



# REDEFINING INNOVATION.

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WORLD-CLASS PRODUCT DESIGN FROM CONCEPT...TO REALITY

## MOVING MANUFACTURING FROM OFFSHORE TO DOMESTIC

PRESENTED TO THE 12,317 MANUFACTURING COMPANIES OF ILLINOIS

PRESENTED BY: **ERRIN GNADINGER**

FOUNDER AND CTO

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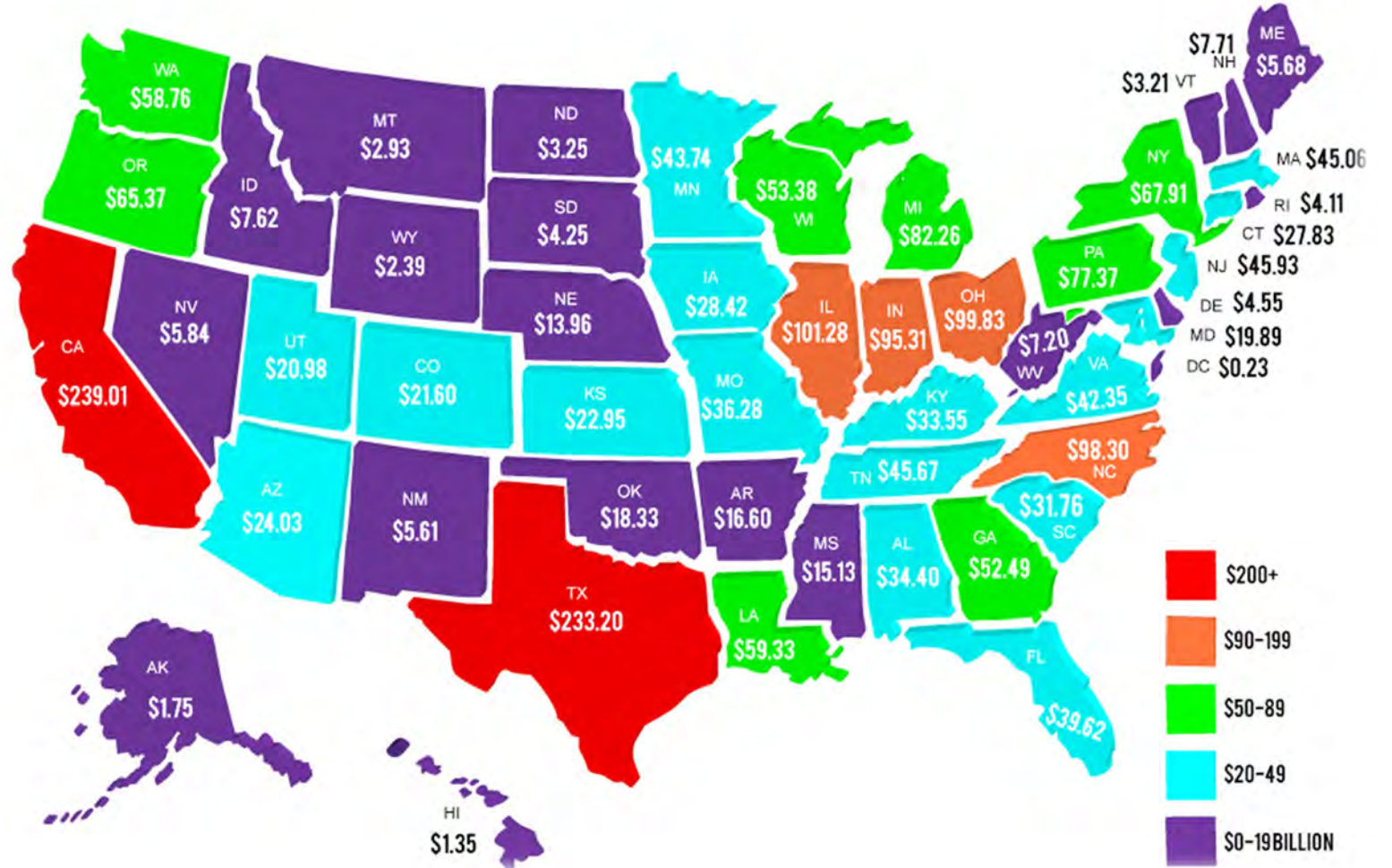
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502-365-1548

**PRESENTER BACKGROUND:** 25 years of Product Engineering Design and Development for volume manufactured durable goods, electrical goods, devices, appliances, and world-first technologies. 60+ patents, designs in 90million+ homes, 30k+ commercial and manufacturing sites, and onboard Gulfstream and Falcon jet fleets. Founder and Chief Technology Officer of Advanced Automations, LLC. Specializing in world-class product design and technology for the manufacturing sector.

