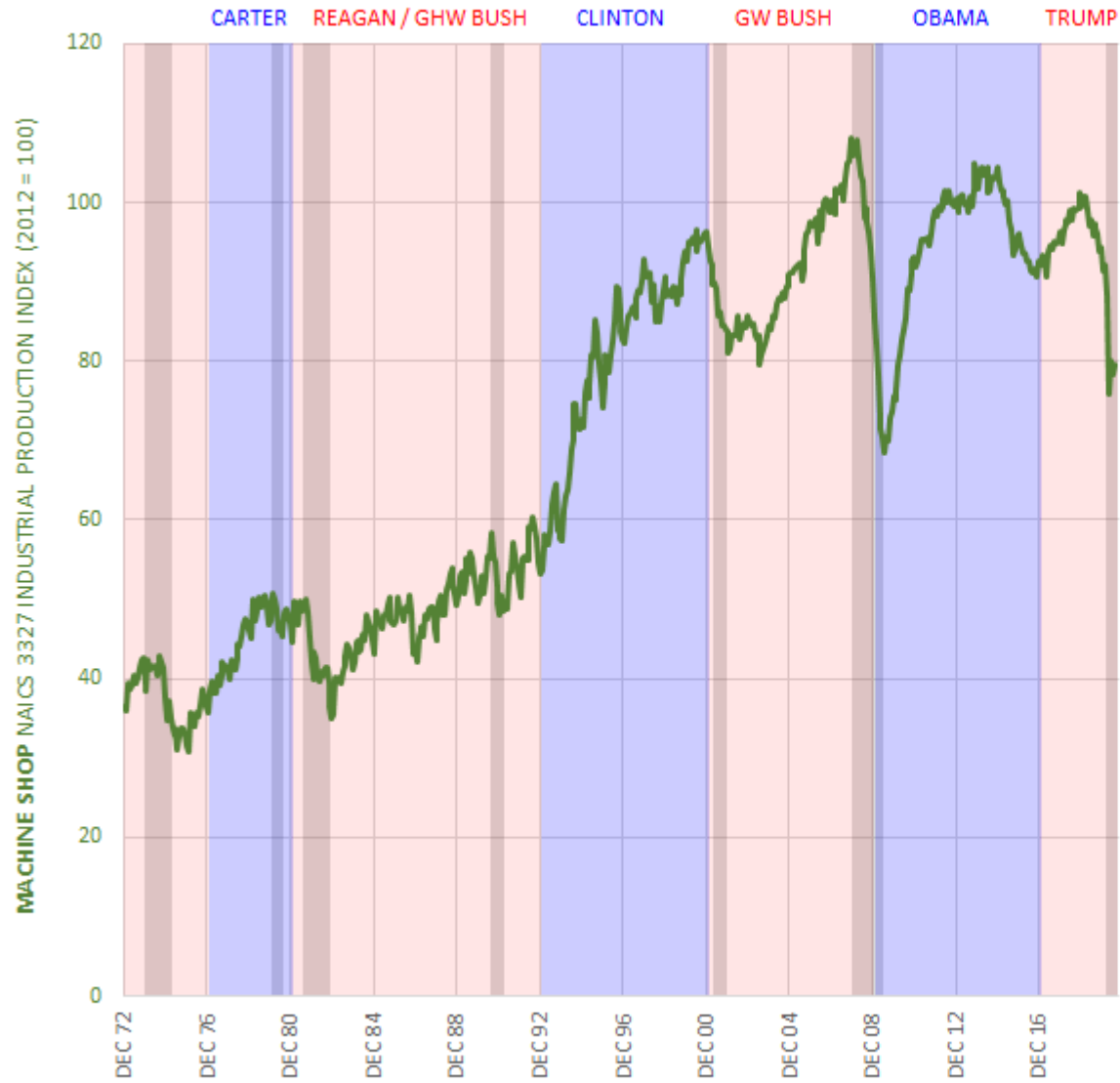


**MACHINE TOOL ORDERS**  
 HAVE A STRONG CORRELATION WITH  
**MACHINE SHOP OUTPUT**

**RESHORING AND PRODUCTIVITY**  
 WILL HELP US ALL GROW TOGETHER

SOURCE: FEDERAL RESERVE AND THE ASSOCIATION FOR MANUFACTURING TECHNOLOGY





PRESIDENT		MACHINE SHOP GROWTH (CAGR)
NIXON/FORD	R	+3.5%
CARTER	D	+7.2%
REAGAN	R	+1.2%
GHW BUSH	R	+1.4%
CLINTON	D	+7.6%
GW BUSH	R	-0.5%
OBAMA	D	+1.0%
TRUMP	R	-3.9%

