AERIAL & DIE MOUNT CAMS CATALOG
IEM is a leading manufacturer of die sets 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, NAAMS, JIS and many large automotive and appliance manufacturers’ standards. The complete product offering includes:

- Accu-Bend™ Rotary Benders
- Air Presses
- Cams
  - Aerial and Diemount Cams
  - Box Cams
  - Roller Cams
  - Wide Cams
- Die Accessories
- Die Sets
  - Plain and Ball Bearing Sets
  - Catalog Ball Bearing Sets
  - Wear Plate Sets
  - Cast Sets
- Ejector Boxes
- Guide Posts and Bushings
  - Plain and Ball Bearing Styles
  - Steel, Bronze, Bronze-Plated and Self-Lubricating Bushings
  - Lempcoloy® Bushings
  - Special Pins, Bushings and Retainers
- Hydraulics
  - Electronic Die Setters
  - Die Separators
  - Drill and 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 and Self-Lubricated Bushings
  - Leader Pins
  - Bronze and Bronze-Plated Wear Strips and Ways
- Punches, Buttons & Retainers
- Reliance Fabrications
  - Custom Fabrications
  - Robotic Welding
  - Aluminum and Steel Fixture Bases
- 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 and Disc Springs
- Wear Products
  - Plates, Strips, Gibs and Blocks
  - Steel, Bronze, Bronze-Plated and Self-Lubricating Materials
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</table>

**Nitrogen Return Option** – Using nitrogen springs to replace the standard mechanical springs will provide more slide return force for applications involving heavier tooling mounted on the slide face. Individual return forces can be found on the specifications table for each size cam.

**Positive Return** – Included are mechanical return straps designed into the cam to pull the slide and tooling out of the part in case of a tooling jam. Positive return straps are designed to provide a positive return but are not designed to provide continuous stripping force.

**Electronic Templates Available** – Each cam has Template or Model files online for easy download into your die designs. The slide, body and driver are broken into three components for die movement simulation. The formats available are 2D/3D DWG, IGES, STEP, Parasolid, Catia, and Solidworks.

**Special Cam Designs** – We know there are sometimes when a standard cam doesn’t fit into an application or is at the wrong angle. If you provide us with your application specifications, we will design and build a special cam for you.
Product Information

Product Features

Every NAAMS cam provides excellent performance and is designed with heavy-duty high volume production in mind.

- Self lubricating sliding surfaces provide maintenance free operation.
- Aluminum Bronze against steel wear surfaces is standard with an option of steel on steel wear surfaces.
- Slide accelerators are added to certain angles for quiet operation & reduced wear.
- Positive return(s) on the cam slide assures slide retraction and extra protection.
- Ease of setup with home position slide lockout capabilities.
- Rear spring access for ease of maintenance.
- Quick slide removal with top access keeper plate for all die mount cams.
Aerial Cam – 50 mm

2X Ø12 DOWELS
2X M12 MOUNTING SCREWS

TOP VIEW

WORK ANGLE

<table>
<thead>
<tr>
<th>WORK ANGLE</th>
<th>Z</th>
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<td>0 - 15°</td>
<td>147.5</td>
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<td>20 - 60°</td>
<td>127.5</td>
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</table>

SLIDE TRAVEL
30 mm

ADAPTER ANGLE

CAM MOTION

SIDE VIEW

TOOLING MOUNTING FACE

CUSTOMER SUPPLIED BACK KEY REF.

2X Ø12 DOWELS
2X M12 MOUNTING SCREWS

BOTTOM VIEW (Driver Only)

TOOLING BALL Ø12

Tooling ball located at “A” dimension per NAAMS.
“Y” dimension represents the tooling ball from the slide centerline.
Dowel holes undersized 0.2/0.3mm.
All dimensions are for reference only.
No tolerance is stated or implied.
### Aerial Cam – 50 mm

**NAAMS Standards Aerial Cam**

**Face Width**

**Working Angle**

**Suffix (Optional)**

- **N2** = Nitrogen Gas Spring (2000 psi)
- **AA85** = Obtain this number from Customer Service (for special angles)

### Numbering Example

**NAC050 - 25 X**

### Part Number | NAAMS Number | Work Angle | Adapt Angle | Work Travel (mm) | A (mm) | C (mm) | D (mm) | E (mm) | H (mm) | J (mm) | N (mm) | P (mm) | Y (mm)
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---

