



Manufacturing  
...more

THAN YOU MIGHT THINK

Montana  
Manufacturing Center

# Montana Manufacturing Center



Growing  
Manufacturing  
Through  
Innovation

# Traversing the Technology Valley of Death

...You don't HAVE IT  
until you can  
MAKE IT



Adele Ratcliff  
Director, Navy Mantech

# Program Overview



**University Center Since 1986**



**MEP Since 1996**



**MilTech Since 2004**

# UTAP at Work





**MEP • MANUFACTURING  
EXTENSION PARTNERSHIP**  
NATIONAL INSTITUTE OF  
STANDARDS AND TECHNOLOGY

# MEP Centers



# Montana Manufacturing Extension Center

## SERVING MONTANA

800 Companies in 54 Counties with 1,530 Projects

## PROVEN IMPACTS! Typical MMEC Client Experiences\*

- \$5.6 million/year in increased and retained sales
- \$526,000 in investments
- \$586,000/year in cost savings

## Montana's Return on Investment

- 8.2 x Return to Montana's Treasury
- 2,656 new and retained jobs



\*Based on two year period ending Sept. 2011 for 71 companies

# Montana Manufacturing Extension Center

## SERVING MONTANA

800 Companies in 54 Counties with 1,530 Projects

## PROVEN IMPACTS! MMEC Client Experiences\*

- \$800 Million in increased and retained sales
- \$128 Million in investments
- \$ 91 Million in cost savings

## Montana's Return on Investment

- 8.2 x Return to Montana's Treasury
- 2,656 new and retained jobs



# Montana Manufacturing Extension Center

## Typical MMEC Manufacturing Services

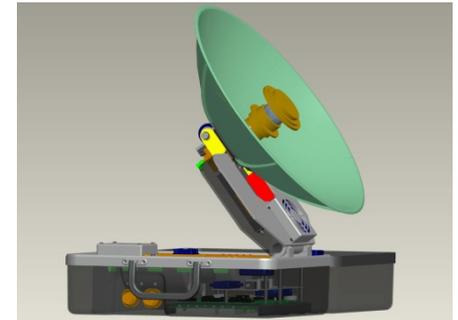
- **Process Improvement**
- **Innovation & Growth Services**
- **Quality Systems & Standards Compliance**
- **Business to Business Marketing**
- **Energy Efficiency**

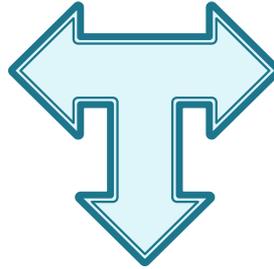


# MILTECH™



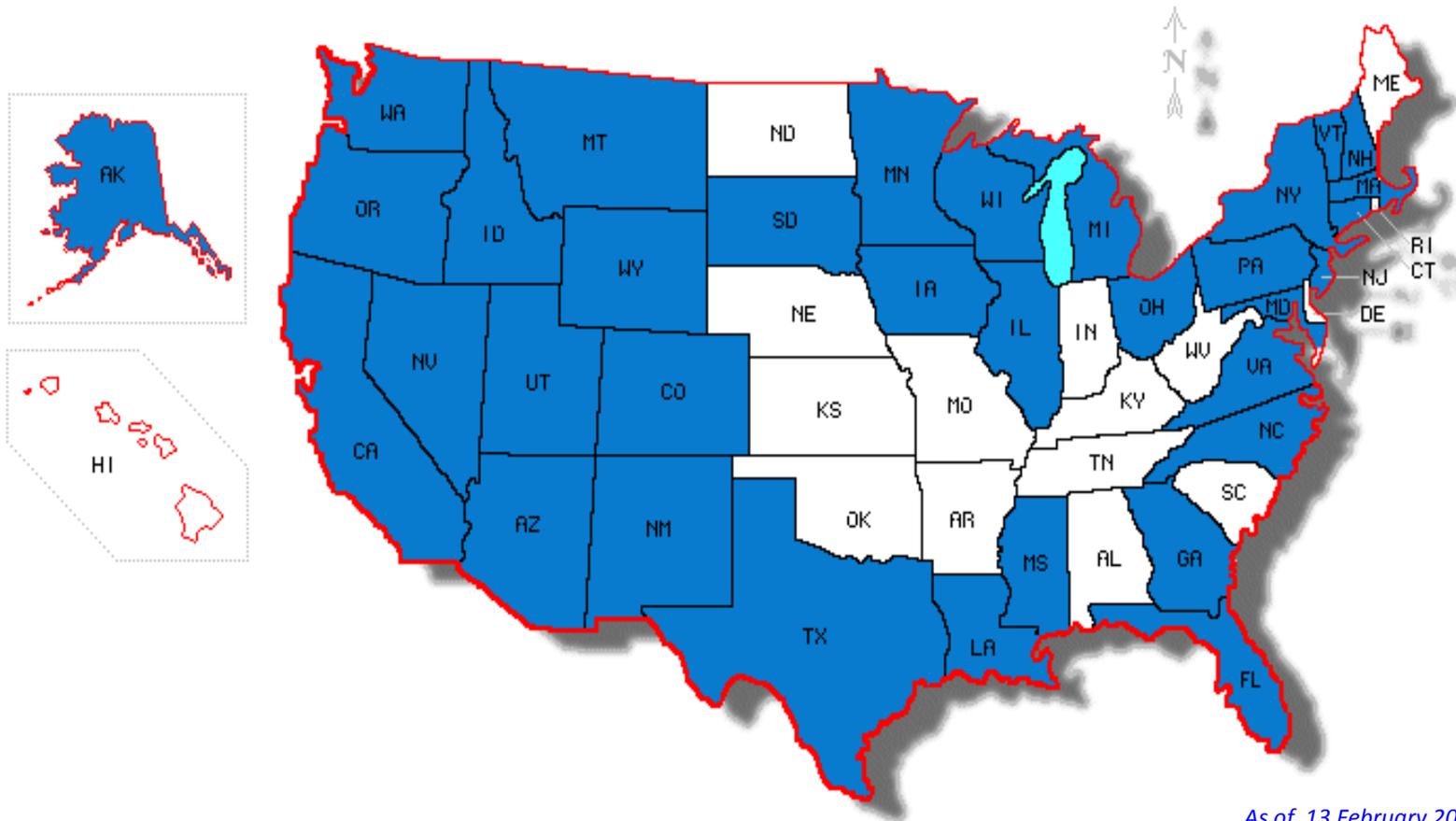
## Transitioning Innovative Technology to the US Warfighter





**Helping the Department of Defense  
obtain critically needed innovative  
technologies from small  
manufacturers**

***States in which MilTech has helped companies progress DoD-developed technology or to transition innovative new technology to DoD operational use***





