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# Geo-politics and Manufacturing

## *The Changing Landscape of Manufacturing and Supply Chains*

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# Microtech Ventures – Company History and Background

## Main focus is on venture capital, angel investing, and M&A advisory services for sensors, MEMS, and microtechnology companies



- Headquartered in Birmingham, Michigan
- Founded in 2003 as MEMS Journal; became the largest MEMS publication worldwide (34,800+ subscribers)
- Additional activities and services include:
  - **Strategy consulting** (focus and positioning, marketplace perception, competitive analysis, technology roadmap development)
  - **Business development**
  - **Market research and intelligence** (technology scouting and assessment, system and component teardowns, patent/IP analysis)
  - **Event organization and management** (organize 4-5 events and sponsor 20-25 events per year)
  - **Recruiting** (senior executives and engineers)



Enabling the largest, most active  
MEMS network worldwide  
**NOW 34,800+ MEMBERS STRONG**

# Geo-politics and Manufacturing in 2020

- Tariffs and Trade Imbalances have created a Global Narrative and Governmental Posturing
  - Trump administration has chosen to push this agenda aggressively
  - Industries have scrambled the last 2 years to minimize any negative impacts
  - Investors are actively looking for opportunities
- The tariffs are having some impact on most segments of the US economy
  - The primary messaging has been focused on jobs and job creation
  - Trade constraints raise several other issues of importance
    - Manufacturing is a critical element to a thriving economy
    - Protecting manufacturing capabilities is a national security concern
    - Can the US reverse the manufacturing decline that has taken place over the last 40 years
- The US strength in technology markets is one of the top areas of focus
  - Military, Data Security, Privacy are the prime drivers of governmental focus
  - Investing in US manufacturing assets is back on the table for consideration
  - Changes to the supply chain for electronics and semiconductors is on the minds of most OEMs
  - Shifting electronic manufacturing at a global level is enormously complex

# All Manufacturing in the US

- In 2019: US Manufacturing contributed \$2.33 Trillion and 11.6% of the US economic output (Bureau of Economic Analysis)
  - In 1970: manufacturing contributed to roughly 24% of the US economic output
- US Manufacturing
  - 18% of the world's goods
- China Manufacturing
  - 20% of the world's goods
- Manufacturing Jobs in the US
  - 12.85M jobs in 2019. 8.5% of the total workforce
  - 89% of manufacturers are leaving jobs unfilled (2019 labor shortage)
  - Predicted gap of 2.4M jobs between 2018 and 2028
  - Impact of the labor shortfall to US industry is estimated to be \$454B

# Reasons for US Manufacturing Decline

## **US shift to a Service Sector Economy starting in the late 1990's**

- Repeal of the Glass – Steagall Act (1999)
  - De-regulated Banking (previously investment banks and retails banks were separated)
- Growth in Healthcare industry
  - 18% of the total economy in 2018 (5% in 1960)