**NAC050-00** | C130500 | 0 | 50 | 19.3 | 120 | 155.5 | 150.5 | 241.9 | 160.0 | -12.0 | -16.9 | -9.5 | 1.1

**NAC050-05** | C130505 | 5 | 45 | 21.3 | 125 | 149.5 | 153.0 | 237.5 | 160.0 | -8.3 | -12.5 | -7.0 | 2.0

**NAC050-10** | C130510 | 10 | 40 | 23.3 | 130 | 145.0 | 160.1 | 231.0 | 160.0 | -4.1 | -6.0 | 0.1 | 4.4

**NAC050-15** | C130515 | 15 | 35 | 25.5 | 135 | 140.5 | 166.9 | 228.6 | 160.0 | -0.4 | -3.6 | 6.9 | 6.0

**NAC050-20** | C130520 | 20 | 30 | 27.7 | 140 | 134.5 | 151.9 | 220.3 | 140.0 | 5.1 | 4.7 | 11.9 | 7.4

**NAC050-25** | C130525 | 25 | 25 | 30.2 | 145 | 130.0 | 156.9 | 213.5 | 140.0 | 9.8 | 11.5 | 16.9 | 8.2

**NAC050-30** | C130530 | 30 | 20 | 32.9 | 150 | 125.5 | 163.1 | 205.6 | 140.0 | 14.1 | 19.4 | 23.1 | 7.7

**NAC050-35** | C130535 | 35 | 15 | 35.7 | 155 | 119.5 | 163.0 | 198.1 | 140.0 | 18.5 | 26.9 | 23.0 | 7.7

**NAC050-40** | C130540 | 40 | 10 | 38.9 | 160 | 115.0 | 167.0 | 188.0 | 140.0 | 22.1 | 37.0 | 27.0 | 6.7

**NAC050-45** | C130545 | 45 | 5 | 42.7 | 165 | 110.5 | 168.8 | 180.9 | 140.0 | 25.1 | 44.1 | 28.8 | 5.3

**NAC050-50** | C130550 | 50 | 0 | 47.1 | 170 | 106.0 | 171.0 | 174.5 | 140.0 | 27.7 | 50.5 | 31.0 | 4.0

**NAC050-55** | C130555 | 55 | 0 | 52.7 | 175 | 101.5 | 171.1 | 167.6 | 140.0 | 28.8 | 57.4 | 31.1 | 2.0

**NAC050-60** | C130560 | 60 | 0 | 60.4 | 180 | 98.5 | 174.3 | 162.8 | 140.0 | 28.1 | 62.2 | 34.3 | -0.3

### Max. Work Force | Slide Travel | Mechanical Spring Return Force | Nitrogen Spring Return Force | Maximum Tooling Weight | Maximum Tooling Envelope | Approx. Cam Unit Weight (Kg/Lbs)
--- | --- | --- | --- | --- | --- | ---

(KN/Tons) | (mm) | Final (Kg/Lbs) [One Spring] | Final (Kg/Lbs) [One Spring] | Weight (Kg/Lbs) | Weight (Kg/Lbs) | Protrusion (mm) | Tooling Overhang per side of Slide (mm)
--- | --- | --- | --- | --- | --- | --- | ---

134/15 | 30 | 153/338 | 94/208 | 8/18 | 16/35 | 125 | 20 | 21/45

---

1Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

2Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

---

**PRESS TRAVEL** = Work Travel × \( \frac{\sin (\text{Adapter Angle} + \text{Work Angle})}{\cos (\text{Adapter Angle})} \)

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

All dimensions are for reference only.

No tolerance is stated or implied.
Aerial CAM – 75 mm

**WORK ANGLE** | **Q** | **Z**
---|---|---
0° | 272 | 18.5
5° | 282 | 18.5
10° | 292 | 18.5
15° | 287 | 18.5
20° | 282 | 22.5
25° | 282 | 22.5
30° | 292 | 22.5
35° | 287 | 22.5
40° | 287 | 22.5
45° | 287 | 22.5
50° | 277 | 22.5
55° | 277 | 22.5
60° | 277 | 22.5

---

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.
### Aerial CAM – 75 mm

**NAAMS Standards Aerial Cam**
- Face Width
- Working Angle

**NUMBERING EXAMPLE**

```
N A C 0 7 5 - 2 5 x
```

**SUFFIX (Optional)**
- N2 = Nitrogen Gas Spring (2000 psi)
- AA85 = Obtain this number from Customer Service (for special angles)

---

#### PART NUMBERING

Aerial CAM

**Face Width**

### Working Angle

#### Air Spring Parameters

**Model:** NAC075-

**Suffix:** Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

#### Press Travel Formula

\[
\text{PRESS TRAVEL} = \text{Work Travel} \times \frac{\sin (\text{Adapter Angle} + \text{Work Angle})}{\cos (\text{Adapter Angle})}
\]

---

#### Press Travel Example

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

Picture not representative of all angles.

---

**Part Number**

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<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Adapt Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>P (mm)</th>
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#### Press Travel Example

1. Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

---

### Maximum Work Force

**Slide Travel**

**Mechanical Spring Return Force**

**Nitrogen Spring Return Force**

**Maximum Tooling Weight**

**Maximum Tooling Envelope**

**Approx. Cam Unit Weight**

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
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<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Weight (Kg/Lbs)</td>
<td>Weight (Kg/Lbs)</td>
<td>(Kg/Lbs)</td>
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<td>316/697</td>
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All dimensions are for reference only.
No tolerance is stated or implied.
Aerial Cam – 125 mm

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

Picture not representative of all angles.

Dowel holes undersized 0.2/0.3mm.

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Tooling ball is not supplied with the cam and is a reference point only.

No tolerance is stated or implied.
Aerial Cam – 125 mm

Part Number | NAAMS Number | Work Angle | Adapt Angle | Work Travel (mm) | A (mm) | C (mm) | D (mm) | E (mm) | G (mm) | J (mm) | N (mm) | P (mm) | Y (mm)
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
NAC125-00 | C131200 | 0 | 50 | 32.1 | 170 | 180.5 | 210.1 | 330.0 | 290 | -12.0 | -40.0 | 15.1 | 15.0
NAC125-05 | C131205 | 5 | 45 | 35.5 | 175 | 173.0 | 218.2 | 330.0 | 300 | -5.5 | -30.0 | 23.2 | 14.4
NAC125-10 | C131210 | 10 | 40 | 38.9 | 180 | 165.5 | 226.0 | 330.0 | 310 | 0.9 | -20.0 | 31.0 | 13.1
NAC125-15 | C131215 | 15 | 35 | 42.4 | 185 | 156.5 | 233.6 | 320.0 | 305 | 6.8 | -15.0 | 38.6 | 11.1
NAC125-20 | C131220 | 15 | 30 | 46.1 | 190 | 140.0 | 241.2 | 315.0 | 310 | 12.1 | -5.0 | 46.2 | 8.3
NAC125-25 | C131225 | 25 | 25 | 50.0 | 195 | 125.0 | 254.0 | 300.0 | 300 | 16.5 | 0.0 | 53.9 | 4.8
NAC125-30 | C131230 | 30 | 20 | 54.3 | 205 | 113.0 | 262.0 | 275.0 | 305 | 22.6 | 10.0 | 59.0 | 6.0
NAC125-35 | C131235 | 35 | 15 | 59.0 | 215 | 105.5 | 275.0 | 305 | 310 | 28.5 | 20.0 | 63.3 | 6.9
NAC125-40 | C131240 | 40 | 10 | 64.3 | 225 | 96.4 | 287.0 | 275.0 | 305 | 34.1 | 30.0 | 67.0 | 7.4
NAC125-45 | C131245 | 45 | 5 | 70.4 | 235 | 91.9 | 294.9 | 275.0 | 305 | 39.3 | 40.0 | 69.9 | 7.5
NAC125-50 | C131250 | 50 | 0 | 77.8 | 245 | 87.2 | 304.9 | 275.0 | 305 | 43.9 | 42.7 | 72.3 | 7.3
NAC125-55 | C131255 | 55 | 0 | 87.2 | 255 | 82.5 | 316.3 | 275.0 | 295 | 48.1 | 28.2 | 94.8 | 7.3
NAC125-60 | C131260 | 60 | 0 | 100.0 | 265 | 113.0 | 286.4 | 259.7 | 295 | 54.4 | 35.3 | 91.4 | -0.7