## **A few Montana Companies Assisted by MilTech**

**Belgrade: *Phillips Environmental/CleanWaste, Bacterin***

**Bozeman: *Mystery Ranch, Scientific Materials, BlackHawk, CrossTac***

**Great Falls: *Cable Technologies/EMTEQ, Inc.***

**Helena: *Summit Aeronautics/Boeing***

**Kalispell: *Nomad Technologies, NorthWest Precision***

**Lewiston: *Spika Welding and Manufacturing***

**Missoula: *GCS Research***

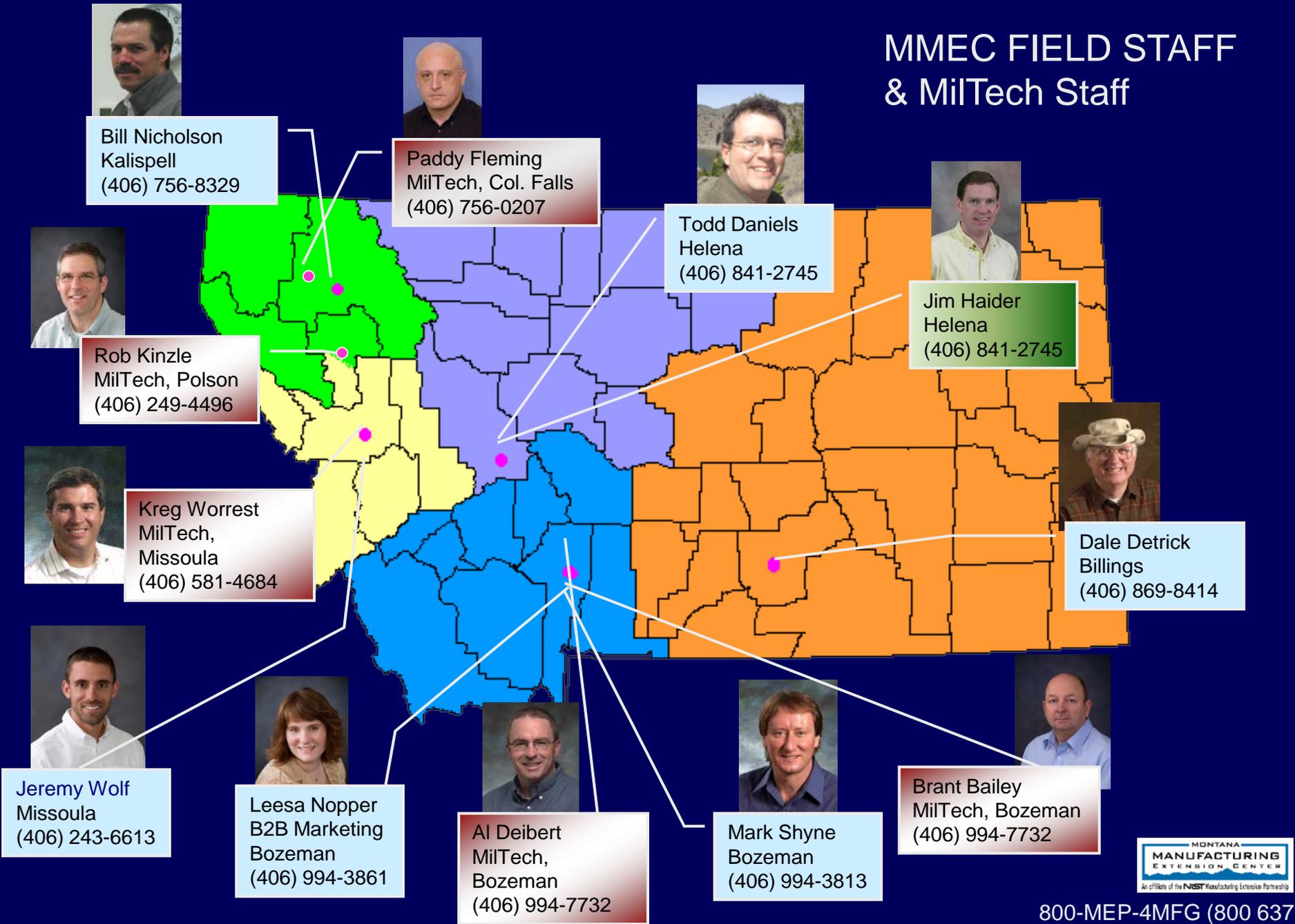
**Pablo: *S&K Electronics***

**Plains: *Lilja Barrels***

**Polson: *Dr. Down***

**Townsend: *PFM Manufacturing***

# MMEC FIELD STAFF & MilTech Staff



800-MEP-4MFG (800 637-4634)

# MMEC FIELD STAFF & MilTech Staff



MilTech Sewn Products Development Engineer



Dale Detrick  
Billings  
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Brant Bailey  
MilTech, Bozeman  
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Mark Shyne  
Bozeman  
(406) 994-3813