## **Less Competitive on the World Stage**

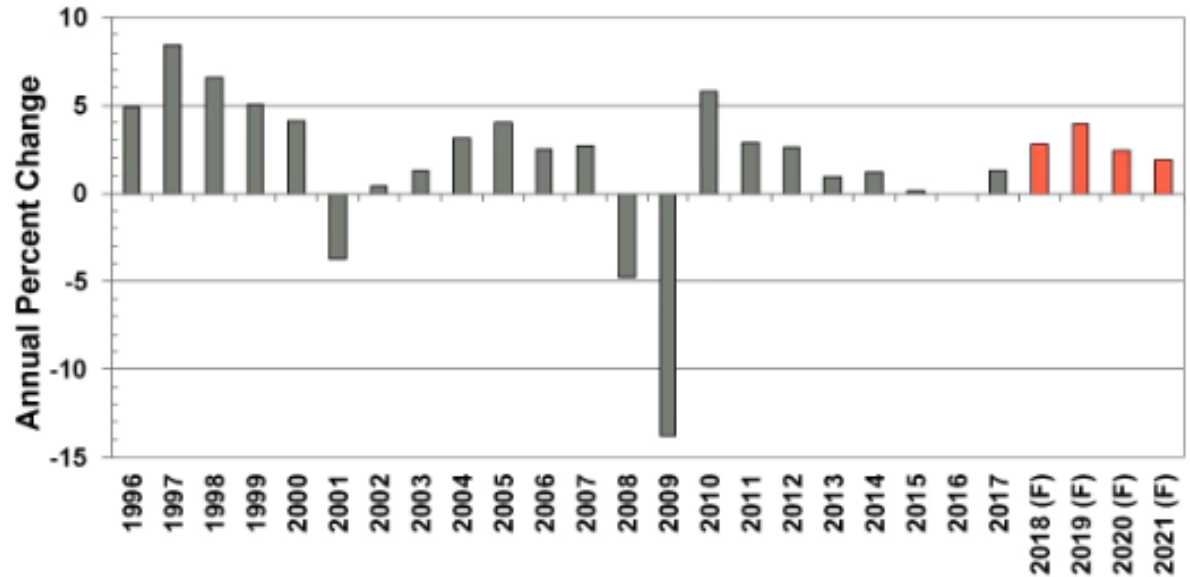
- High Standard of Living
  - Labor costs and limited availability of manufacturing labor (in many regions)
- US Federal Policy has limited competitiveness
  - Regulations, Corporate Tax Structures, Limited Bilateral Free Trade Agreements
- US electronics industry has always had a strong position in APAC (Captive and Outsourced)
  - 1961 Fairchild assembly in Hong Kong

# Manufacturing Outlook (US)

## Manufacturing Alliance for Productivity and Innovation (MAPI)

- 2019 = 3.9% Growth
- 2020 = 2.4% Growth (forecasted)
- 2021 – 1.9% Growth (forecasted)

U.S. Manufacturing Production Growth

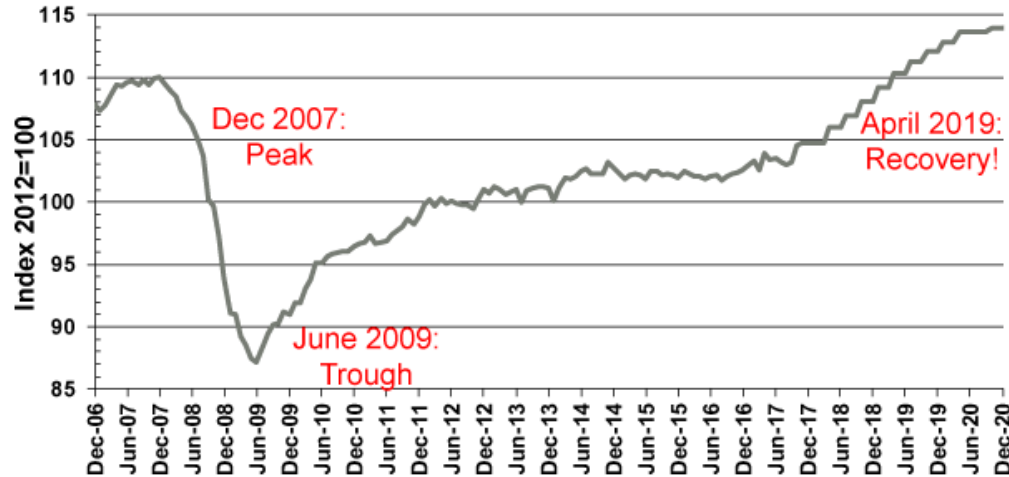


# Manufacturing Industrial Production Index (INDPRO)

## Summary

- Aerospace, machinery, computers and electronic products, and chemicals are catalyzing a dramatic improvement in the overall U.S. manufacturing growth picture, as the sector appears poised for its strongest output growth performance in more than a decade. A wide range of consumer-related, investment-related and materials industries are expected to see moderate to strong output growth during 2018 and 2019, before slowing during 2020 and 2021.

