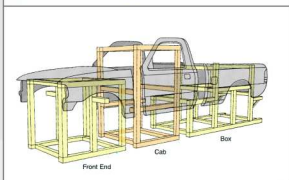
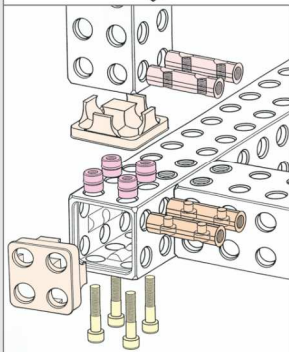
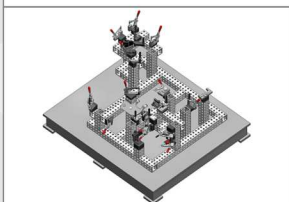
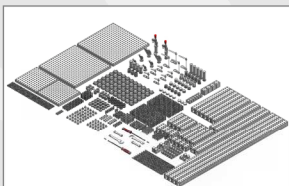


# American Modular Tooling

**C2**  
**GAUGE & FIXTURE**  
Precision Modular Measurement & Testing Tools



**DECADES OF  
EXPERIENCE**

**PROVEN  
FIXTURING  
EXCELLENCE**

**AMERICAN MADE**

# **C2** **GAUGE & FIXTURE** *American Modular Tooling*

- ⊕ Established in 1991, Paul W. Marino Gages, Inc. is dedicated to providing the finest quality products and professional services to our customers.
- ⊕ In 2018 PWMG created a partnership with C2 Machining in Kentwood Michigan, C2 Gage & Fixture, to sell and manufacture American Modular Tooling as well as design and build fixtures of all types.
- ⊕ Our 5,000 sq. ft. design and 20,000 sq. ft. manufacturing facility, located in Kentwood MI, is home to our sales, design and manufacturing groups and includes a working showroom with demonstration and learning facilities.
- ⊕ Our customer service and sales groups are knowledgeable, professional and ready to assist you.
- ⊕ Our design group are specialists in several fields of design and support all typical file formats.
- ⊕ Our manufacturing and quality groups consist of knee mills, lathes, coordinate measuring systems and all associated equipment required for manufacturing with the future in mind.



C2 Gauge & Fixture, Kentwood Michigan

## Widespread Acceptance

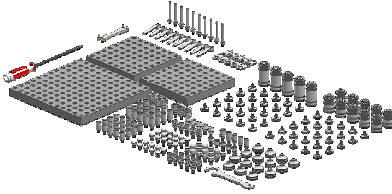
- |                  |                   |                 |
|------------------|-------------------|-----------------|
| ⊕ Aerospace      | ⊕ Die Casting     | ⊕ Ship Building |
| ⊕ Aircraft       | ⊕ Electronics     | ⊕ Steel         |
| ⊕ Aluminum       | ⊕ Instrumentation | ⊕ Tooling       |
| ⊕ Automotive     | ⊕ Machine Tool    | ⊕ And growing   |
| ⊕ Communications | ⊕ Medical         |                 |
| ⊕ Defense        | ⊕ Plastics        |                 |

# American Modular Tooling

## The New Manufacturing

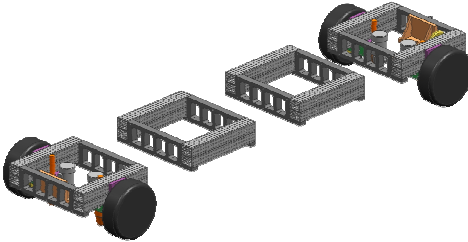
There is a worldwide movement to lean, efficient methods of manufacturing. The U.S. government is currently working with major manufacturers to implement modular, reconfigurable tooling. AMT fulfills the following:

- ⊕ Modular and reconfigurable
- ⊕ Rapid response and deployment
- ⊕ Light weight
- ⊕ Three E's...ecological, ergonomic and economic



## AMT Advantages

- ⊕ Fixtures may be built rapidly and modified easily, resulting in immediate savings of time and money.
- ⊕ All components are completely reusable, unlike welded fixtures.
- ⊕ Aluminum is light in weight, resists corrosion and is ecologically sound
- ⊕ Modular elements make it easy to duplicate, or repeat, designs.
- ⊕ Large fixtures, such as body cubes, may be built in sections which can be assembled or dismantled quickly, permitting work at multiple locations.
- ⊕ A fixture may be assembled away from its site of design.