Al Deibert  
MilTech, Bozeman  
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Leesa Nopper  
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Jeremy Wolf  
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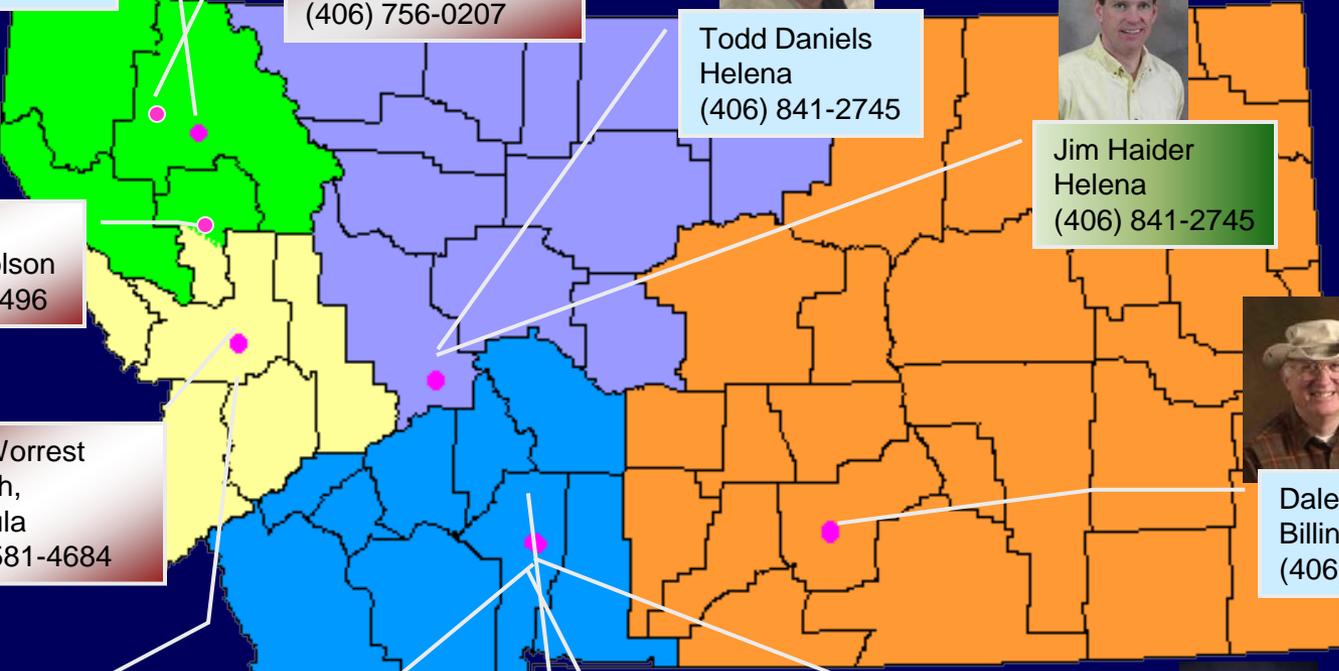
Paddy Fleming  
MilTech, Col. Falls  
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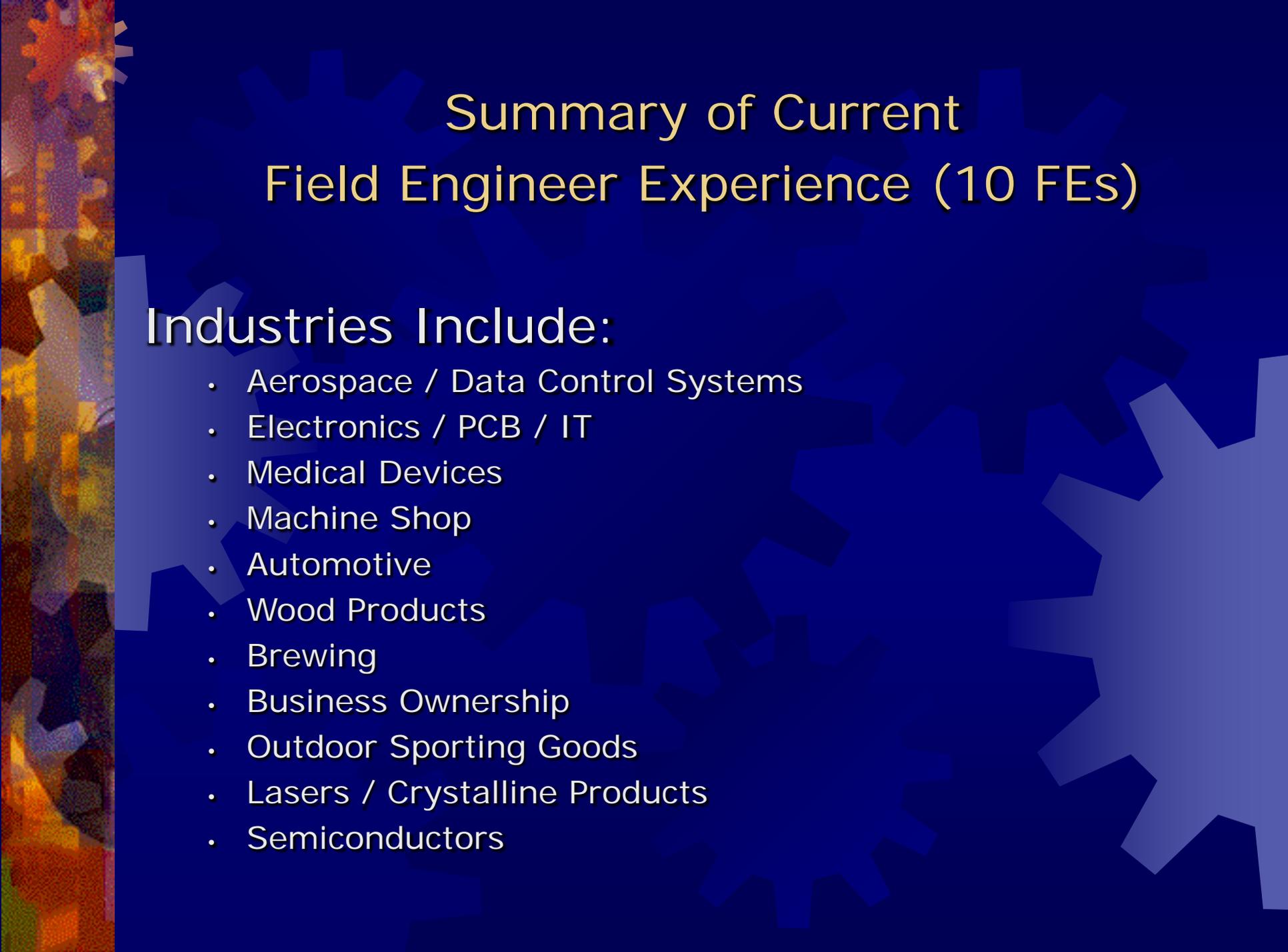
Todd Daniels  
Helena  
(406) 841-2745



Jim Haider  
Helena  
(406) 841-2745



800-MEP-4MFG (800 637-4634)



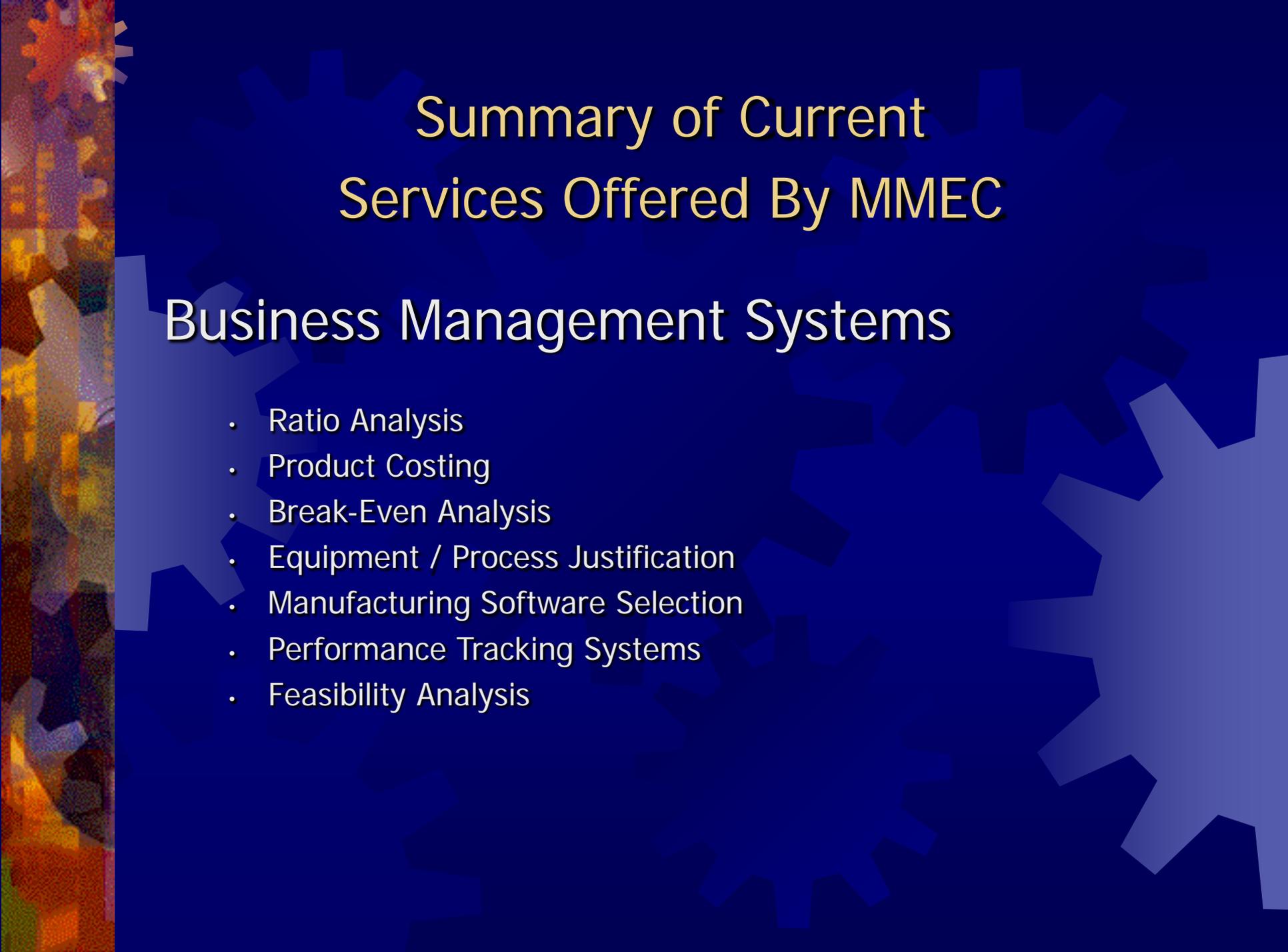
# Summary of Current Field Engineer Experience (10 FEs)