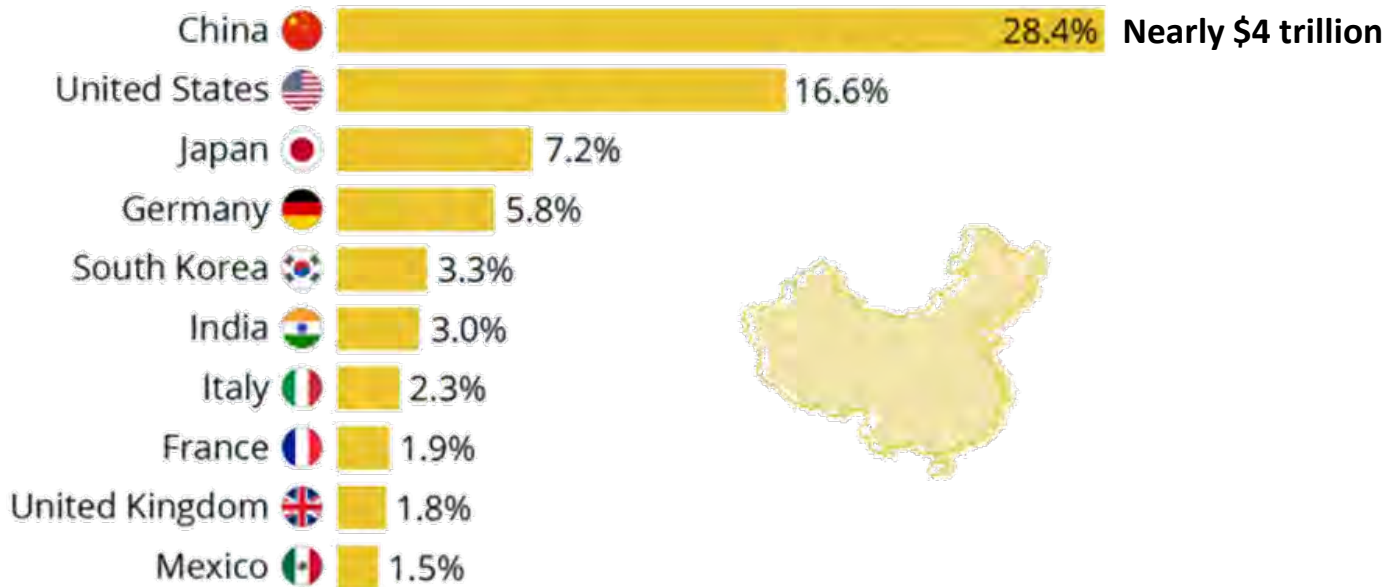
# CURRENT STATE OF ILLINOIS MANUFACTURING INDUSTRY

- a. 12,317 MANUFACTURING COMPANIES
- b. MANUFACTURING ACCOUNTS FOR 12.54% OF ILLINOIS' TOTAL OUTPUT
- c. TOTAL ILLINOIS MANUFACTURING OUTPUT IS \$108.43 BILLION
- d. MANUFACTURING EMPLOYS 9.61% OF ILLINOIS' WORKFORCE
- e. 592,000 EMPLOYEES (9.68% OF NON-FARM EMPLOYMENT)
- f. AVERAGE ANNUAL MANUFACTURING EMPLOYEE COMPENSATION \$89,853
- g. ILLINOIS RANKED IN TOP 5 STATES BY MANUFACTURING OUTPUT