## Manufacturing Industrial Production



The Industrial Production Index (INDPRO) is an economic indicator that measures real output for all facilities located in the United States manufacturing

Sources: Federal Reserve Board and MAPI Foundation

## TOP 10 INDUSTRIES FOR PRIVATE EQUITY INVESTMENT REVEALED

✍️ Posted on August 22, 2018 By Benchmark International



### 1. Manufacturing

Manufacturing features on the list, in part, as a result of advancements in manufacturing. With automation, processes are made more efficient in many different sectors such as technology, aerospace, automobile and medical devices, making manufacturing companies an attractive prospect for private equity firms as they can utilize the technology in their portfolio companies, and it is a good investment.



# Investment Opportunity in US Manufacturing

- **Changing View on Manufacturing in Recent Years:**

- Increased Productivity in US factories and facilities (Robotics, Automated Inspection and other Technologies)
- The increase in domestic production of natural gas and shale oil (lower cost energy with limited foreign dependency)
- Rising wages in emerging markets
- Need to protect home-grown IP
- Public Awareness that “Made in America” means US jobs
  - Kimberly Amadeo – The Balance October 22, 2019

- **37% of Manufacturers prefer to locate in the US (19% in 2011)**

- Alix Partners 2019

- **Sharp increases in acquisitions of manufacturing assets (Investment Banks and PE Firms)**

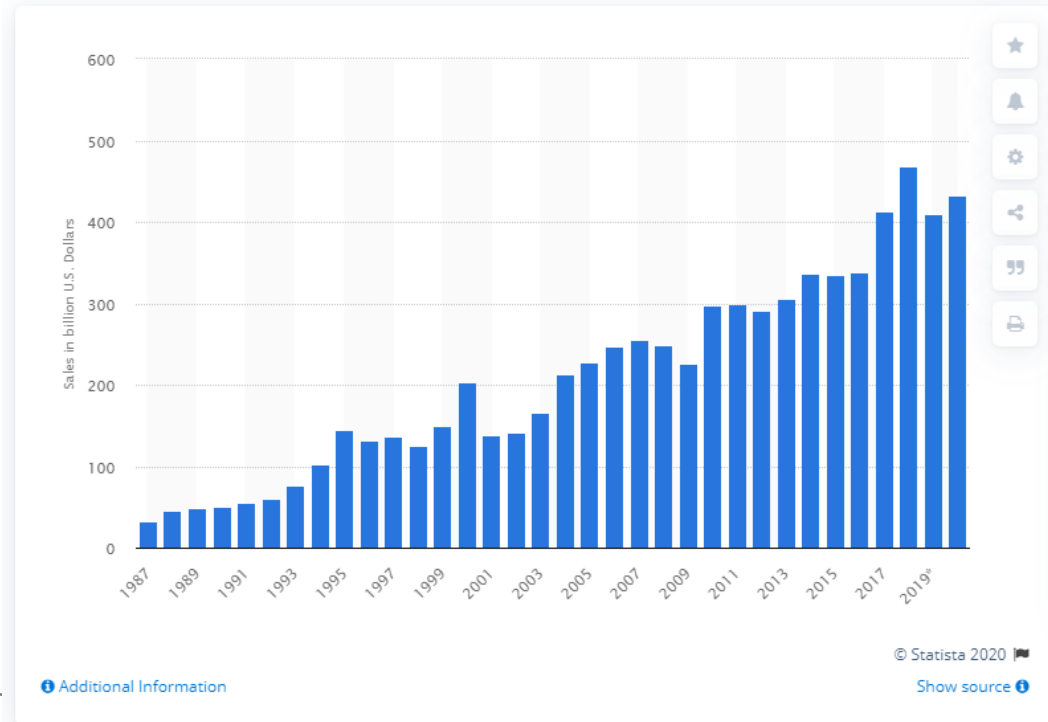
- Investment Banks and PE Firms are normally ahead of OEMS in trends