## Industries Include:

- Aerospace / Data Control Systems
- Electronics / PCB / IT
- Medical Devices
- Machine Shop
- Automotive
- Wood Products
- Brewing
- Business Ownership
- Outdoor Sporting Goods
- Lasers / Crystalline Products
- Semiconductors

# MEP Service Delivery Model

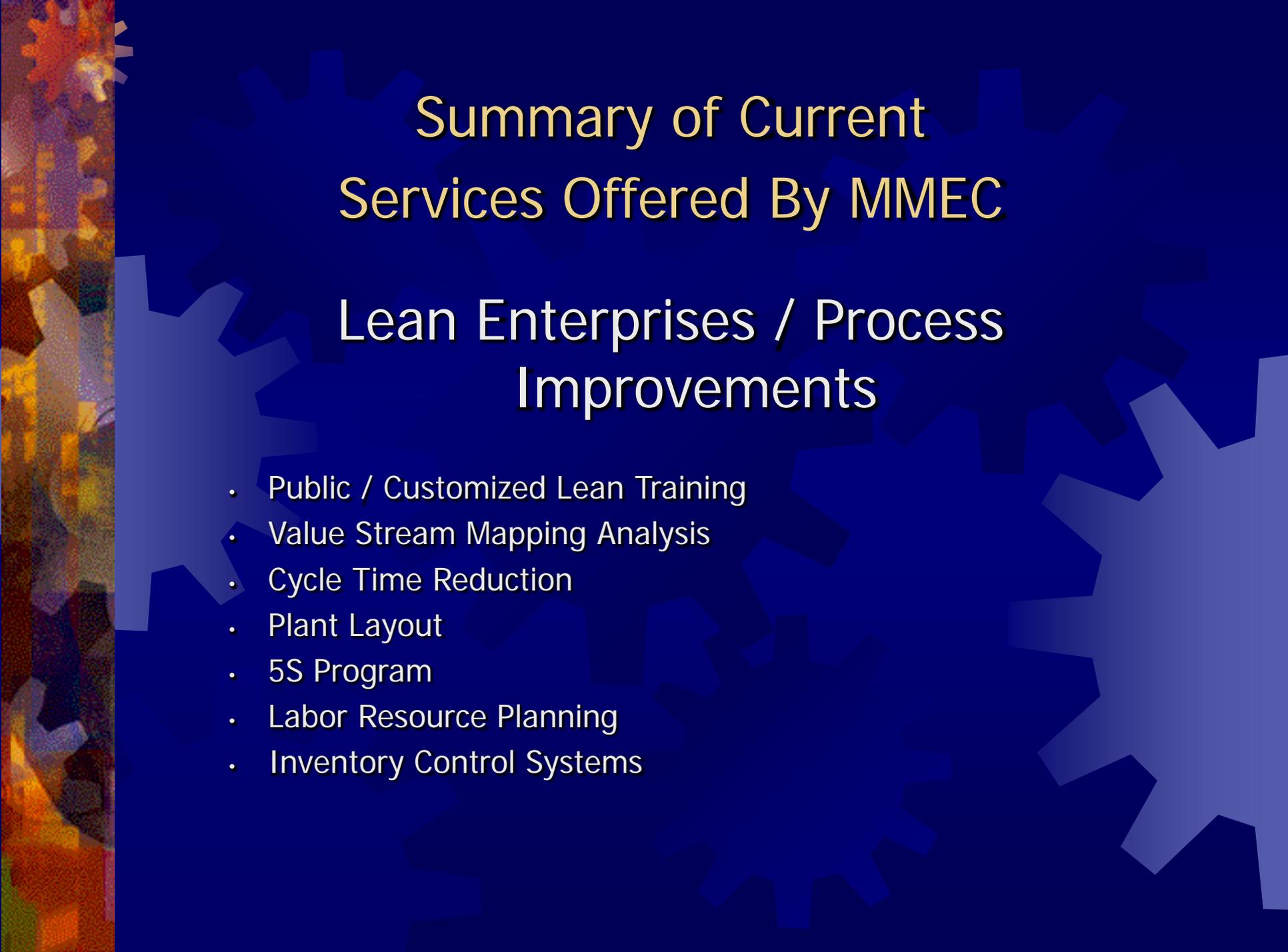
- ✦ Field Engineers Sell and Deliver Services
- ✦ Office Staff Supports Field Engineers
- ✦ Third Party Services
  - ✦ Industrial Marketing
  - ✦ Drafting
  - ✦ Automation
  - ✦ Special Expertise



# Summary of Current Services Offered By MMEC

## Business Management Systems

- Ratio Analysis
- Product Costing
- Break-Even Analysis
- Equipment / Process Justification
- Manufacturing Software Selection
- Performance Tracking Systems
- Feasibility Analysis



# Summary of Current Services Offered By MMEC

## Lean Enterprises / Process Improvements

- Public / Customized Lean Training
- Value Stream Mapping Analysis
- Cycle Time Reduction
- Plant Layout
- 5S Program
- Labor Resource Planning
- Inventory Control Systems



# Summary of Current Services Offered By MMEC

## Quality Systems

- Quality Systems Gap Assessment
- Training
- Implementation of Quality Systems
- Statistical Process Control
- Registration Compliance Assistance
  - ISO 9001:2000
  - ISO 14001:2004



# Summary of Current Services Offered By MMEC

## Other Services

- Project Management
- Third Party Resources
  - Mechanical Design
  - Marketing
  - Client Specific Training
- Wood Industry
- CAD / Design / Product Development Assistance