**UNCLEAR WHETHER PRESIDENT AFFECTS MACHINE SHOP OUTPUT**

**TIMING AND SEVERITY OF RECESSION HAVE LARGER AFFECT**

SOURCE: FEDERAL RESERVE

ALL RESPONSES

N 160

MEAN +0.3%

ST DEV 6.6%

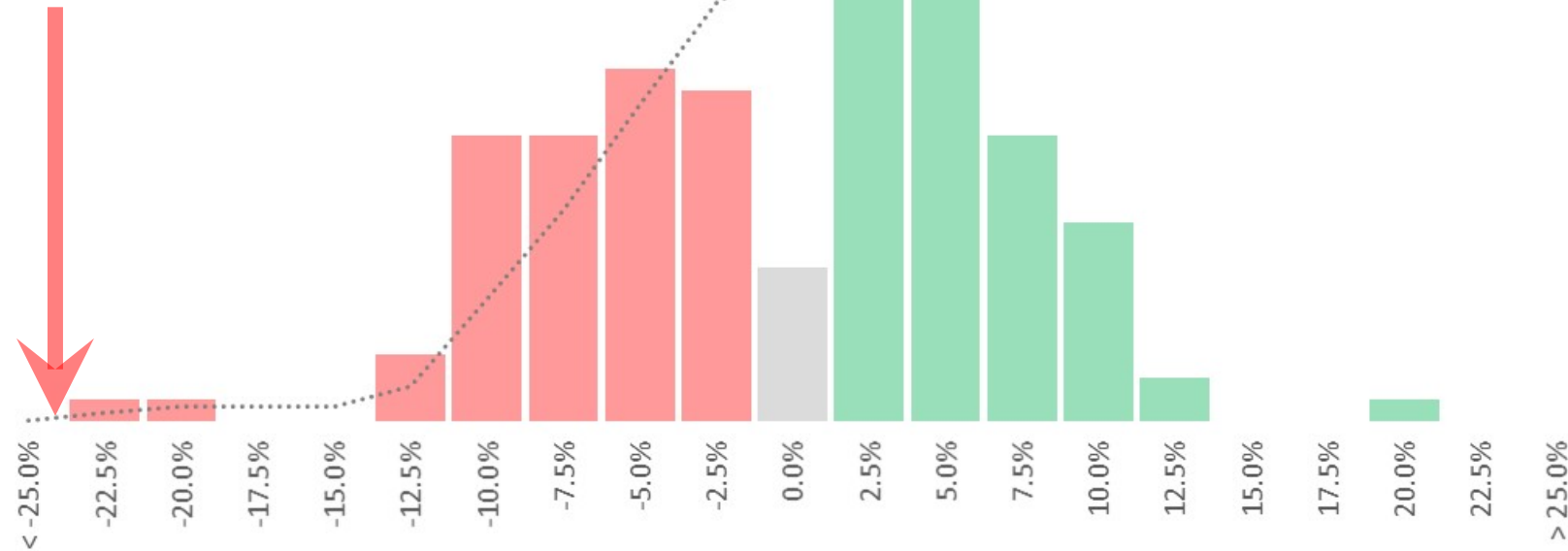
1ST QUARTILE -5.0%

MEDIAN +2.1%

3RD QUARTILE +5.0%

% NEGATIVE 41.3%

YTD AUG  
ACTUAL  
**-23.6%**



HOW MUCH % WILL  
US MACHINE TOOL  
METAL CUTTING **DOLLARS**  
CHANGE IN 2020 VS 2019?

100%

US MACHINE TOOL ORDER  
PREDICTION CONTEST

AVERAGE (MEAN)  
PREDICTION WAS **+0.3%**

MAXIMUM WAS **+20%** AND  
MINIMUM WAS **-22%**

HALF THE PREDICTION WERE  
BETWEEN **-5%** AND **+5%**

DISTRIBUTION HAS TWO CLUSTERS  
ABOVE AND BELOW ZERO

**41%** PREDICT A MARKET  
DECLINE IN 2020

75%

50%

25%

0%

**SEND ME YOUR 2021 GUESS**  
CONTEST STARTS DECEMBER 2020