Max. Work Force | Slide Travel | Mechanical Spring Return Force | Nitrogen Spring Return Force | Maximum Tooling Weight | Maximum Tooling Envelope | Approx. Cam Unit Weight
--- | --- | --- | --- | --- | --- | ---
(KN/Tons) | (mm) | (Final (Kg/Lbs) [One Spring] | Final (Kg/Lbs) [One Spring] | Weight (Kg/Lbs) Mechanical Spring | Weight (Kg/Lbs) Nitrogen Spring | Protrusion (mm) | Tooling Overhang per side of Slide (mm) | (Kg/Lbs)
178/20 | 50 | 220/485 | 316/697 | 20/44 | 40/88 | 150 | 20 | 77/170

♦ Accelerator included (0° – 45°)

\[ \text{PRESS TRAVEL} = \text{Work Travel} \times \frac{\sin (\text{Adapter Angle} + \text{Work Angle})}{\cos (\text{Adapter Angle})} \]

Ask Customer Service for design templates on our website or CD. Picture not representative of all angles.

All dimensions are for reference only.
No tolerance is stated or implied.
Aerial Cam – 150 mm

Ask Customer Service for design templates on our website or CD. Picture not representative of all angles.
# Aerial Cam – 150 mm

**NUMBERING EXAMPLE**

- **Part Number**
- **NAAMS Number**
- **Work Angle**
- **Adapt Angle**
- **Work Travel** (mm)
- **A** (mm)
- **C** (mm)
- **D** (mm)
- **E** (mm)
- **G** (mm)
- **J** (mm)
- **N** (mm)
- **P** (mm)
- **Y** (mm)

<table>
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<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Adapt Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
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<th>Y (mm)</th>
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**Max. Work Force**

- **Max. Work Force (KN/Tons)**
- **Slide Travel (mm)**
- **Mechanical Spring Return Force** (Final [Kg/Lbs] [Two Springs])
- **Nitrogen Spring Return Force** (Final [Kg/Lbs] [Two Springs])
- **Maximum Tooling Weight**
- **Maximum Tooling Envelope**
- **Approx. Cam Unit Weight (Kg/Lbs)**

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<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
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<td>(mm)</td>
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<td>[Final (Kg/Lbs) [Two Springs]]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm) Tooling Overhang per side of Slide (mm)</td>
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<td>440/970</td>
<td>632/1394</td>
<td>20/44</td>
<td>40/88</td>
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---

**Notes:**

- **Accelerator included (0° – 45°)**
- **Press Travel** = Work Travel \( \times \frac{\sin (\text{Adapter Angle}) + \text{Work Angle}}{\cos (\text{Adapter Angle})} \)

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

Picture not representative of all angles.

All dimensions are for reference only.

No tolerance is stated or implied.
Aerial Cam – 175 mm

Ask Customer Service for design templates on our website or CD.
Picture not representative of all angles.

Tooling ball located at “A” dimension per NAAMS.
“Y” dimension represents the tooling ball from the slide centerline.
Dowel holes undersized 0.2/0.3mm.
All dimensions are for reference only.
No tolerance is stated or implied.
Aerial Cam – 175 mm

**NUMBERING EXAMPLE**

- **N A C 1 7 5 - 2 5 X**
- **NAAMS Standards Aerial Cam**
- **Face Width**
- **Working Angle**
- **SUFFIX (Optional)**
  - **N2 = Nitrogen Gas Spring (2000 psi)**
  - **AA85 = Obtain this number from Customer Service (for special angles)**

---

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<th>G (mm)</th>
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- **Max. Work Force**
- **Slide Travel**
- **Mechanical Spring Return Force**
- **Nitrogen Spring Return Force**
- **Maximum Tooling Weight**
- **Maximum Tooling Envelope**
- **Approx. Cam Unit Weight**

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
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<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>[Final (Kg/Lbs) [Two Springs]]</td>
<td>[Final (Kg/Lbs) [Two Springs]]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm) Tooling Overhang per side of Slide (mm)</td>
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<tr>
<td>267/30 50</td>
<td>440/970</td>
<td>632/1394</td>
<td>32/71</td>
<td>175</td>
<td>30</td>
<td>105/230</td>
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</table>

1Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

2Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

♦ Accelerator included (0° – 45°)

PRESS TRAVEL = Work Travel x \(\frac{\sin(\text{Adapter Angle} + \text{Work Angle})}{\cos(\text{Adapter Angle})}\)

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Picture not representative of all angles.

