IEM is a leading manufacturer of die and die component products supplied globally to the parts forming industry. Backed by years of tool and die experience, quality and innovation are some of the reasons why our name is respected throughout the world. We have taken the lead role in creating and bringing new products to customers and helping them find solutions that improve their operations. Based on the capabilities IEM offers, we can help you to meet the demands of quick deliveries, technical support, quality products and competitive prices. IEM and its’ broad distribution channels and direct sales personnel will assist you in any way to make your product a better and more profitable one.

Whether standard or customized products, with our years of experience, customers can be sure the products they receive will meet their expectations for reliability and dependable performance. We understand the demanding schedules of die builders and production personnel and have developed efficient manufacturing processes to shorten product lead times as well as put inventory on our shelves so you can have it in your facility when you need it. Put the IEM network to work for you. We’ve got the service you’ve been looking for.

Included in our full line offering are both inch and metric size die sets and die components that are designed to numerous die standards including ISO, NAAAMS, JIS and many large automotive and appliance manufacturers’ standards. The complete product offering includes:

- Accu-Bend™ Rotary Benders
- Air Presses
- Cams
  - Aerial & Diemount Cams
  - Box Cams
  - Roller Cams
  - Wide Cams
- Die Accessories
- Die Sets
  - Plain & Ball Bearing Sets
  - Catalog Ball Bearing Sets
  - Wear Plate Sets
  - Cast Sets
- Ejector Boxes
- Fabrications
  - Custom Fabrications
  - Robotic Welding
  - Aluminum & Steel Fixture Bases
- Guide Posts & Bushings
  - Plain & Ball Bearing Styles
  - Steel, Bronze, Bronze-Plated & Self-Lubricating Bushings
  - Lempcoloy Bushings
  - Special Pins, Bushings & Retainers
- Hydraulics
  - Electronic Die Setters
  - Die Separators
  - Drill & Tap Equipment
  - Hydraulic Motors
- In-Die Tapping Units
- Machined and Cut Ground Plate
  - Adapter Plates
  - Bolster Plates
  - 1020, 1045 & 4140 materials
- Manufacturing Services
  - CNC Machining
  - Blanchard Grinding
  - Stress Relieving
  - Die Set Repair
- Mold Components
  - Bronze Plated & Self-Lubricated Bushings
  - Leader Pins
  - Bronze & Bronze Plated Wear Strips & Ways
- Punches, Buttons & Retainers
- Springs
  - DieMax L Inch Series Springs
  - DieMax XL Series ISO Springs
  - JIS Series Springs
  - Custom Heavy Duty Springs
  - Marsh Mellow Springs
  - Formathane Urethane
  - Kaller Gas Springs
  - Utility & Disc Springs
- Wear Products
  - Plates, Strips, Gibs & Blocks
  - Steel, bronze, Bronze-Plated and Self-Lubricating Materials
<table>
<thead>
<tr>
<th>Section</th>
<th>Page Number</th>
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<tbody>
<tr>
<td>Cam Selection Matrix</td>
<td>ii</td>
</tr>
<tr>
<td>Retainer Mounting Methods</td>
<td>iv</td>
</tr>
<tr>
<td>Mini Cam™</td>
<td>1</td>
</tr>
<tr>
<td>Standard Box Cam</td>
<td>4</td>
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<tr>
<td>Maximum Power Heavy Duty Cam™ (MP)</td>
<td>11</td>
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<tr>
<td>Long Travel Box Cam</td>
<td>14</td>
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<td>Custom Cams</td>
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Cam Selection Matrix

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<tr>
<th></th>
<th>Gib Cam™</th>
<th>Mini Cam™</th>
<th>Long Travel Box</th>
<th>Standard Box</th>
<th>Max Power™ Box (MP)</th>
<th>Milfab®</th>
<th>NDM Die Mounts</th>
<th>NAC Aerial</th>
<th>NAAMS Standards</th>
<th>Long Reaching Die Mount</th>
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<td>Inch</td>
<td>X</td>
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<td></td>
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<tr>
<td>Short length</td>
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<td>Maximum slide travel</td>
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<td>Maximum stripping force</td>
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<td>Nitrogen Return</td>
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<td>Maximum piercing force</td>
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<td>X</td>
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<td>Designed to NAAMS Standards</td>
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<td>Special Cam Designs Available</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tr>
</tbody>
</table>

**Inch Design** — Cam is designed around the English or Inch measurement standard. Bolt and dowel holes are standard inch components.