### AMT is ideal for:

- |                                       |   |                                      |
|---------------------------------------|---|--------------------------------------|
| ⊕ CMM Holding fixtures                | ⊕ Checking fixtures, SPC and indicating | ⊕ Vacuum holding fixtures            |
| ⊕ Attribute gages                     | ⊕ Body stacks, cube ups and bucks       | ⊕ Multi-part pallet systems for CMMs |
| ⊕ Holding fixtures                    | ⊕ Armatures                             | ⊕ Shuttle systems                    |
| ⊕ Assembly fixtures                   | ⊕ Interior and exterior bucks           | ⊕ Special machined details           |
| ⊕ Welding fixtures                    | ⊕ Jigs and jiggling base plates         | ⊕ Standard details                   |
| ⊕ Hand apply fixtures or gages        | ⊕ Universal, multi-part holding devices | ⊕ Check rails, net pads, locators    |
| ⊕ Layout fixtures                     |   | ⊕ Clamping systems                   |
| ⊕ Checking fixtures, flush and feeler |   |                                      |

- ⊕ We have included several illustrations and photos of production AMT jobs throughout our catalog — refer to the Photo chapter on pages 139-150 for even more.

# American Modular Tooling

Fast parts fixturing, rapid tool development, simplified machining and fast assembly make American Modular Tooling an ideal addition to the worldwide movement for lean, efficient methods of manufacturing. Every element has been designed for maximum efficiency and cross-system adaptability. Components are available individually, in kits or as custom fixtures designed and built per your part print.

## Material Properties of AMT Components:

### AMT "Construction Grade" Extruded Profiles and Locators

- ⊕ 6061-T6, Temper 6
- ⊕ KSI Tensile: 47,000 PSI
- ⊕ KSI Yield: 40,000 PSI
- ⊕ Hard Coat Anodized
- ⊕ Elongation Factor: 8%

### AMT "Professional Grade" Extruded Profiles and Top Elements

- ⊕ 7075-T6, Temper 6
- ⊕ KSI Tensile: 78,000 PSI
- ⊕ KSI Yield: 68,000 PSI
- ⊕ Hard Coat Anodized
- ⊕ Elongation Factor: 6%

### AMT "Special Duty" Extruded Profiles.

- ⊕ 6082-T6, Temper 6, Special Blend
- ⊕ KSI Tensile: 45,000 PSI
- ⊕ KSI Yield: 30,000 PSI
- ⊕ Hard Coat Anodized
- ⊕ Elongation Factor: 4.5–5.5%

### AMT "Special Duty" Cast Products

- ⊕ 319, 0-T5 Sand Cast
- ⊕ KSI Tensile: 30,000 PSI
- ⊕ KSI Yield: 26,000 PSI
- ⊕ Hard Coat Anodized
- ⊕ Elongation Factor: 1.5%

### AMT Connection Elements

- ⊕ 2024-T6
- ⊕ KSI Tensile: 69,000 PSI
- ⊕ KSI Yield: 57,000 PSI
- ⊕ Hard Coat Anodized
- ⊕ Elongation Factor: 10%

## Benefits of the American Modular Tooling System

### Manufacturing and Engineering:

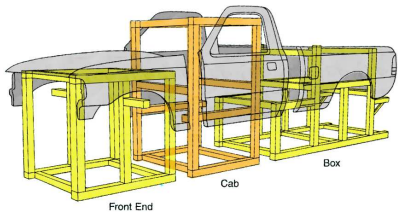
- |                     |              |
|---------------------|--------------|
| ⊕ Facility Usage    | 48% Less     |
| ⊕ Lead Time         | 60% Less     |
| ⊕ Tooling Costs     | 44% Less     |
| ⊕ Tooling Labor     | 60% Less     |
| ⊕ Tool Design Costs | 50% Less     |
| ⊕ Equipment Needs   | 70% Less     |
| ⊕ Reusable Material | 70% Reusable |

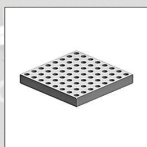
### Manufacturing and Assembly:

- |                             |             |
|-----------------------------|-------------|
| ⊕ Assembly Labor            | 70% Less    |
| ⊕ Through-put Increase      | 45% More    |
| ⊕ Accuracy of Assemblies    | 50% Greater |
| ⊕ Periodic Inspection       | 50% Less    |
| ⊕ Reconfigurable            | Priceless   |
| ⊕ Modularity                | Priceless   |
| ⊕ Rapid Engineering Changes | Priceless   |