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.
# Aerial Cam – 200 mm

### NAAMS Standards Aerial Cam
- Face Width
- Working Angle

**NUMBERING EXAMPLE**

```
N A C 2 0 0 - 2 5 X
```

**SUFFIX (Optional)**
- N2 = Nitrogen Gas Spring (2000 psi)
- AA85 = Obtain this number from Customer Service (for special angles)

### Part Numbering Example

- Accelerator included (0° – 45°)

### Table: Aerial Cam – 200 mm

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<th>NAAMS Number</th>
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<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>J (mm)</th>
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### Max. Work Force

<table>
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<tr>
<th>Max. Work Force (KN/Tons)</th>
<th>Slide Travel (mm)</th>
<th>Mechanical Spring Return Force [Final (Kg/Lbs) [Three Springs]]</th>
<th>Nitrogen Spring Return Force [Final (Kg/Lbs) [Two Springs]]</th>
<th># Optional Nitrogen Cylinder Pockets</th>
<th>Return Force per Nitrogen Spring (Kg/Lbs)</th>
<th>Maximum Tooling Weight (Kg/Lbs)</th>
<th>Maximum Tooling Envelope (mm)</th>
<th>Approx. Cam Unit Weight (Kg/Lbs)</th>
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</table>

1. Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Three spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional spring for more return force.
3. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

> ♦ Accelerator included (0° – 45°)

**PRESS TRAVEL** = Work Travel \( \times \frac{\sin(\text{Adapter Angle} + \text{Work Angle})}{\cos(\text{Adapter Angle})} \)

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## Aerial Cam – 250 mm

**NUMBERING EXAMPLE**

<table>
<thead>
<tr>
<th>NAAMS Standards Aerial Cam</th>
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<tr>
<td>Face Width</td>
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<tr>
<td>Working Angle</td>
</tr>
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</table>

**SUFFIX (Optional)**

- N2 = Nitrogen Gas Spring (2000 psi)
- AA85 = Obtain this number from Customer Service (for special angles)

### Table 1: Part Numbering Information

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<th>Adapter Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
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<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
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<th>M (mm)</th>
<th>N (mm)</th>
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### Table 2: Performance and Tooling Information

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<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th># Optional Cylinder Pockets</th>
<th>Return Force per Nitrogen Spring</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
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</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [Three Springs]</td>
<td>Final (Kg/Lbs) [Two Springs]</td>
<td>Final (Kg/Lbs)</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>protrusion (mm)</td>
<td>Tooling Overhang per side of Slide (mm)</td>
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<td>320/705</td>
<td>65/143</td>
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</table>

1 Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

2 Three spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional spring for more return force.

3 Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

♦ Accelerator included (0° – 45°)

\[
\text{PRESS TRAVEL} = \text{Work Travel} \times \frac{\sin (\text{Adapter Angle} + \text{Work Angle})}{\cos (\text{Adapter Angle})}
\]

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Aerial Cam – 300 mm

**TOP VIEW**

**SIDE VIEW**

**BOTTOM VIEW** (Driver Only)

**WORK ANGLE**

<table>
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<th>WORK ANGLE</th>
<th>Q</th>
<th>T</th>
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<tr>
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</table>

*Tooling ball is not supplied with the cam and is a reference point only.*

*Tooling ball located at “A” dimension per NAAMS.*

*“Y” dimension represents the tooling ball from the slide centerline.*

*Dowel holes undersized 0.2/0.3mm.*

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# Aerial Cam – 300 mm

## NAAMS Standards Aerial Cam

### Face Width

<table>
<thead>
<tr>
<th>Work Angle (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>M (mm)</th>
<th>N (mm)</th>
<th>P (mm)</th>
<th>Y (mm)</th>
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<tbody>
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<td>242.0</td>
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<td>345</td>
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## Numbering Example

**NAC300-25**

### SUFFIX (Optional)

- **N2** = Nitrogen Gas Spring (2000 psi)
- **AA85** = Obtain this number from Customer Service (for special angles)

## Accelerator included (0° – 45°)

### PRESS TRAVEL

\[
\text{PRESS TRAVEL} = \text{Work Travel} \times \frac{\sin \left( \text{Adapter Angle} + \text{Work Angle} \right)}{\cos \left( \text{Adapter Angle} \right)}
\]

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

All dimensions are for reference only.
No tolerance is stated or implied.
Die Mount Cam – 50 mm

TOP VIEW (Driver only)

CUSTOMER SUPPLIED BACK KEY REF.

WORK ANGLE

<table>
<thead>
<tr>
<th>WORK ANGLE</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>150</td>
</tr>
<tr>
<td>5°</td>
<td>160</td>
</tr>
<tr>
<td>10°</td>
<td>165</td>
</tr>
<tr>
<td>15°</td>
<td>170</td>
</tr>
<tr>
<td>20°</td>
<td>170</td>
</tr>
</tbody>
</table>

BOTTOM VIEW (Body only)

TOOLING FACE

TOOLING MOUNTING FACE

SIDE VIEW

Tooling ball located at “A” dimension per NAAMS. “Y” dimension represents the tooling ball from the slide centerline. Dowel holes undersized 0.2/0.3mm. All dimensions are for reference only. No tolerance is stated or implied.

NAAMS TOOLING BALL

Tooling ball is not supplied with the cam and is a reference point only.