**Metric Design** — Cam is designed around the Metric measurement standard. Bolt and dowel holes are standard metric components. (May require a metric callout when placing an order)

**Low Profile** — The overall height is minimized in a die design. The low profile cams are an excellent choice for short press stroke operations, where die space is limited.

**Narrow Width** — Reduces progression space used in a die design while allowing multiple standard cams to align side-by-side in a die.
# Cam Selection Matrix

## Short Length
The short length design is ideal for working at the edge of a die or on the inside of a large part working out. The length of the cam is minimized by an internal spring return.

## Maximum Slide Travel/Long Reaching
The slide travel increases by 30% or more over standard design cams. Cams are good in applications where there is a need to reach over large part flanges or stock material placement limits the proximity of the cam.

## Maximum Stripping Force
Return spring force is 10% of working force. May require Nitrogen Return option.

## Nitrogen Return
Gas springs are designed into the cam to provide higher stripping forces and even slide return. Cams with nitrogen gas springs will either come standard with a gas spring or may be an option to replace or use in combination with standard mechanical springs.

## Positive Return
A mechanical return designed into the cam to pull the slide and tooling out of the part. Ideal for applications piercing large holes or in sticky materials where there is a chance of die damage due to a stuck punch.

## Maximum Piercing Force
Large self lubricated surface areas on moving parts provides maximum piercing forces over long extended periods of cam operation.

## Designed to NAAMS Standards
Cams meet or exceed all of the NAAMS Global Standards for Aerial and Die Mount Cam design.

## Special Cam Designs
If a standard cam design doesn’t work for you, then give us your application specifications and we will design a special cam for you.
**Retainer Mounting Methods**

**STANDARD RETAINER**

The soft mounting face of the cam slide allows for the mounting of a standard light or heavy duty punch retainer.

**STANDARD RETAINER**

Oversized retainers work well if multiple punches are set in an even load pattern in relation to the center of the slide. Off-center loads will reduce the working tonnage rating of the cam.

**STANDARD RETAINER**

Multiple retainers easily fit our “double wide” #4L and #14L cams. Applications requiring off-center loading of the slide reduces the working tonnage rating of the cam.

**GANG MOUNTING RETAINERS ON (2) CAMS**

Using a bridge block fastened on the slide face of two of the same cams allows for mounting of multiple retainers. Precise timing of both cam slides ensures load sharing between the cams.
Mini Cam™
Technical Information

INCH DESIGN METRIC DESIGN NARROW WIDTH SHORT LENGTH

Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.

### Standard Metric Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Slide Diameter</th>
<th>Travel</th>
<th>Working Load</th>
<th>Spring Force</th>
<th>Maximum Tooling Weight</th>
<th>Approx. Cam Weight</th>
<th>Spring Catalog Number</th>
<th>Number of Springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>1.25</td>
<td>.75</td>
<td>2</td>
<td>140</td>
<td>2</td>
<td>8</td>
<td>9-1012-26</td>
<td>1</td>
</tr>
<tr>
<td>101MM</td>
<td>31.75</td>
<td>19.05</td>
<td>17.8</td>
<td>24.5</td>
<td>0.91</td>
<td>3.63</td>
<td></td>
<td></td>
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<tr>
<td>102</td>
<td>1.50</td>
<td>1.00</td>
<td>3</td>
<td>308</td>
<td>2</td>
<td>12</td>
<td>9-1214-26</td>
<td>1</td>
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<tr>
<td>102MM</td>
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<td>25.40</td>
<td>26.7</td>
<td>53.9</td>
<td>0.91</td>
<td>5.44</td>
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<td></td>
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</tbody>
</table>

Ball Lock Punches

Cam Unit Number
Body diameter of punch (375 = 3/8")

1 0 1 - B - 375

B = Ball Lock Retainer

Retainers for Ball Lock Punches

Ball-lock punches are widely used in the industry because the self-locking feature eliminates the need for keying the punch. The necessity for sharpening or the replacement of a broken punch during production is simplified.