### Other Benefits:

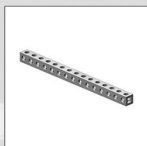
- ⊕ Fewer corrosion problems due to hard coat aluminum
- ⊕ Lower shipping costs due to lighter weight
- ⊕ Faster setup at customers facility
- ⊕ Good ROI on leasing of tool (70% reusable)
- ⊕ Can be used as temporary rate tool
- ⊕ Less space required for storage
- ⊕ Minimal maintenance requirements
- ⊕ Environmentally correct





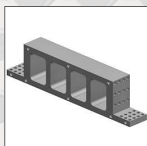
Grid Plates provide the basic structural foundation of almost any fixture.

Pages 7—16



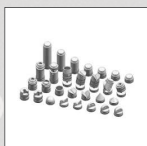
Light weight Hollows feature a channelled interior for high accuracy.

Pages 17—34



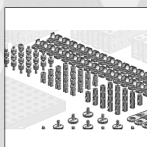
Special duty supports, gussets and foot plates provide added strength.

Pages 35—42



Locating and Clamping Elements hold and locate parts of many shapes and sizes.

Pages 43—72



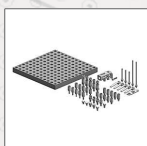
Connection Elements permit rapid assembly of fixtures.

Pages 73—86



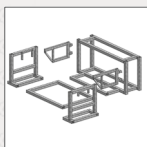
Tools and Storage Cabinets

Pages 87—92



Kits are designed to accommodate all varieties of fixturing requirements.

Pages 93—124



Studio Tools

Pages 125—138



Photos

Pages 139—150

# American Modular Tooling

## Testimonial of the Year:

### Modular Tooling Reduces Fixturing Costs, Allows Conversion From One Make to Another.

"It's easy to learn, but there is so much there that you have to sort through it. Once you know what everything does, it's like working with one of those Erector® sets you had when you were a kid. It's very, very user friendly."

Bill Ralph, Quality Metalcraft, Inc.



"I would recommend it to anybody. You are better off sticking with the people who know what to do with it."

Two sided modular tool converted for reuse after its initial run for a different manufacturer.

"If it's going to cost us a measly \$3,000.00 to build a, say, \$100,000.00 fixture...we want to do it."



A close-up view showing a three-axis adjustable locating element holding a door in body position.

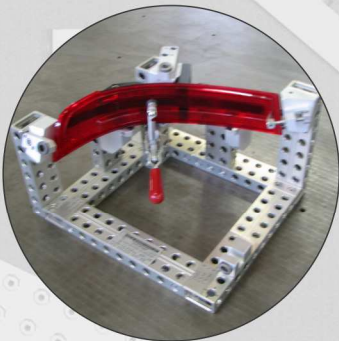
"It's part of our system now, they are definitely going to use it on the next big project. It should last for years."

Read the entire article in Quality Magazine, 2008 or online at [www.qualitymag.com](http://www.qualitymag.com).

See more on our website, [pmargage.com](http://pmargage.com)