Ask Customer Service for design templates on our website or CD.
Picture not representative of all angles.
### Die Mount Cam – 50 mm

**NUMBERING EXAMPLE**

- **NDM** = Nitrogen Gas Spring (2000 psi)
- **AA85** = Obtain this number from Customer Service (for special angles)

**NAAMS Standards Die Mount Cam**
- Face Width
- Working Angle

**Suffix (Optional)**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM050-00</td>
<td>C230500</td>
<td>0</td>
<td>45</td>
<td>160</td>
<td>170.0</td>
<td>242.0</td>
<td>292.0</td>
<td>330</td>
<td>165</td>
<td>-12</td>
<td>38.0</td>
<td>0.0</td>
</tr>
<tr>
<td>NDM050-05</td>
<td>C230505</td>
<td>5</td>
<td>45</td>
<td>150</td>
<td>180.0</td>
<td>247.5</td>
<td>300.0</td>
<td>330</td>
<td>175</td>
<td>-8.7</td>
<td>30.0</td>
<td>0.0</td>
</tr>
<tr>
<td>NDM050-10</td>
<td>C230510</td>
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<td>45</td>
<td>140</td>
<td>190.0</td>
<td>248.0</td>
<td>308.0</td>
<td>330</td>
<td>180</td>
<td>-5.3</td>
<td>22.0</td>
<td>0.0</td>
</tr>
<tr>
<td>NDM050-15</td>
<td>C230515</td>
<td>15</td>
<td>45</td>
<td>135</td>
<td>200.0</td>
<td>250.8</td>
<td>325.3</td>
<td>330</td>
<td>185</td>
<td>-1.9</td>
<td>4.7</td>
<td>0.0</td>
</tr>
<tr>
<td>NDM050-20</td>
<td>C230520</td>
<td>20</td>
<td>45</td>
<td>130</td>
<td>210.0</td>
<td>247.8</td>
<td>325.3</td>
<td>330</td>
<td>185</td>
<td>-1.6</td>
<td>4.7</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Max. Work Force**

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>(Kg/Lbs) Protrusion (mm) Tooling Overhang per side of Slide (mm)</td>
</tr>
<tr>
<td>134/15</td>
<td>45</td>
<td>58/128</td>
<td>94/208</td>
<td>8/18</td>
<td>16/35</td>
<td>125</td>
</tr>
</tbody>
</table>

1 Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

2 Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

Ask Customer Service for design templates on our website or CD.
Picture not representative of all angles.

All dimensions are for reference only.
No tolerance is stated or implied.
Die Mount Cam – 75 mm

**TOP VIEW** (Driver Only)

CUSTOMER SUPPLIED BACK KEY REF.

275

115

WORK TRAVEL

TOOLING MOUNTING FACE

SIDE VIEW

12

4X M12 MOUNTING SCREWS

2X Ø12 DOWELS

**BOTTOM VIEW** (Body Only)

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.

**WORK ANGLE**

<table>
<thead>
<tr>
<th>WORK ANGLE</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>167</td>
</tr>
<tr>
<td>5°</td>
<td>172</td>
</tr>
<tr>
<td>10°</td>
<td>182</td>
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<tr>
<td>15°</td>
<td>182</td>
</tr>
<tr>
<td>20°</td>
<td>182</td>
</tr>
</tbody>
</table>

Tooling ball is not supplied with the cam and is a reference point only.

Ask Customer Service for design templates on our website or CD. Picture not representative of all angles.
## Die Mount Cam – 75 mm

### NAAMS Standards Die Mount Cam
- **Face Width**
- **Working Angle**

### NUMBERING EXAMPLE

```
NDM075-00
```

**SUFFIX (Optional)**
- **N2** = Nitrogen Gas Spring (2000 psi)
- **AA85** = Obtain this number from Customer Service (for special angles)

### Part Numbering Example

- **NDM075-00**
- **NDM075-05**
- **NDM075-10**
- **NDM075-15**
- **NDM075-20**

### Table

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle (mm)</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM075-00</td>
<td>C230700</td>
<td>0</td>
<td>60</td>
<td>200</td>
<td>170</td>
<td>296</td>
<td>340</td>
<td>380</td>
<td>185</td>
<td>-12</td>
<td>40</td>
<td>-6</td>
</tr>
<tr>
<td>NDM075-05</td>
<td>C230705</td>
<td>5</td>
<td>60</td>
<td>190</td>
<td>180</td>
<td>300.3</td>
<td>352</td>
<td>380</td>
<td>190</td>
<td>-8.6</td>
<td>28</td>
<td>-6.3</td>
</tr>
<tr>
<td>NDM075-10</td>
<td>C230710</td>
<td>10</td>
<td>60</td>
<td>175</td>
<td>190</td>
<td>304.9</td>
<td>362.9</td>
<td>380</td>
<td>200</td>
<td>-4.5</td>
<td>17.1</td>
<td>-2.6</td>
</tr>
<tr>
<td>NDM075-15</td>
<td>C230715</td>
<td>15</td>
<td>60</td>
<td>165</td>
<td>200</td>
<td>308.3</td>
<td>364.1</td>
<td>380</td>
<td>200</td>
<td>-1.2</td>
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<tr>
<td>NDM075-20</td>
<td>C230720</td>
<td>20</td>
<td>60</td>
<td>155</td>
<td>210</td>
<td>308.5</td>
<td>373.6</td>
<td>380</td>
<td>200</td>
<td>3.1</td>
<td>6.4</td>
<td>-3.1</td>
</tr>
</tbody>
</table>

### Max. Work Force

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force 1</th>
<th>Nitrogen Spring Return Force 1</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope 2</th>
<th>Approx. Cam Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm) Tooling Overhang per side of Slide (mm) (Kg/Lbs)</td>
</tr>
<tr>
<td>134/15</td>
<td>60</td>
<td>229/505</td>
<td>340/748</td>
<td>12/26</td>
<td>24/535</td>
<td>140 25 53/115</td>
</tr>
</tbody>
</table>

1Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

2Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.
Die Mount Cam – 150 mm

Ask Customer Service for design templates on our website or CD. Picture not representative of all angles.

CUSTOMER SUPPLIED BACK KEY REF.