# World Semiconductor Trade Statistics

- 2017 - \$412B +21%
- 2018 - \$468B +16%
- 2019 - \$409B -13%
- 2020 – Forecast \$430B

•Coronavirus impact will be significant, and it cannot be accurately predicted at this point

Semiconductor market size worldwide from 1987 to 2020  
(in billion U.S. dollars)



# Semiconductor Market Trend is Fueling Investment

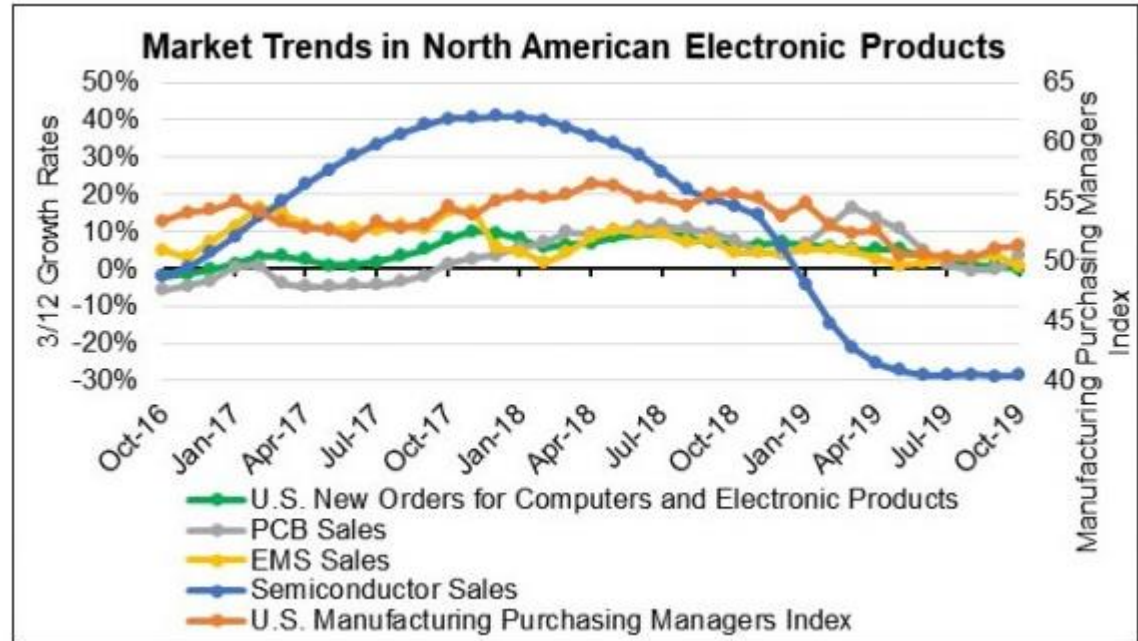
## U.S.-BASED SEMICONDUCTOR COMPANY SALES HAVE DISPLAYED STEADY ANNUAL GROWTH

Sales by U.S. headquartered semiconductor firms grew from \$67.1 billion in 1998 to \$208.9 billion in 2018 -- a compound annual growth rate of 5.84 percent. Sales growth for U.S. headquartered companies shows the same cyclical fluctuations characterized by the industry as a whole.



Source: World Semiconductor Trade Statistics (WSTS) and SIA Estimates.