# CURRENT STATE OF GLOBAL MANUFACTURING INDUSTRY

Top 10 countries by share of global manufacturing output in 2018\*



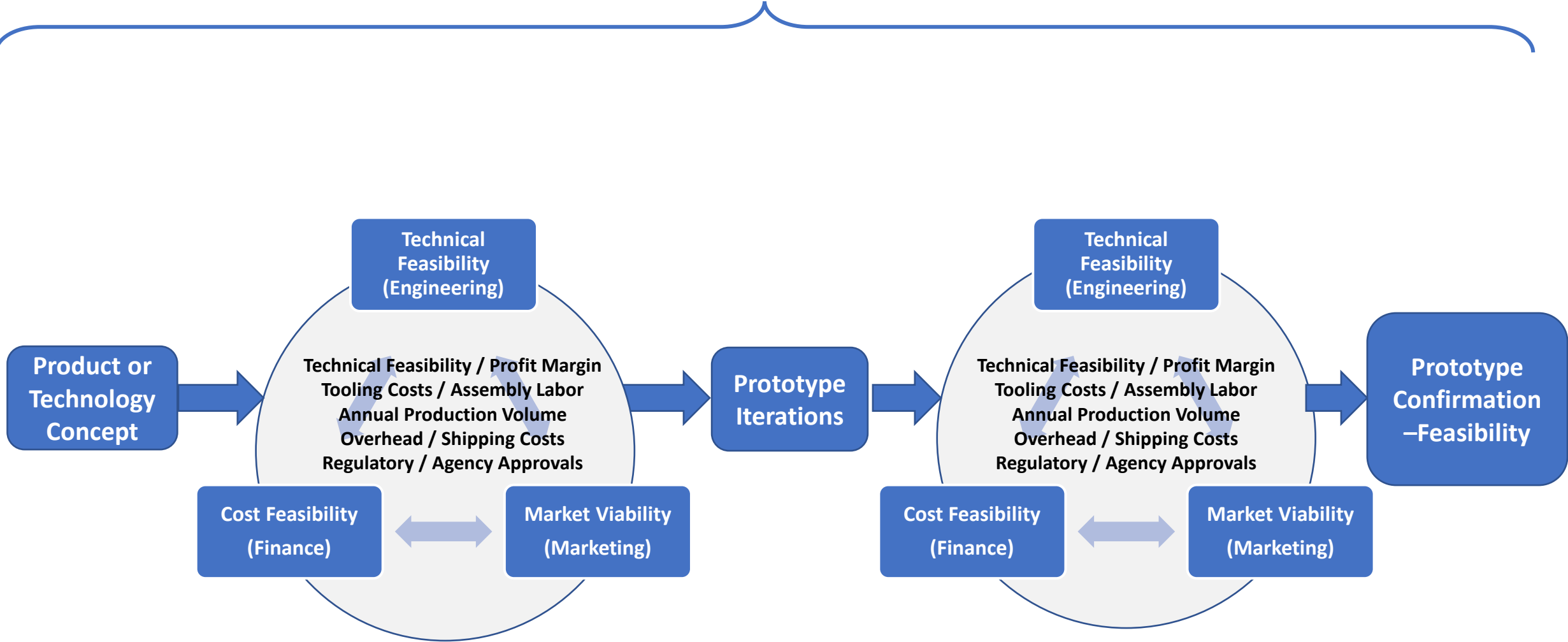
\* output measured on a value-added basis in current U.S. dollars

## MADE IN USA?

1. RECENT SURVEY OF 200 EXECUTIVES (BY BOSTON CONSULTING GROUP) FOUND 21% WERE CURRENTLY ON-SHOREING PRODUCTION OPERATIONS TO THE US. (AN ADDITIONAL 33% SAID THEY WERE CONSIDERING SUCH ACTION).
2. AT FACE VALUE, GOODS PRODUCED IN CHINA ARE 5% CHEAPER THAN IN THE US.
3. CHINESE LABOR COSTS ARE RISING 15%-20% ANNUALLY, COMPARED WITH 1.6% IN THE US
4. NEARLY 78% OF AMERICAN CONSUMERS WOULD RATHER BUY A US-MADE PRODUCT THAN IMPORTED. 60% ARE WILLING TO PAY 10% MORE RETAIL.
5. VERY LOW TOOLING COSTS IN CHINA/INDIA, ROUGHLY 35%
6. MOST CHINESE/INDIAN MOLDS ARE NOT TRANSFERRABLE TO US STANDARD OR EUROPEAN STANDARD MOLDING PRESSES
7. OF TOTAL PRODUCT DEVELOPMENT COSTS, CUSTOM TOOLING AND EQUIPMENT TYPICALLY ACCOUNT FOR 60-70% OF TOTAL PROJECT COST