TOP VIEW (Driver Only)

WORK TRAVEL

4X M16 MOUNTING SCREWS

2X Ø16 DOWELS

BOTTOM VIEW (Body Only)

4X M16 MOUNTING SCREWS

2X Ø16 DOWELS

TOOLING MOUNTING FACE

NAAMS TOOLING BALL

Tooling ball located at "A" dimension per NAAMS. "Y" dimension represents the tooling ball from the slide centerline. Dowel holes undersized 0.2/0.3mm. All dimensions are for reference only. No tolerance is stated or implied.
### Die Mount Cam – 150 mm

**NAAMS Standards Die Mount Cam**
- Face Width
- Working Angle

**NUMBERING EXAMPLE**
- **NDM150-00 C231500 0 60 200 170.0 350.0 390 195 -12 40.0 -1.0**
- **NDM150-05 C231505 5 60 190 180.0 301.2 362.9 390 195 -6.8 27.1 -1.4**
- **NDM150-10 C231510 10 60 175 190.0 306.7 374.7 390 200 -1 15.3 2.2**
- **NDM150-15 C231515 15 60 165 200.0 311.0 376.8 390 210 3.9 13.2 -0.3**
- **NDM150-20 C231520 20 60 155 210.0 312.2 387.2 390 225 9.7 2.8 1.3**

**Max. Work Force**
- **KN/Tons** (mm) **Slide Travel**
- **Mechanical Spring Return Force**
- **Nitrogen Spring Return Force**
- **Maximum Tooling Weight**
- **Maximum Tooling Envelope**
- **Approx. Cam Unit Weight**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM150-00</td>
<td>C231500</td>
<td>0</td>
<td>60</td>
<td>200</td>
<td>170.0</td>
<td>296.0</td>
<td>350.0</td>
<td>390</td>
<td>195</td>
<td>-12</td>
<td>40.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>NDM150-05</td>
<td>C231505</td>
<td>5</td>
<td>60</td>
<td>190</td>
<td>180.0</td>
<td>301.2</td>
<td>362.9</td>
<td>390</td>
<td>195</td>
<td>-6.8</td>
<td>27.1</td>
<td>-1.4</td>
</tr>
<tr>
<td>NDM150-10</td>
<td>C231510</td>
<td>10</td>
<td>60</td>
<td>175</td>
<td>190.0</td>
<td>306.7</td>
<td>374.7</td>
<td>390</td>
<td>200</td>
<td>-1</td>
<td>15.3</td>
<td>2.2</td>
</tr>
<tr>
<td>NDM150-15</td>
<td>C231515</td>
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<td>60</td>
<td>165</td>
<td>200.0</td>
<td>311.0</td>
<td>376.8</td>
<td>390</td>
<td>210</td>
<td>3.9</td>
<td>13.2</td>
<td>-0.3</td>
</tr>
<tr>
<td>NDM150-20</td>
<td>C231520</td>
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<td>60</td>
<td>155</td>
<td>210.0</td>
<td>312.2</td>
<td>387.2</td>
<td>390</td>
<td>225</td>
<td>9.7</td>
<td>2.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

1Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

♦ Accelerator included (0° – 20°)

Ask Customer Service for design templates on our website or CD.
Picture not representative of all angles.
Die Mount Cam – 200 mm

TOP VIEW (Driver Only)

CUSTOMER SUPPLIED BACK KEY REF.

WORK ANGLE

Dowel holes undersized 0.2/0.3mm.

Tooling ball is not supplied with the cam and is a reference point only.

BOTTOM VIEW (Body Only)

TOOLING MOUNTING FACE

SIDE VIEW

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.
### Die Mount Cam – 200 mm

#### NAAMS Standards Die Mount Cam
- Face Width
- Working Angle

#### NUMBERING EXAMPLE

- **NDM 200 - 20 X**
- **SUFFIX** (Optional)
  - N2 = Nitrogen Gas Spring (2000 psi)
  - AA85 = Obtain this number from Customer Service (for special angles)

### Part Numbering Example

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM200-00</td>
<td>C232000</td>
<td>0</td>
<td>60</td>
<td>200</td>
<td>170.0</td>
<td>296.0</td>
<td>350.0</td>
<td>390</td>
<td>195</td>
<td>-12</td>
<td>40.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>NDM200-05</td>
<td>C232005</td>
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<td>60</td>
<td>190</td>
<td>180.0</td>
<td>301.2</td>
<td>362.9</td>
<td>390</td>
<td>195</td>
<td>-6.8</td>
<td>27.1</td>
<td>-1.4</td>
</tr>
<tr>
<td>NDM200-10</td>
<td>C232010</td>
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<td>60</td>
<td>175</td>
<td>190.0</td>
<td>306.7</td>
<td>374.7</td>
<td>390</td>
<td>200</td>
<td>-1</td>
<td>15.3</td>
<td>2.2</td>
</tr>
<tr>
<td>NDM200-15</td>
<td>C232015</td>
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<td>60</td>
<td>165</td>
<td>200.1</td>
<td>311.0</td>
<td>376.8</td>
<td>390</td>
<td>210</td>
<td>3.9</td>
<td>13.2</td>
<td>-0.3</td>
</tr>
<tr>
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<td>C232020</td>
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<td>60</td>
<td>155</td>
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<td>312.2</td>
<td>387.2</td>
<td>390</td>
<td>225</td>
<td>9.7</td>
<td>2.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

### Technical Specifications

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring</th>
<th>Nitrogen Spring</th>
<th>Return Force per Nitrogen Spring</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final Force [Three Springs]</td>
<td>Final Force [Two Springs]</td>
<td>Final (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm) To Tooling Overhang per side of Slide (mm) (Kg/Lbs)</td>
</tr>
<tr>
<td>312/35</td>
<td>60</td>
<td>687/1515</td>
<td>680/1496</td>
<td>1</td>
<td>340/748</td>
<td>64/141</td>
<td>175 45 141/310</td>
</tr>
</tbody>
</table>

1. Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Three spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional spring for more return force.
3. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

- Accelerator included (0° – 20°)

---

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Picture not representative of all angles.