# **Manufacturing in Montana**

## **More than you might think...**

- ◆ **\$10 Billion in output (sales) per year**
- ◆ **\$1.6 Billion in exports**
- ◆ **More than 3,100 companies**
- ◆ **20,000 workers (includes sole proprietors)**
- ◆ **More than \$1.1 billion per year wages**
- ◆ **Average annual wage of \$43,000**
  - ◆ **Average of \$35,300 for all Montana workers.**
- ◆ **20% of Montana's Basic Industry (Labor Income)**

# Montana Manufacturing Competition & Evolution



**2000**

**LEAN Manufacturing**  
Continuous Improvement  
Process Efficiency



**2010**

**LEAN Manufacturing**  
+  
**Top Line Growth**  
New Markets  
New Customers  
New Products



**2012 & Beyond**  
**LEAN Manufacturing**  
+  
**Top Line Growth**  
+  
**Innovation & Speed**  
Rapid Innovation  
Speed to Market

**DO IT ALL**  
**Faster**  
**Better**  
**Cheaper**

**Technology**

**Scouting**

**Analyses**

**Assessments**

**SUSTAINABLE**

**Prototyping**

**Life-Cycle**

**Manufacturing**

**review**

**Ideas**

**Cost**

**Evaluation**

**Improvement**

**Transition**

**INNOVATION**

**Innovation**

**Customer**

**Montana**

**Process**

**VALUE**

**Design**

# Why is Innovation Important?



# Why is Innovation Important?

## **Innovation is not Uniquely American**

- ✓ **It is no longer enough to serve only US Markets**
- ✓ **96% of the world's consumers do not live in the US**
- ✓ **Foreign companies sell in the US**

# Why is Innovation Important?

## China is Innovating

- ✓ **Patents to Chinese Inventors Doubled since 2005**
- ✓ **Chinese Companies are growing in the wind and solar power industries**
- ✓ **Huawei and ZTE ranked in the top Five corporate patent registrants in 2010**