- 2019 Semiconductor Revenue declined about 13%
- R&D and Capital Investments remained strong
- Capital Markets in the US are adopting a longer view on ROI



## Semiconductor Supply Chains: An Urgent Need for Change

### SUPPLY CHAIN

## What Do the New U.S. - China Tariffs Mean for the Electronics Supply Chain?

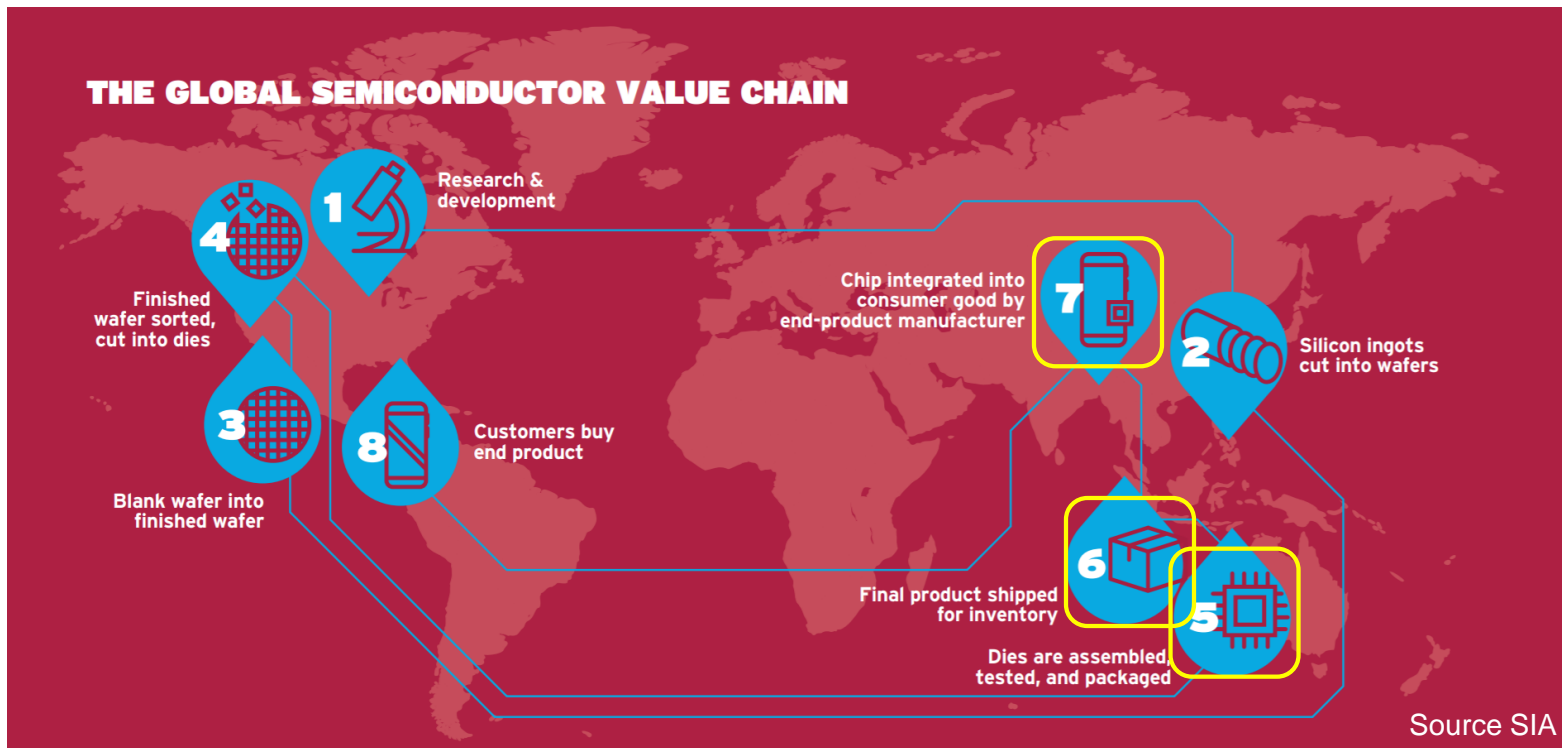
Here's what electronics buyers need to be thinking about as the U.S.-China trade wars continue to escalate.