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Ask Customer Service for design templates on our website or CD.
Picture not representative of all angles.

Die Mount Cam – 250 mm

**TOP VIEW (Driver Only)**

CUSTOMER SUPPLIED BACK KEY REF.

**BOTTOM VIEW (Body Only)**

2X Ø20 DOWELS

4X M20 MOUNTING SCREWS

**SIDE VIEW**

TOOLING MOUNTING FACE

**WORK ANGLE**

<table>
<thead>
<tr>
<th>WORK ANGLE</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>350</td>
</tr>
<tr>
<td>5°</td>
<td>375</td>
</tr>
<tr>
<td>10°</td>
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<td>15°</td>
<td>375</td>
</tr>
<tr>
<td>20°</td>
<td>375</td>
</tr>
</tbody>
</table>

Tooling ball located at “A” dimension per NAAMS.

“Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.
### Die Mount Cam – 250 mm

**NAAMS Standards Die Mount Cam**
- **Face Width**
- **Working Angle**

**NUMBERING EXAMPLE**

```
N D M 2 5 0 - 2 0 X
```

**SUFFIX (Optional)**
- **N2** = Nitrogen Gas Spring (2000 psi)
- **AA85** = Obtain this number from Customer Service (for special angles)

#### Part Number NAAMS Number Work Angle Work Travel (mm) A (mm) C (mm) D (mm) E (mm) G (mm) H (mm) J (mm) N (mm) Y (mm)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM250-00</td>
<td>C232500</td>
<td>0</td>
<td>60</td>
<td>260</td>
<td>170.0</td>
<td>359.2</td>
<td>372.0</td>
<td>375</td>
<td>240</td>
<td>-12</td>
<td>3.0</td>
<td>-3.4</td>
</tr>
<tr>
<td>NDM250-05</td>
<td>C232505</td>
<td>5</td>
<td>60</td>
<td>235</td>
<td>180.0</td>
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<td>383.3</td>
<td>400</td>
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<td>60</td>
<td>225</td>
<td>190.0</td>
<td>344.6</td>
<td>390.6</td>
<td>400</td>
<td>240</td>
<td>1.8</td>
<td>9.4</td>
<td>-6.6</td>
</tr>
<tr>
<td>NDM250-15</td>
<td>C232515</td>
<td>15</td>
<td>60</td>
<td>210</td>
<td>200.0</td>
<td>336.5</td>
<td>396.0</td>
<td>400</td>
<td>240</td>
<td>7.9</td>
<td>4.0</td>
<td>-9.5</td>
</tr>
<tr>
<td>NDM250-20</td>
<td>C232520</td>
<td>20</td>
<td>60</td>
<td>195</td>
<td>210.0</td>
<td>327.6</td>
<td>410.3</td>
<td>400</td>
<td>240</td>
<td>13.9</td>
<td>-10.3</td>
<td>-11.5</td>
</tr>
</tbody>
</table>

#### Max. Work Force Slide Travel Mechanical Spring Return Force Nitrogen Spring Return Force¹ Optional Nitrogen Cylinder Pockets² Return Force per Nitrogen Spring Maximum Tooling Weight Maximum Tooling Envelope³ Approx. Cam Unit Weight

<table>
<thead>
<tr>
<th>(KN/Tons)</th>
<th>(mm)</th>
<th>Final (Kg/Lbs) [Three Springs]</th>
<th>Final (Kg/Lbs) [Two Springs]</th>
<th>Final (Kg/Lbs)</th>
<th>Weight (Kg/Lbs) Mechanical Spring</th>
<th>Weight (Kg/Lbs) Nitrogen Spring</th>
<th>Protrusion (mm)</th>
<th>Tooling Overhang per side of Slide (mm)</th>
<th>(Kg/Lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>356/40</td>
<td>60</td>
<td>687/1515</td>
<td>640/1410</td>
<td>1</td>
<td>320/705</td>
<td>65/143</td>
<td>130/287</td>
<td>200</td>
<td>40</td>
</tr>
</tbody>
</table>

¹Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

²Three spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional spring for more return force.

³Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

♦ Accelerator included (0° – 20°)
Die Mount Cam – 300 mm

Ask Customer Service for design templates on our website or CD. Picture not representative of all angles.

CUSTOMER SUPPLIED BACK KEY REF.

WORK ANGLE

Dowel holes undersized 0.2/0.3mm.

Tooling ball is not supplied with the cam and is a reference point only.

Tooling ball located at “A” dimension per NAAMS. “Y” dimension represents the tooling ball from the slide centerline.

Dowel holes undersized 0.2/0.3mm.

All dimensions are for reference only.