Headed Punches

Cam Unit Number
Length of retainer (1250 = 1-1/4")

1 0 2 - H - 1250

H = Headed Punch Retainer

Retainers for Headed Punches

Retainers for headed punches come in three (3) different lengths for each Mini Cam™ unit. The shortest length retainer comes as a standard for each unit and will be suitable for most applications. However, some applications may require the use of a longer retainer. An example might be an application in which an exceptionally long punch is used, or when perforating a heavy material. A longer retainer allows for greater stability due to increased gripping range on the body of the punch.

Ask Customer Service for design templates on our website or CD.
Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Mini Cam™
102/102MM Slide Unit

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Standard Box Cam

EXTERNAL SPRING

<table>
<thead>
<tr>
<th>Standard Cam Models</th>
<th>Face Size X in/mm</th>
<th>Travel in/mm</th>
<th>Working Load tons/kN</th>
<th>Spring Force lbs/N</th>
<th>Maximum Tooling Weight lbs/kg</th>
<th>Approx. Cam Weight lbs/kg</th>
<th>Spring Catalog Number</th>
<th>Number of Springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2L 2LHM</td>
<td>1.875 Sq 48 Sq</td>
<td>.75</td>
<td>2.5</td>
<td>216</td>
<td>5</td>
<td>17</td>
<td>9-1614-21</td>
<td>1</td>
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<tr>
<td>3L 3LHM</td>
<td>2.5 Sq 63 Sq</td>
<td>1.625</td>
<td>4</td>
<td>444</td>
<td>8</td>
<td>42</td>
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<tr>
<td>4L 4LHM</td>
<td>2.75 x 4.75 70 x 121</td>
<td>1.625</td>
<td>8</td>
<td>888</td>
<td>12</td>
<td>78</td>
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<td>2</td>
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<tr>
<td>5L 5LHM</td>
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<td>2.5</td>
<td>7</td>
<td>652</td>
<td>10</td>
<td>93</td>
<td>9-2428-21</td>
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INTERNAL SPRING

<table>
<thead>
<tr>
<th>Standard Cam Models</th>
<th>Face Size X in/mm</th>
<th>Travel in/mm</th>
<th>Working Load tons/kN</th>
<th>Spring Force lbs/N</th>
<th>Maximum Tooling Weight lbs/kg</th>
<th>Approx. Cam Weight lbs/kg</th>
<th>Spring Catalog Number</th>
<th>Number of Springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>22L 22LHM</td>
<td>1.875 Sq 48 Sq</td>
<td>.75</td>
<td>2.5</td>
<td>258</td>
<td>5</td>
<td>15</td>
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<tr>
<td>23L 23LHM</td>
<td>2.50 Sq 63 Sq</td>
<td>1.625</td>
<td>4</td>
<td>415</td>
<td>8</td>
<td>41</td>
<td>9-2020-21</td>
<td>1</td>
</tr>
<tr>
<td>24MP</td>
<td>3.0 x 4.75 76 x 120</td>
<td>1.625</td>
<td>12</td>
<td>2,141</td>
<td>12</td>
<td>125</td>
<td>C.909.025*</td>
<td>2</td>
</tr>
<tr>
<td>24MP-XW</td>
<td>3.0 x 8.0 76 x 203</td>
<td>1.625</td>
<td>20</td>
<td>3,213</td>
<td>20</td>
<td>183</td>
<td>C.090.025*</td>
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</tr>
</tbody>
</table>

**NOTE:**
- The cam slide has .0005" – .001" (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. To request less clearance, add suffix to part number:
  - For 0.001" total clearance – CL001
  - For .0005" total clearance – CL0005

Calculated stroke, tonnage and wear curves are presented as a guideline for design and maintenance only. No warranty exists, either expressed or implied, as a result of the application, as it may relate to the information provided.