## *Trade War Starts Changing Manufacturers in Hard-to-Reverse Ways*

- **Re-Alignment**
  - *National*
  - *Political*
  - *Financial*

# Top Investment Opportunities in Semiconductor Manufacturing Industries

(Wafer Fabs, OSATS, SME, EMS, Raw Materials)



# Specific Supply Chain Re-Alignment (Investment Opportunities)

- **Raw Materials:**

- US Government concern over rare earth minerals, precious metals and chemicals (National Security and Industrial Competitiveness)
- This segment of the supply chain is mostly outside US industrial control
- **Outlook:**
  - Re-alignment will be very slow and involve global negotiations with companies and governments to secure long term supplies

- **Wafer Substrates:**

- Shifting requirements have created investment opportunities in the last 20 years (SOI, Quartz, Compound, other esoteric materials)
- Attractive investment in the US (growing presence of specialty manufacturers and finishers in the US)
- Like raw materials, this capability raises national concern
- **Outlook:**
  - Expect increased investments in North America and strengthened base of suppliers in NA

# Specific Supply Chain Re-Alignment (Investment Opportunities)

- **SME (Semiconductor Manufacturing Equipment)**

- Dominated by several large public companies
- Consolidation of smaller companies will continue
- Strong interest from PE in manufacturing equipment
- SME has a lengthy supply chain that impacts a broad set of small manufacturing companies.
- **Outlook:**
  - SME Stocks are attractive and will stay strong in the coming decade
  - Small manufacturers continue to address critical problems and acquisition targets
  - China is investing heavily in this space and will be a major player in the future

- **Wafer Fabs**

- CMOS Fabs will be limited to the very large companies capable of making the investment
- Growing base of specialty fabs, serving demand for non-CMOS and Microfabrication in the US
- PE Firms have been attracted to this space
- **Outlook:** Opportunistic investment in specialty fabs, consolidation will be on-going



# Specific Supply Chain Re-Alignment (Investment Opportunities)

- **EMS (Electronic Manufacturing Services)**

- Very large and complex array of suppliers, the most flexible piece of the supply chain
- US manufacturers have global facilities, APAC concentration is dominant (Cost Driven)
- Low margin, capital intensive and labor dependency have discouraged investors
- Some new areas for investment opportunity exist (flexible)
- **Outlook:**
  - Major corporations have facilities in NA that can be scaled up to meet market demand
  - EMS Automation is starting to level the global playing field

- **OSATS (Outsourced Semiconductor Assembly and Test)**

- APAC involvement for more than 60 years
- Considered a potential exposure to US interests and semiconductor market position
- Limited investment focus in this area due to: Legacy Dependencies, Regulations
- **Outlook:**
  - No clear move to re-align this area of the supply chain from large manufacturers
  - Small facilities in the US will address specialty needs
  - Select opportunities to invest in advanced packaging like 3D and High Frequency

# Near Term Opportunities for US Manufacturing

- **Manufacturing Automation**

- US SME companies will benefit as the primary enablers of these technologies
- US EMS companies can provide similar costs for services located in NA
  - Automation helps to minimize the dependence on low cost labor
  - Throughput and quality are significantly improved

- **Advanced Packaging**

- Wafer fabs providing advances wafers (RDL) and wafer level packaging
- EMS and OSATs service various packaging and testing requirements that are not commoditized
- SME providing advanced test and specialized fixturing
- SME serving new needs in the Automotive and Medical markets

- **Power Reduction and Cooling Technologies**

- Semiconductor Start-ups providing advanced power control and on chip cooling

- **Sensing Technologies**

- Wafer Fabs to manufacture solutions for this fast-growing market (Auto, Medical, IoT, Industrial)
- EMS and OSATs providing new solutions, this is not a strength in APAC



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for sensors, MEMS, and microtechnology companies**

# Questions and Discussion



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- Mike Pinelis – President and CEO
- Mike Forbis – Managing Director
- Paul Pickering – Managing Director
- Steve Whalley – Managing Director

We look forward to speaking with you!

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