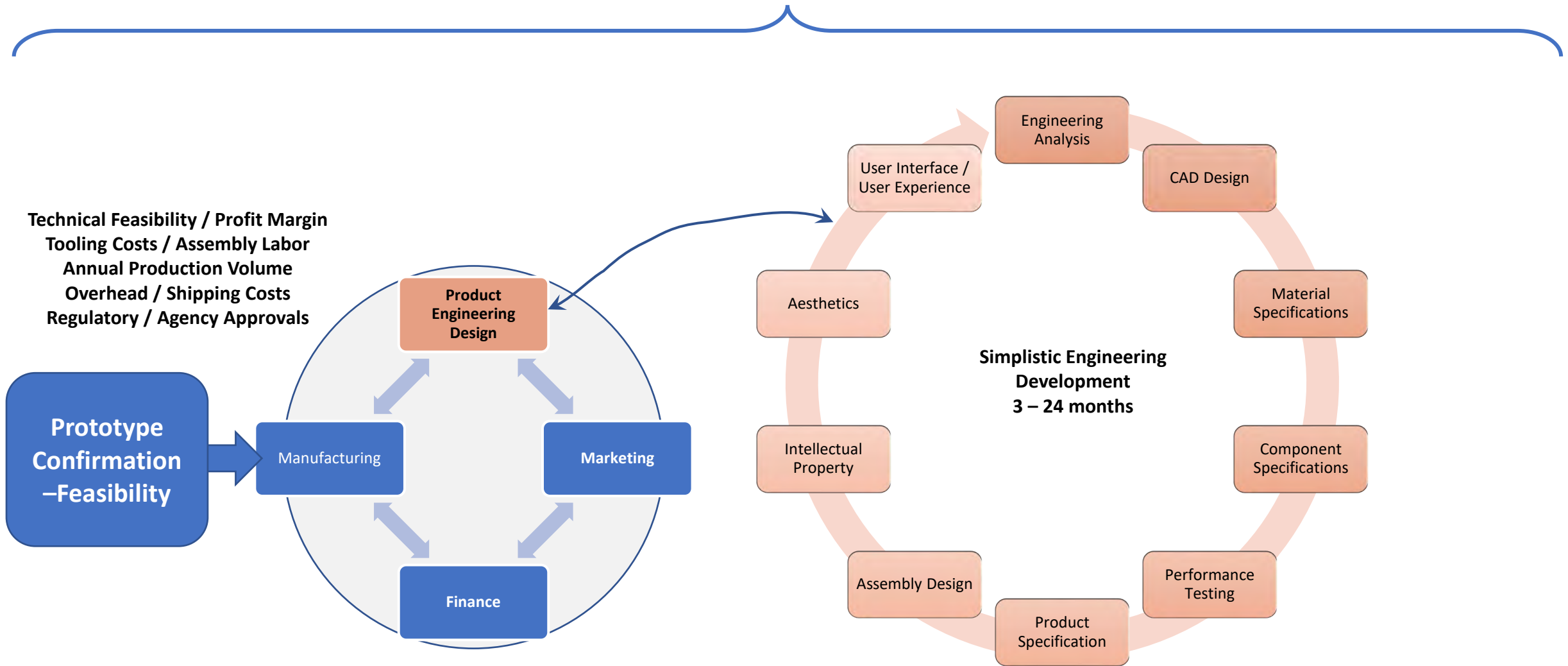
# PROCESS BACKGROUND: -CONCEPT TO MANUFACTURING