Ask Customer Service for design templates on our website or CD.
External Spring Box Cam

2L/2LHM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
External Spring Box Cam
3L/3LHM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
External Spring Box Cam (Double Wide)  
4L/4LHM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
External Spring Box Cam
5L/5LHM

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Ask Customer Service for design templates on our website or CD.
Internal Spring Box Cam
22L/22LMM

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Ask Customer Service for design templates on our website or CD.
Internal Spring Box Cam
23L/23LMM

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Ask Customer Service for design templates on our website or CD.
Maximum Power
Heavy Duty Cam™ (MP)

Product Features
The Maximum Power Cam™ is designed for tight spaces where length and height is limited. It’s a compact high power cam with a maximum working load for applications requiring pierced holes through thicker steel like automotive chassis frame rails. You will find the bronze wear plates with graphite inserts provide a premium wear surface for the slide to move along. The maximum stripping power is derived from a combination mechanical and nitrogen spring slide return design. The Maximum Power Cam™ is a cam with everything a large automotive type cam has except the large size.

NOTES:
1 Nitrogen and mechanical spring combination.
♦ Cam is designed in hard inch. Metric dimensions are for reference only.
♦ The cam slide has .0005" – .001" (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. To request less clearance, add suffix to part number:

  For 0.001" total clearance – CL001
  For .0005" total clearance – CL0005

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Ask Customer Service for design templates on our website or CD.
Maximum Power Heavy Duty Cam™ (MP)  
24MP

All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Maximum Power Heavy Duty Cam™ (MP)
24MP-XW

Ask Customer Service for design templates on our website or CD.

All dimensions are for reference only and no tolerance is stated or implied.
Long Travel Box Cam

### Standard Cam Models

<table>
<thead>
<tr>
<th>Models</th>
<th>Face Size X in/mm</th>
<th>Travel in/mm</th>
<th>Working Load tons/kN</th>
<th>Spring Force lbs/N</th>
<th>Maximum Tooling Weight lbs/kg</th>
<th>Approx. Cam Weight lbs/kg</th>
<th>Spring Catalog Number</th>
<th>Number of Springs</th>
</tr>
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<tbody>
<tr>
<td>11 L</td>
<td>1.875 Sq</td>
<td>2</td>
<td>5</td>
<td>199</td>
<td>4</td>
<td>29</td>
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<tr>
<td>11LMM</td>
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<td>51</td>
<td>44.5</td>
<td>885</td>
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<td>12L</td>
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<td>7</td>
<td>314</td>
<td>5</td>
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<td>64</td>
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<td>13L</td>
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<td>3.25</td>
<td>11</td>
<td>476</td>
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<td>100</td>
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<tr>
<td>13LMM</td>
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<td>97.9</td>
<td>2117</td>
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<td>14L</td>
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<td>952</td>
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<td>153</td>
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<tr>
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<td>3.25 Sq</td>
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<td>12</td>
<td>738</td>
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<td>140</td>
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<tr>
<td>15LMM</td>
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<td>83</td>
<td>106.8</td>
<td>3283</td>
<td>4.55</td>
<td>63.52</td>
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</tr>
</tbody>
</table>

### NOTE:
- The cam slide has .0005” – .001” (0.0127 – .0254mm) clearance between each side of the slide and body to allow for lubrication and heat dissipation. To request less clearance, add suffix to part number:
  - For 0.001” total clearance – CL001
  - For .0005” total clearance – CL0005

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Ask Customer Service for design templates on our website or CD.
Long Travel Box Cam

13L/13LMM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Long Travel Box Cam (Double Wide)

14L/14LMM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Long Travel Box Cam
15L/15LMM

Cam models are designed in both inch and metric. Listed dimensions may not convert directly into the other standard. All dimensions are for reference only and no tolerance is stated or implied.

Ask Customer Service for design templates on our website or CD.
Although IEM has a large offering of catalog cams, we realize that in today’s competitive environment, a catalog cam doesn’t always fit all applications.

Custom cams include:
- Cams engineered by IEM specifically for your application
- Cams machined to your design

CUSTOM CAM CAPABILITIES:

- **CAM DESIGN**
  - IEM’s engineering team designs for any application

- **CAM MANUFACTURING**
  - IEM can build your cam design
    - Machining – components up to 900mm
    - Flame hardening with minimal distortion

BENEFITS:

- Frees up your design resources
- Frees up your machine capacity
- Provides the best solution for your application
- Can improve your project scheduling
- Saves you money as compared to in-house costs
- Lets you focus on your core competencies