American Modular Tooling



Grid Plates

Hollows

Special Duty

Locating & Clamping

Connection Elements

Tools & Storage

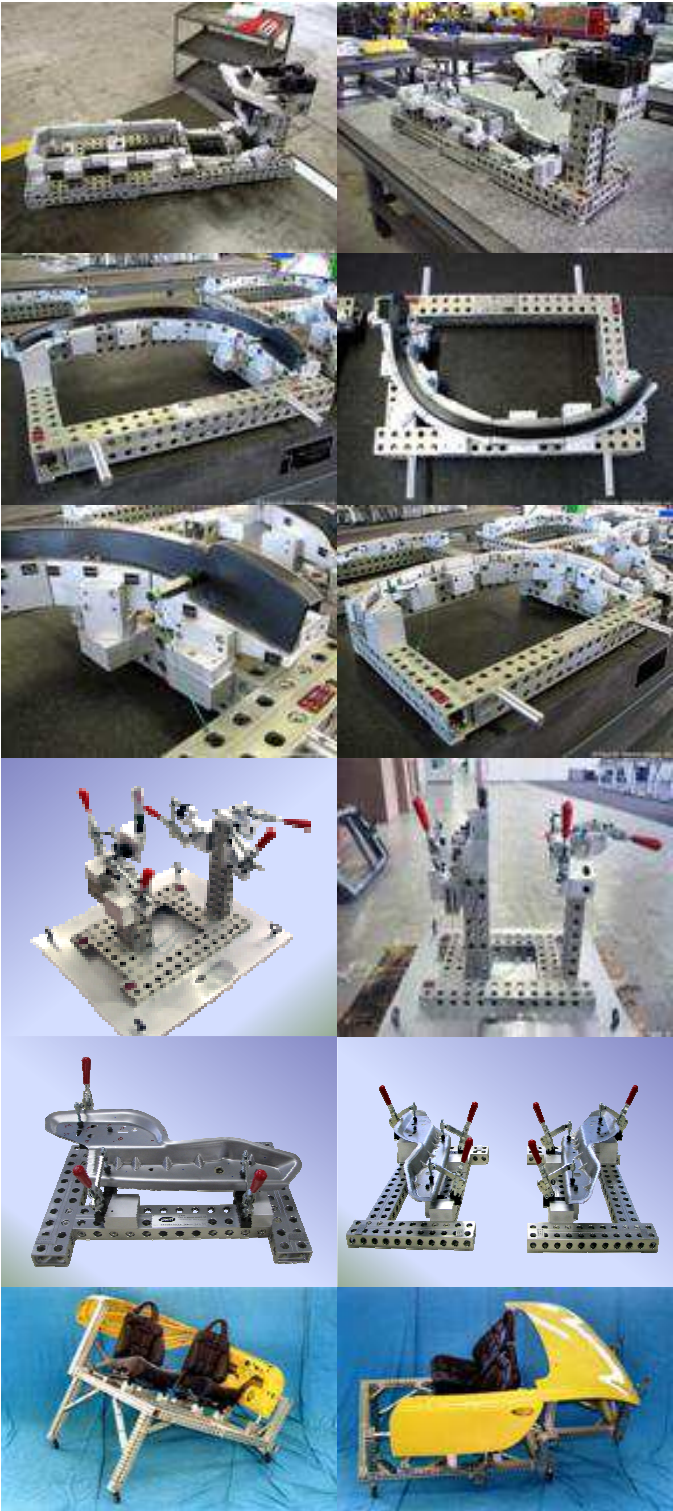
Fixturing Kits

Studio Tools

Photos

American Modular Tooling

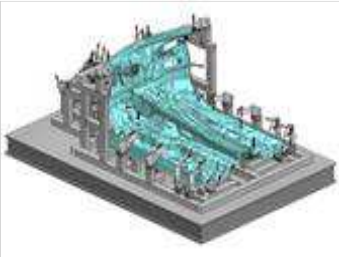
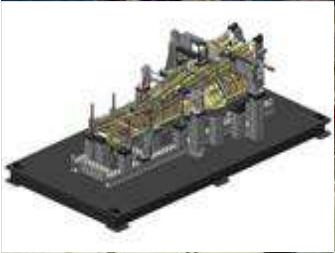
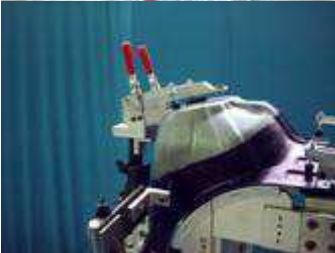
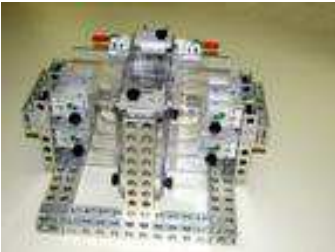
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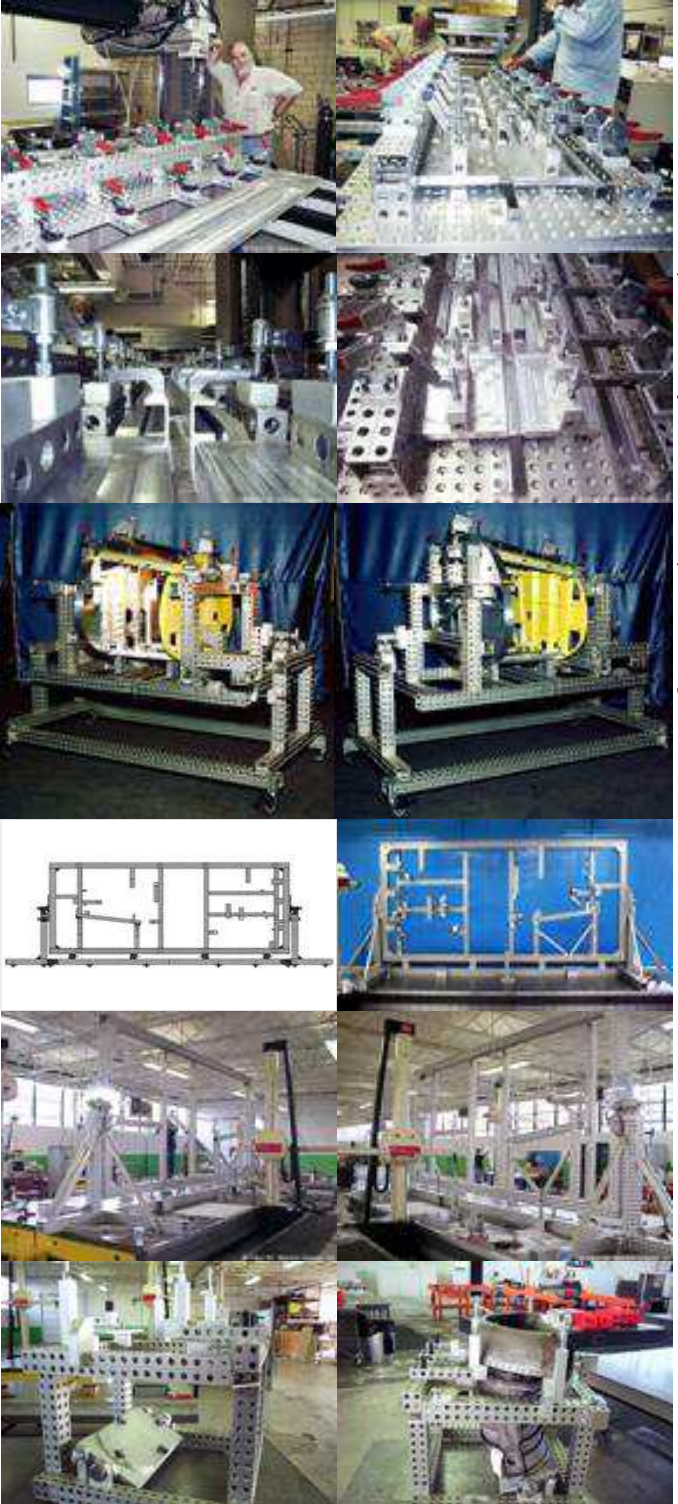