# Why is Innovation Important?

**Without (Chinese) patent reform, companies must rely on ... 2 strategies for protecting Intellectual property:**

- ✓ **Outrun the Competition**
- ✓ **Technology “Signatures”**

# Innovation Problems

- ✓ It can take a LONG  
TIME to see results
- ✓ It can be very RISKY

# Innovation

## More Than Ideas

✓ **Team**

✓ **Talent**

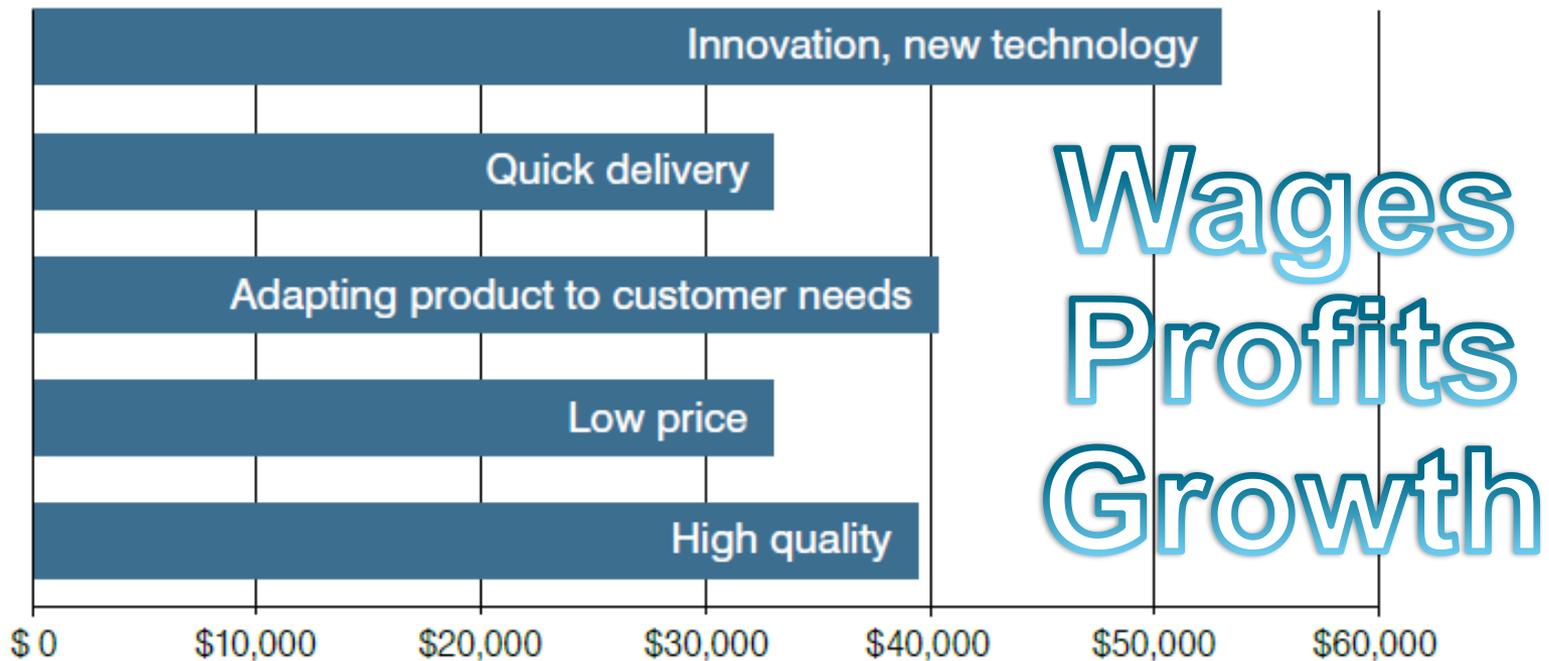
✓ **Customer Understanding**

✓ **Market Understanding**



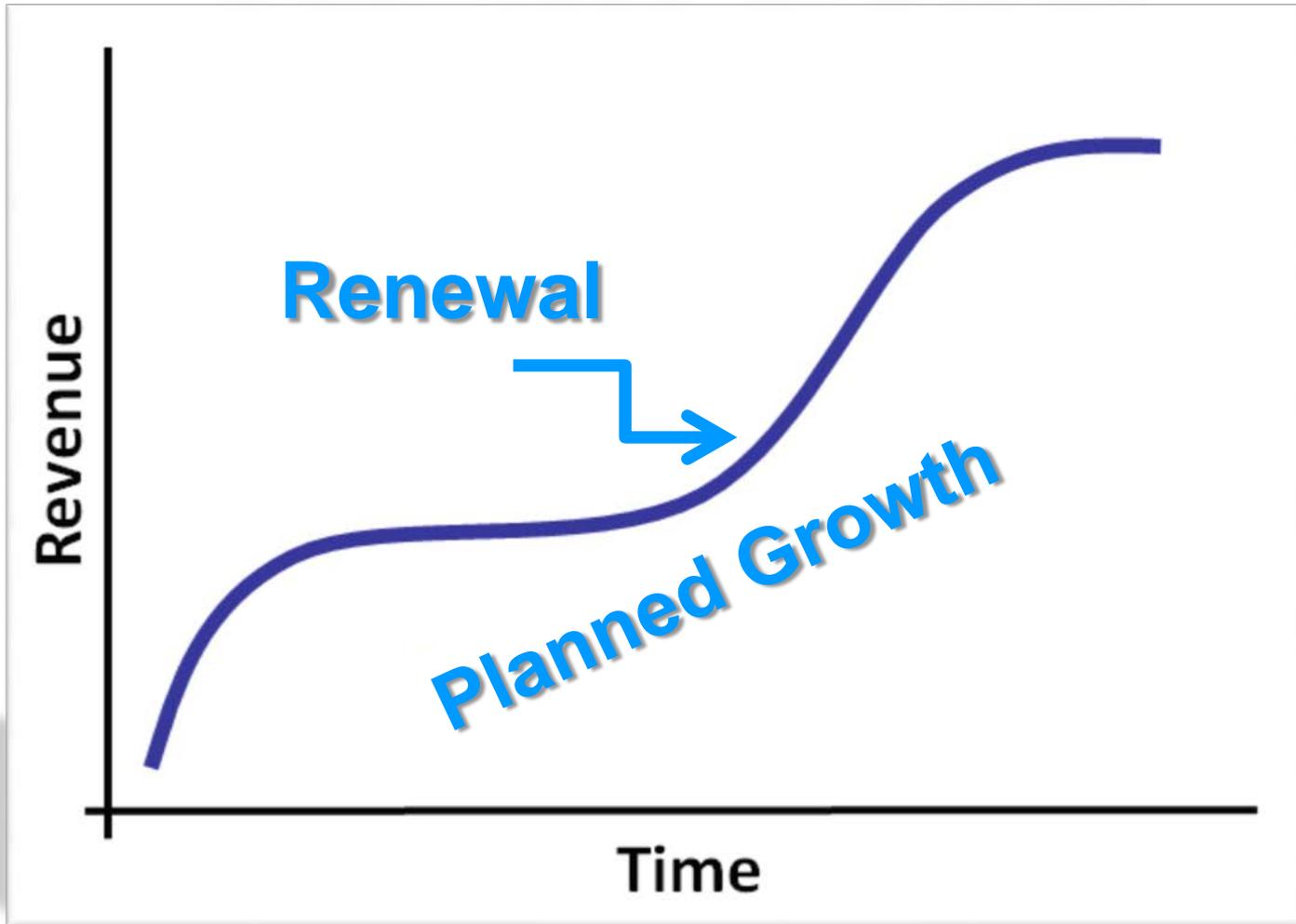
# Innovation Value

**Higher Returns to the Community Linked to Innovation**  
**Manufacturing Wages by Percentages of Respondents Ranking Strategies**  
**Highest in 2010**



*Source: Georgia Manufacturing Survey 2010, weighted responses of 494 manufacturers.*

# Business Growth





# Hurdles



# Transition

## Staff

### Production System

### Quality

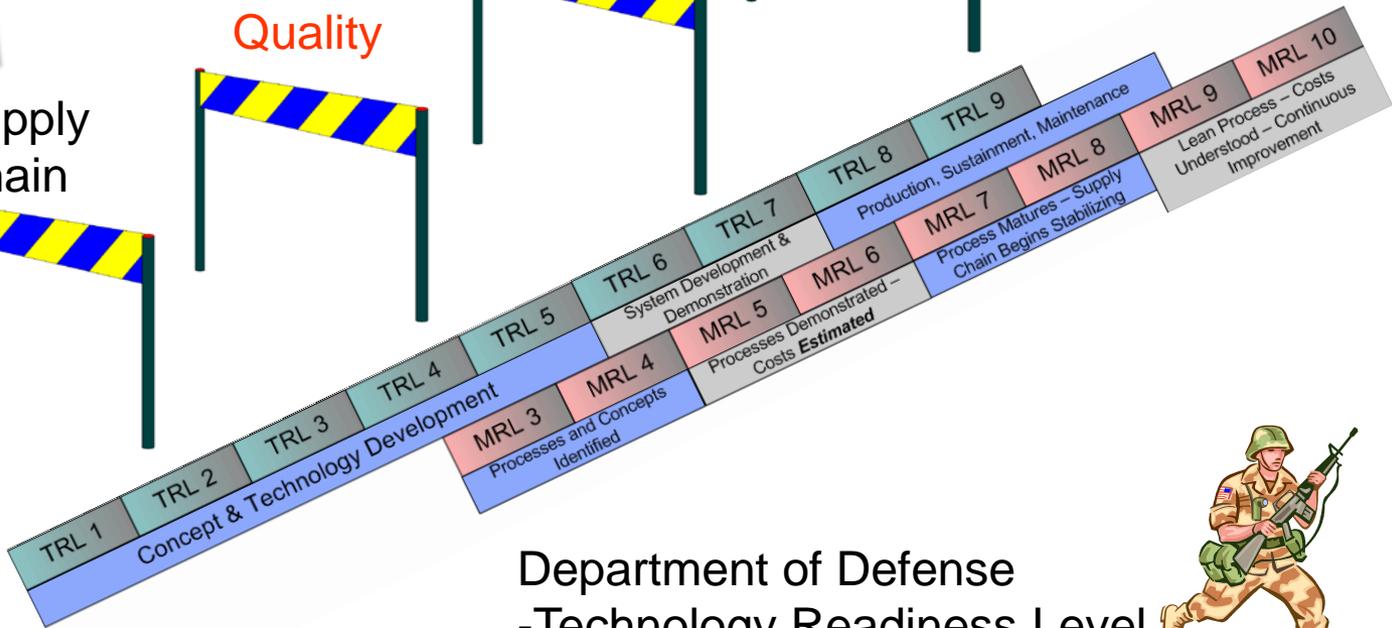
### Supply Chain

# Technology

### Concept Design



Labs  
Inventors  
Technology Transfer



Department of Defense  
-Technology Readiness Level  
-Manufacturing Readiness Level





# Technology Transition Tools

TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
MRL 1	MRL 2	MRL 3	MRL 4	MRL 5	MRL 6	MRL 7	MRL 8	MRL 9

**Technology Readiness Level**

**Manufacturing Readiness Level**



# Technology Transition Tools

TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
MRL 1	MRL 2	MRL 3	MRL 4	MRL 5	MRL 6	MRL 7	MRL 8	MRL 9
Concept & Technology Development					System Development & Demonstration		Production, Sustainment, Maintenance	
Initial Product/Process Capability			Product/Process Development		Initial Product/Process Insertion		Initial Product/Process Improvement & Sustainment	



# Technology Transition Tools

TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
MRL 1	MRL 2	MRL 3	MRL 4	MRL 5	MRL 6	MRL 7	MRL 8	MRL 9
Concept & Technology Development					System Development & Demonstration		Production, Sustainment, Maintenance	
Initial Product/Process Capability			Product/Process Development		Initial Product/Process Insertion		Initial Product/Process Improvement & Sustainment	

**Critical Design Review – DFM, DFA, Maintainability, Quality, Equipment**

**Manufacturing System Design**

**Employee Development, Training**

- Quality Systems
- Organizational Development
- Vendor Qualification
- Financial Management
- Lean Manufacturing
- Project Management