## PRODUCT/DESIGN FEASIBILITY (SIMPLISTIC)



# PROCESS BACKGROUND: -CONCEPT TO MANUFACTURING

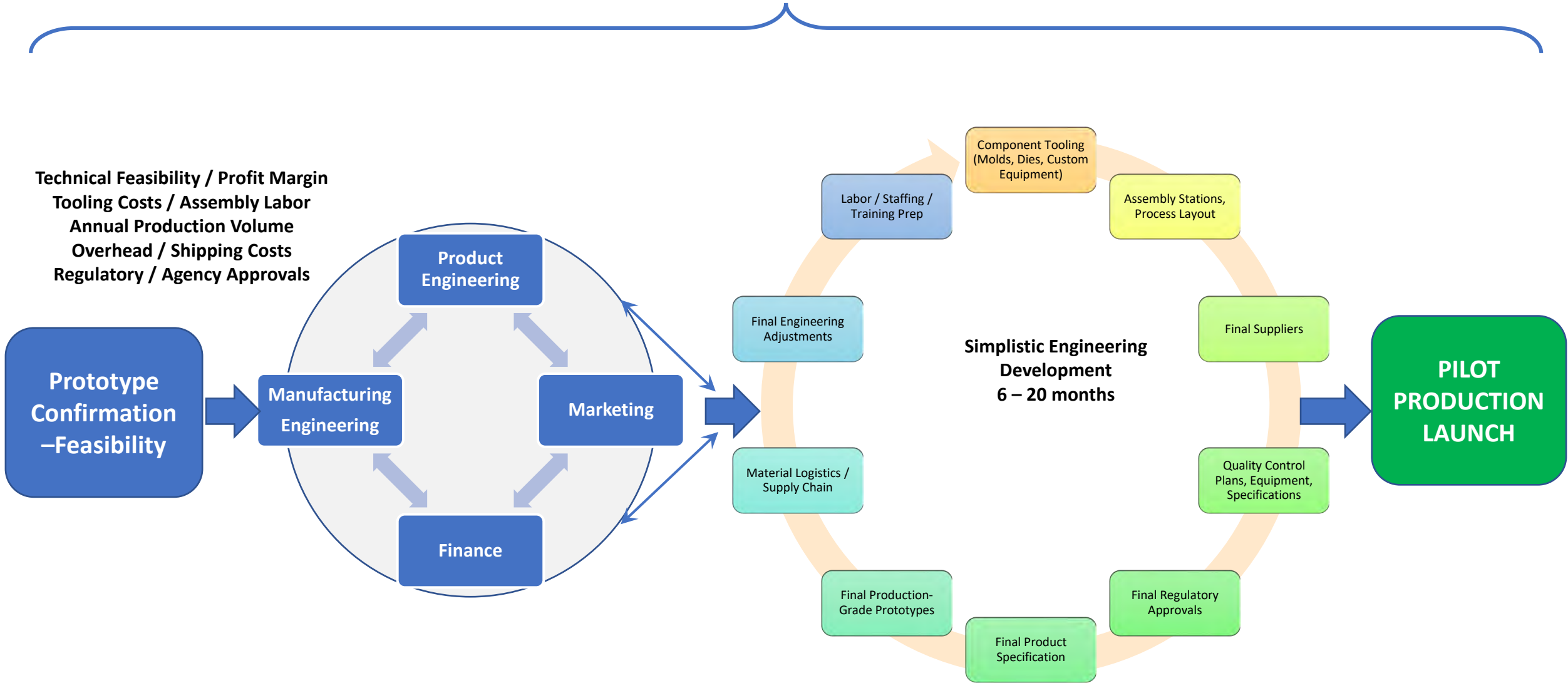
## DETAILED ENGINEERING (SIMPLISTIC)





# PROCESS BACKGROUND: -CONCEPT TO MANUFACTURING

## TRANSITION TO PRODUCTION (SIMPLISTIC)



# ONSHORING TO THE US

## CAN I SIMPLY MOVE THE OPERATION TO THE US?

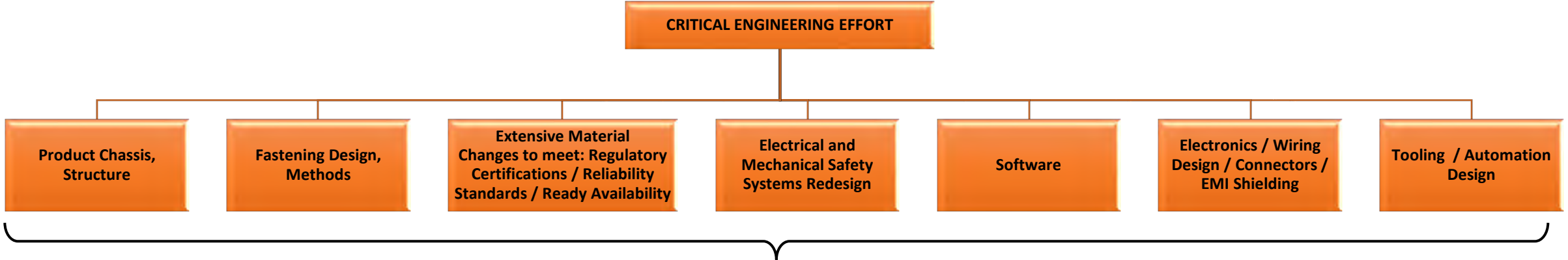
1. YES, BUT WITH MANY CONSIDERATIONS TO ADDRESS
  - i. Cannot usually transfer and use existing molds and dies
  - ii. Most Chinese molds and dies are fabricated with S50C steel to non-US and non-Euro press standards.
    - a. S50C steel is considered, by any manufacturing standards in the US or Europe, sub-standard. It has a (Rockwell) hardness range of 7-20.
    - b. Minimum standard US molds and dies use hardened P20 tool steel, fabricated to fit US and most European presses. P20 tool Steel has a hardness range of 36-42.
    - c. Lower hardness alloys quicker mold and die fabrication, but also means the life of the mold (against critical failure) is much lower.
  - iii. Chinese products are DESIGNED TO USE VERY HIGH LABOR – Many manual fasteners, manual operations  
Simply replicating most Chinese product designs in the US would require an un-realistically large labor force
  - iv. Ergonomic standards, labor laws, labor litigation and work practice claims and laws are completely different between China and the US, or China and EU.