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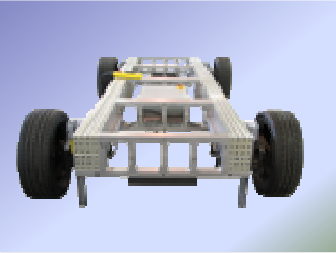
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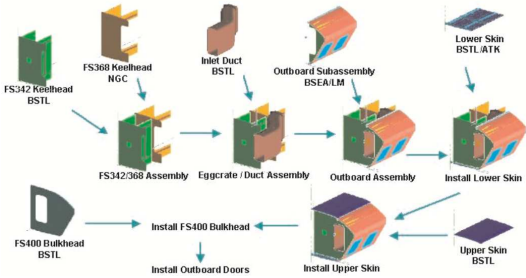




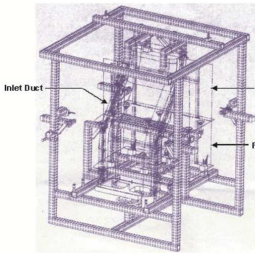
# American Modular Tooling

SOLUTIONS®  
Ideas

## Forward Center Fuselage



### The Parts



**Tooling Vendor:**  
*Paul W. Marino Gages, Inc.*  
*Warren, Michigan*

- Modular Reconfigurable/Recyclable Tool
- Dual Use - Already used in Automotive Industry
- Assembly in Nose-Down Orientation to Facilitate Frame Station Bonding