**Quality System Implementation**

- ISO9000 / AS9100 Gap Assessment
- ASQ Inspection and Sampling Plan
- Vendor Qualification
- MilSpecs

**Project Management**

**Supply Chain Analysis – Vendor Qualification – Supplier Development**

**Managerial Financial Analysis**

- Activity Based Costing
- Ratio Analysis
- Break Even Analysis
- Equipment Justification
- Product Costing
- Sensitivity Modeling

**Lean Manufacturing Implementation**

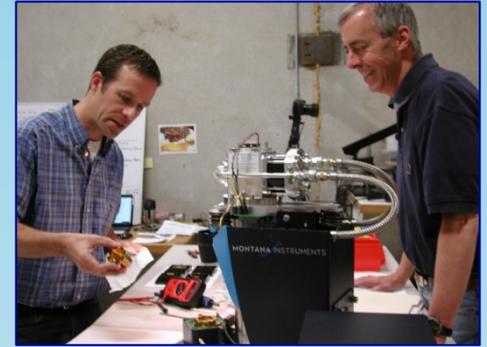
**Bill of Material – Bill of Resources Development**

**Material Requirements Planning – Inventory Control - Scheduling**



# Montana Instruments, Inc.

- ▶ Transitioning from research & development to production
- ▶ Sales started at zero: 2009 on target for \$5 million in 2012 (now 10 employees and hiring)
- ▶ MMEC led on Lean Mfg, repeatability, plug & play metric helping deliver on time even as sales rise
- ▶ MMEC-B2B created appealing tagline “Cold Science Made Simple” plus strategic marketing plan
- ▶ Bolstered online presence
- ▶ Cohesive, customer-focused messaging developed to demonstrate value





Manufacturing  
Process Design



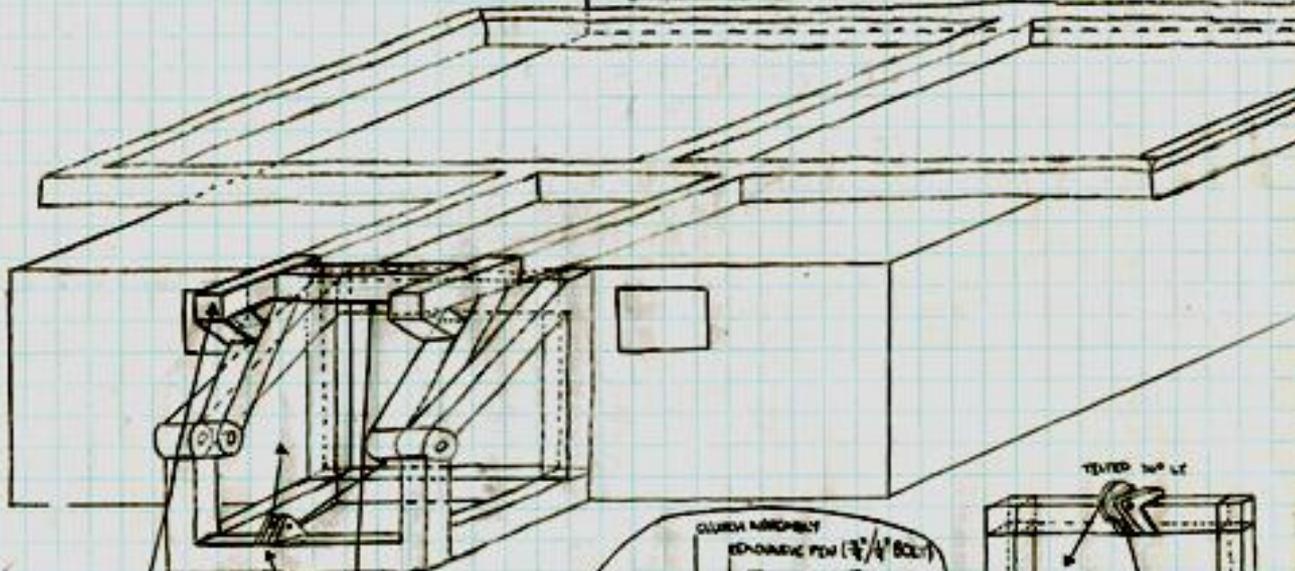
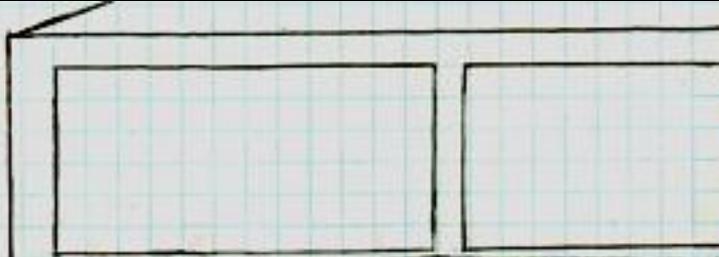
Customer's  
Voice  
~  
Rapid Delivery

ADRESWEEPER (30 FRONT ORDER SIDE)

SCALE: 1/4" = 1'-0"

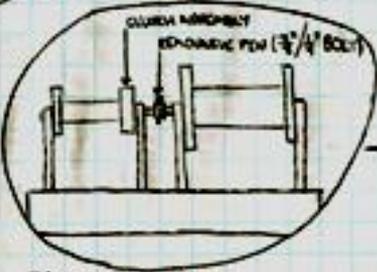
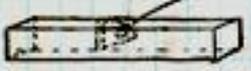
DRAWN BY: SGT STUMER, NATHAN M. 050705

2336/2445



ORDER MEMBERS REMOVED FOR CLARITY

TRUCKED 45° NE



ENLARGED FOR DETAIL

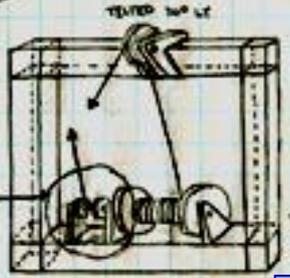
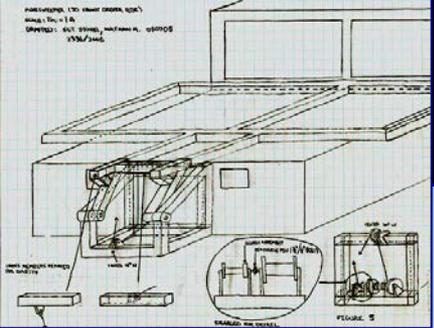