# ONSHORING TO THE US

## CAN I SIMPLY MOVE THE OPERATION TO THE US? (cont'd)

YES, BUT WITH MANY CONSIDERATIONS TO ADDRESS



### WHAT DOES ALL THIS COST? HOW LONG?

#### TYPICAL EXAMPLES:

PRODUCT	ANNUAL PRODUCTION VOLUME	TOTAL COST (INCLUDING EFFORT)	LEAD TIME TO US PRODUCTION START	CHANGE IN WARRANTY CLAIMS, LITIGATION, NET PROMOTER SCORE	CHANGE IN PROFIT MARGIN (MATERIAL, LABOR, SHIPPING, TAXES, BRAND)
Major Home Appliance (White Good)	HIGH (100k+)	\$50Mil - \$100 Mil	36 months	20-35% Benefit	10-15% Benefit
Minor Electrical Durable Good	LOW (less than 10k)	\$100k - \$250k	12-18 months	10-20% Benefit	Neutral
Low-Tech / No-Tech Durable Good	HIGH (100k+)	\$75k - \$150k	8 – 12 months	0 – 10% Benefit	5 – 15% Detriment



# ONSHORING TO THE US

## WHY SO MANY MENTIONS ABOUT TOOLING? WHAT'S THE DEAL?

Any part or component produced in volume, and produced in a fashion that is highly repeatable and consistent, requires custom tooling to produce. The custom tooling is assembled into a mechanized press or other automated equipment to produce parts in mass volume with only minimal human supervision.

Tooling for plastics are typically referred to as “molds”.

Tooling for metals (brackets, wire-forms, metal shapes) are typically referred to as “dies” (with exception to castings).

In nearly ALL cases, the custom tooling needed for any part or component is carefully fabricated, and is often precision fabricated to within 0.0005 inch (5 ten-thousandths of an inch). The specific tool is designed very specifically to work for a very specific grade of material, i.e. plastic resin or particular grade of metal. Any deviation from that very specific material will usually result in very bad things, including a catastrophic tool crash (resulting in a total and complete loss of the tool,...unsalvageable).

Prototypes and Engineering development: 3D printing, CNC ,machining, temporary urethane molds, etc,, VERY HIGH part cost

Production: Hardened precision tooling and presses (and/or automation): Mold, dies, etc., VERY LOW part cost

# ONSHORING TO THE US

WHY SO MANY MENTIONS ABOUT TOOLING? WHAT'S THE DEAL?

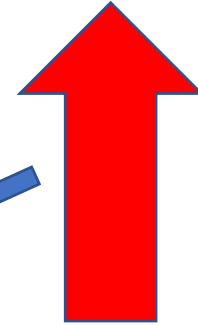


ERRIN'S 'SEESAW' LAW OF TOOLING AND PART COST. THIS IS A UNIVERSAL LAW OF TECHNOLOGY AND ECONOMICS.

Part Cost



Investment Cost and Time



# ONSHORING TO THE US

WHY SO MANY MENTIONS ABOUT TOOLING? WHAT'S THE DEAL?

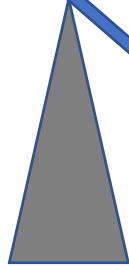
Real World Scenario:

A molded plastic dishwasher tub

Part Cost  
\$5,000-  
\$7,000



Initial Prototypes

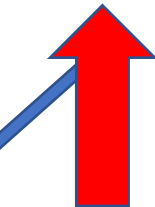


Investment  
Cost and Time:  
\$0, Rapid  
Prototyping  
Technologies

Part Cost  
\$4.50 -  
\$5.75  
each



Production Parts



Investment  
Cost and  
Time:  
\$3.75million,  
15 months

# ONSHORING TO THE US

HOW DOES TOOLING REALLY WORK? WHAT ARE WE TALKING ABOUT?

<https://www.youtube.com/watch?v=b1U9W4iNDiQ>

\$40,000 Prototype



\$4,000 Production Machine



# BOTTOM LINE

## TECHNOLOGY AND COMPLEXITY

	LOW	MID	HIGH
LOW	✗	✗ ✓	✓
MID	✗	✓	✓
HIGH	✗	✓	✓