### The Plan

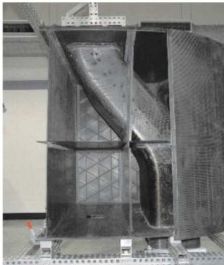


**Eggcrate / Duct Assembly**



**Installation of Outboard Subassembly**

### The Job



**Iso Grid Lower Skin Installed**



**FS400 Bulkhead**

### The Finished Product

Above photos contributed by Tim Tyahla,  
The Boeing Company

# American Modular Tooling

SYMBOL FOR:	ASME Y14.5M 1994	ISO
STRAIGHTNESS		
FLATNESS		
CIRCULARITY		
CYLINDRICITY		
PROFILE OF A LINE		
PROFILE OF A SURFACE		
ALL AROUND		(projected)
ANGULARITY		
PERPENDICULARITY		
PARALLELISM		
POSITION		
CONCENTRICITY (concentricity and coaxiality in ISO)		
SYMMETRY		
CIRCULAR RUNOUT		
TOTAL RUNOUT		
AT MAXIMUM MATERIAL CONDITION		
AT LEAST MATERIAL CONDITION		
REGARDLESS OF FEATURE SIZE	NONE	NONE
PROJECTED TOLERANCE ZONE		
TANGENT PLANE		(projected)
FREE STATE		
DIAMETER		
BASIC DIMENSION (theoretically exact dimension in ISO)		
REFERENCE DIMENSION (auxiliary dimension in ISO)	(50)	(50)
DATUM FEATURE		
DIMENSION ORIGIN		
FEATURE CONTROL FRAME		
CONICAL TAPER		
SLOPE		
COUNTERBORE/SPOTFACE		(projected)
COUNTERSINK		(projected)
DEPTH/DEEP		(projected)
SQUARE		
DIMENSION NOT TO SCALE	15	15
NUMBER OF PLACES	8A	8A
ARC LENGTH		
RADIUS	R	R
SPHERICAL RADIUS	SR	SR
SPHERICAL DIAMETER	SØ	SØ
CONTROLLED RADIUS	CR	NONE
BETWEEN		NONE
STATISTICAL TOLERANCE		NONE
DATUM TARGET		
TARGET POINT		

\* May be filled or not filled



## About Us

We are dedicated to presenting the finest quality products to industry while providing reliability and service. Our mission is to supply the technological advances that enable the manufacturing process to work faster, with higher precision, than past practices. We utilize methods that recognize global economic, ergonomic and ecological considerations.

Over the years our highly skilled personnel, consistency in service, quality and innovative ideas have proven to be our greatest assets.

## Distributor Network

American Modular Tooling® products are sold through our highly valued distributor network, world-wide. We make all efforts to protect those relationships and are looking for additional qualified distribution networks in many areas of the world.

If you are unable to locate a distributor in your area, or are interested in becoming a distributor, please contact us at the numbers below.

### Contact Us

#### Paul W. Marino Gages, Inc.

413 NE Baker Road.  
 Stuart, FL 34994  
 United States

Phone (800) 528.9785

Email: [pwminc@pmargage.com](mailto:pwminc@pmargage.com)  
 Web: [pmargage.com](http://pmargage.com)  
 eShop: [shoppwm.com](http://shoppwm.com)

⊕ Technical Sales & Consultation

#### C2 Gauge & Fixture

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Phone (616) 554.5222

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 Web: [c2gauge.com](http://c2gauge.com)

⊕ Sales ⊕ Design & Build  
 ⊕ Manufacturing ⊕ Logistics

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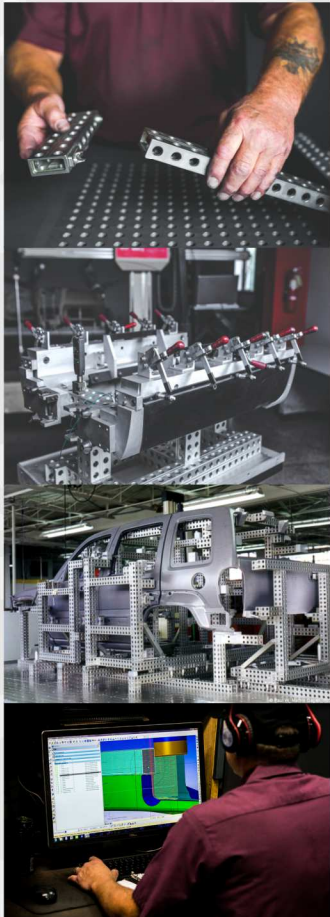
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