FIGURE 5

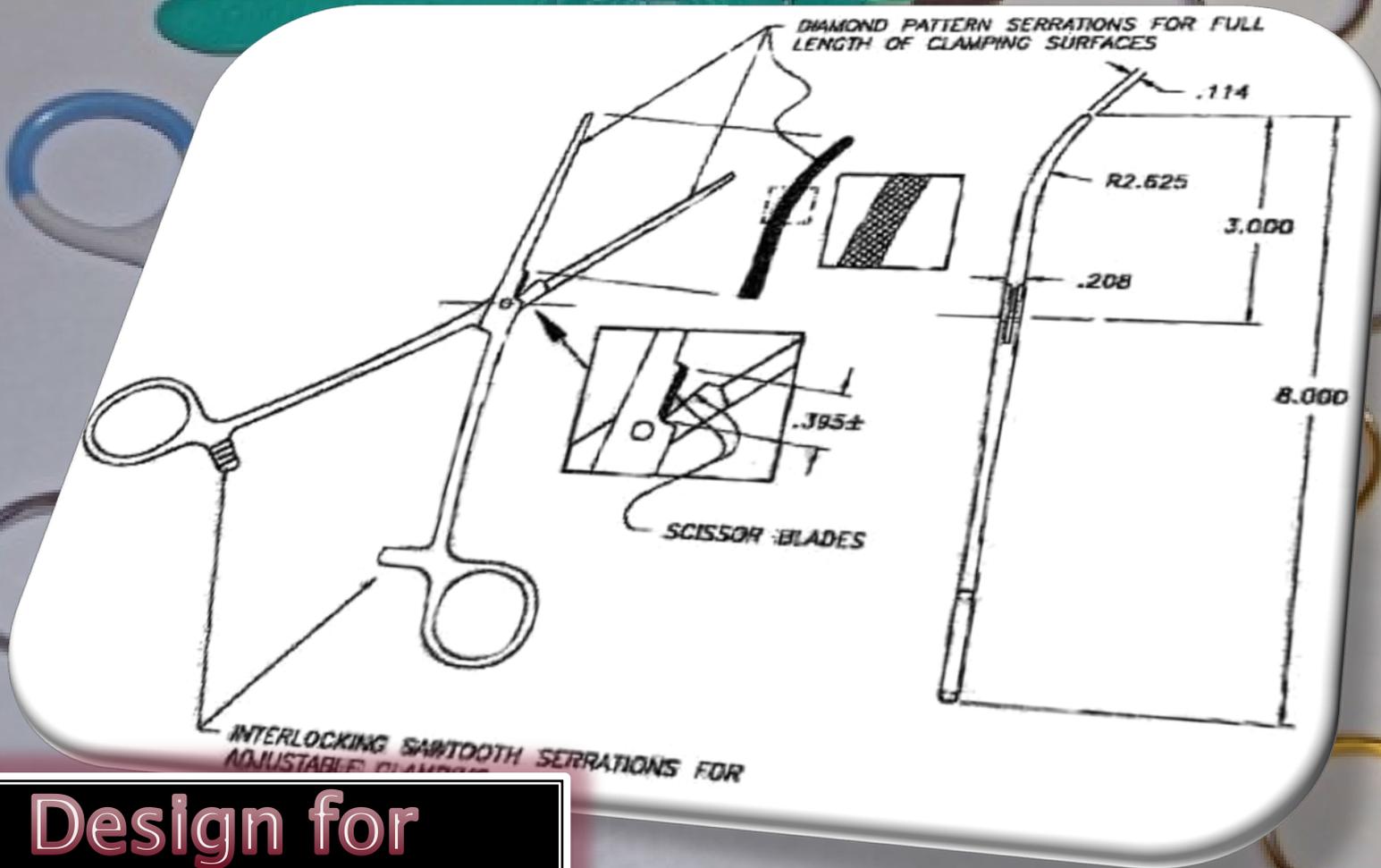


Speed to Market



**Speed to Market**

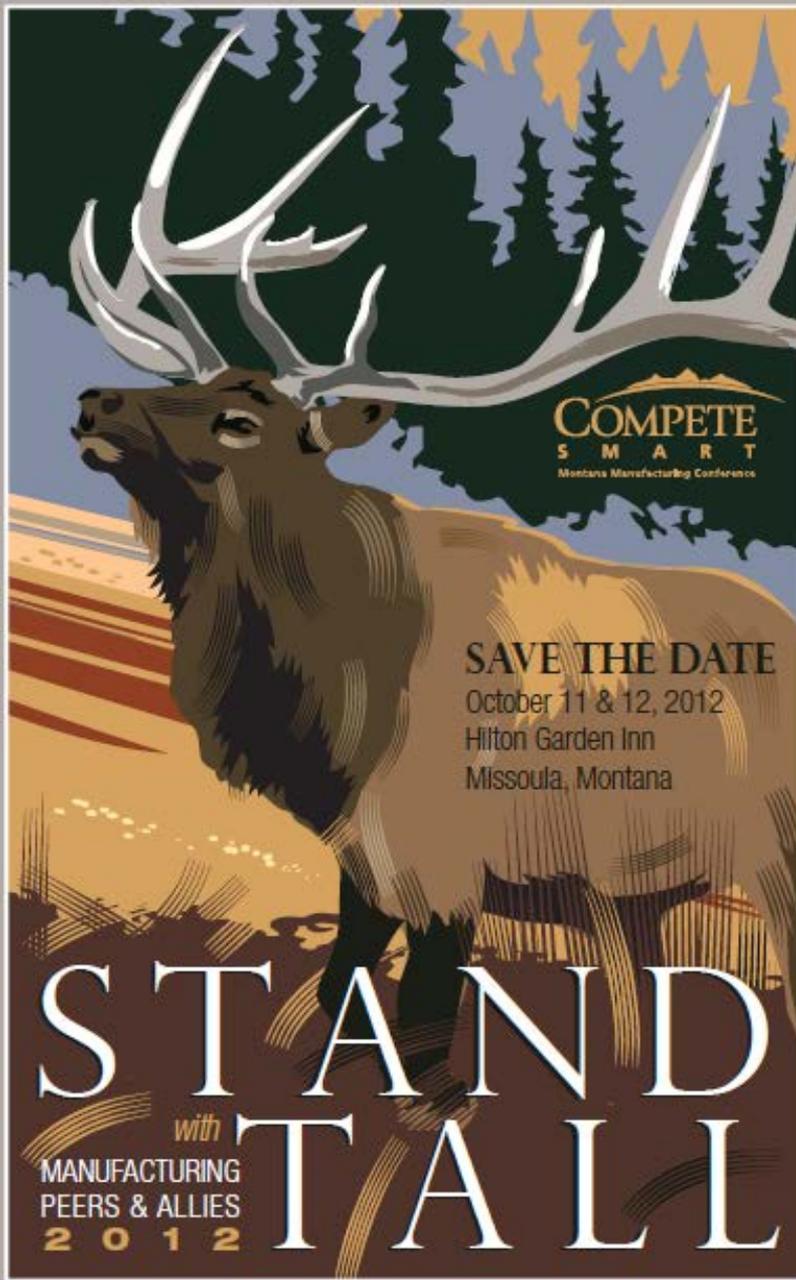
# Prototype



# Design for Manufacturability



**Technical Data  
Package**



COMPETE  
SMART  
Members Manufacturing Conference

SAVE THE DATE

October 11 & 12, 2012  
Hilton Garden Inn  
Missoula, Montana

STAND  
*with*  
MANUFACTURING  
PEERS & ALLIES  
2012 TALL