No tolerance is stated or implied.
# Die Mount Cam – 300 mm

### NAAMS Standards Die Mount Cam
- **Face Width**
- **Working Angle**

### Numbering Example
- **NDM300-00**
- **NDM300-05**
- **NDM300-10**
- **NDM300-15**
- **NDM300-20**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>NAAMS Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>H (mm)</th>
<th>J (mm)</th>
<th>N (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDM300-00</td>
<td>C233000</td>
<td>0</td>
<td>60</td>
<td>260</td>
<td>170.0</td>
<td>359.2</td>
<td>372.0</td>
<td>375</td>
<td>240</td>
<td>-12</td>
<td>3.0</td>
</tr>
<tr>
<td>NDM300-05</td>
<td>C233005</td>
<td>5</td>
<td>60</td>
<td>235</td>
<td>180.0</td>
<td>351.6</td>
<td>383.3</td>
<td>400</td>
<td>240</td>
<td>-4.4</td>
<td>16.7</td>
</tr>
<tr>
<td>NDM300-10</td>
<td>C233010</td>
<td>10</td>
<td>60</td>
<td>225</td>
<td>190.0</td>
<td>344.6</td>
<td>390.6</td>
<td>400</td>
<td>240</td>
<td>1.8</td>
<td>9.4</td>
</tr>
<tr>
<td>NDM300-15</td>
<td>C233015</td>
<td>15</td>
<td>60</td>
<td>210</td>
<td>200.0</td>
<td>336.5</td>
<td>396.0</td>
<td>400</td>
<td>240</td>
<td>7.9</td>
<td>4.0</td>
</tr>
<tr>
<td>NDM300-20</td>
<td>C233020</td>
<td>20</td>
<td>60</td>
<td>195</td>
<td>210.0</td>
<td>327.6</td>
<td>410.3</td>
<td>400</td>
<td>240</td>
<td>13.9</td>
<td>-10.3</td>
</tr>
</tbody>
</table>

### Max. Work Force

<table>
<thead>
<tr>
<th>Max. Work Force (KN/Tons)</th>
<th>Slide Travel (mm)</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force&lt;sup&gt;1&lt;/sup&gt;</th>
<th># Optional Nitrogen Cylinder Pockets&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Return Force per Nitrogen Spring (Kg/Lbs)</th>
<th>Maximum Tooling Weight (Kg/Lbs)</th>
<th>Maximum Tooling Envelope&lt;sup&gt;3&lt;/sup&gt; (mm)</th>
<th>Tooling Overhang per side of Slide (mm)</th>
<th>Approx. Cam Unit Weight (Kg/Lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>444/50</td>
<td>60</td>
<td>916/2020</td>
<td>640/1410</td>
<td>2</td>
<td>320/705</td>
<td>65/143</td>
<td>130/287</td>
<td>200</td>
<td>50</td>
</tr>
</tbody>
</table>

<sup>1</sup>Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.

<sup>2</sup>Four spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional one or two springs for more return force.

<sup>3</sup>Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

- Accelerator included (0° – 20°)

---

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Picture not representative of all angles.

All dimensions are for reference only.

No tolerance is stated or implied.
Long Reaching (Extra Travel) Die Mount Cams

When to use a LRD Cam

The Long Reaching (Extra Travel) Die Mount Cam line is designed to provide maximum clearance for material movement while optimizing the preferred kinematics associated with standard Die Mount Cams. The Long Reaching (Extra Travel) Die Mount Cam provides a sound alternative to the use of low angle aerial cams in transfer press operations and is part of our next generation of automotive and large die cams.

Designers will find the height and length of the 110mm travel Long Reaching (Extra Travel) Cam to be a perfect package providing 30% more slide travel than competitive cams. Take a look at the performance features and you will find it’s easy to see why the Long Reaching Cam line will make everyone’s job easier.

- 110mm slide travel allows unencumbered travel over part flanges
- Quick slide removal with top access keeper plate
- Side wear strip on slide for extra lubrication and ease of maintenance
- Reduce noise and wear with the optional accelerator (150 & 200 wide cams)
- Long lasting Aluminum Bronze Wear Plates against hardened steel surfaces
- Maintenance-free, self-lubricating components
- Optional, longer slide adds 35mm to reach
- Urethane bumper to cushion return
- ISO nitrogen cylinder with no pre-load
- Double protection with positive returns
- Ease of setup with slide lockout capability
- Rear spring access for ease of maintenance
Long Reaching (Extra Travel)
Die Mount Cam – 75 mm

TOP VIEW

WORK TRAVEL

35.0 TYP.

L-SLIDE (OPTIONAL)

BOTTOM VIEW (Body Only)

Dowel holes are press fit.
All dimensions are for reference only.
No tolerance is stated or implied.
### Long Reaching (Extra Travel) Die Mount Cam – 75 mm

**NUMBERING EXAMPLE**

- **LRD075-00**: 0, 110, 90, 270, 320, 65, 81, 25
- **LRD075-05**: 5, 110, 90, 270, 320, 65, 81, 25
- **LRD075-10**: 10, 110, 90, 270, 320, 65, 81, 25
- **LRD075-15**: 15, 110, 30, 210, 260, 125, 141, 30
- **LRD075-20**: 20, 110, 30, 210, 260, 125, 141, 30

---

**Max. Work Force**

<table>
<thead>
<tr>
<th>Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Final (Kg/Lbs) [One Spring]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm)</td>
</tr>
<tr>
<td>134/15</td>
<td>110</td>
<td>N/A</td>
<td>340/748</td>
<td>N/A</td>
<td>8/18</td>
<td>140</td>
</tr>
</tbody>
</table>

---

1. Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.
Long Reaching (Extra Travel)
Die Mount Cam – 150 mm

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Picture not representative of all angles.

Dowel holes are press fit.
All dimensions are for reference only.
No tolerance is stated or implied.
### Long Reaching (Extra Travel) Die Mount Cam – 150 mm

#### Numbering Example

![Diagram of the numbering example](image)

- **LRD**: Long Reaching (Extra Travel) Die Mount CAM
- **Face Width**
- **Working Angle**

**Suffix (Optional)**

- **A**: Accelerator
- **L**: Long Slide (35mm longer)

#### Part Numbering

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Work Angle</th>
<th>Work Travel (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRD150-00</td>
<td>0</td>
<td>110</td>
<td>90</td>
<td>270</td>
<td>320</td>
<td>65</td>
<td>81</td>
<td>25</td>
</tr>
<tr>
<td>LRD150-05</td>
<td>5</td>
<td>110</td>
<td>90</td>
<td>270</td>
<td>320</td>
<td>65</td>
<td>81</td>
<td>25</td>
</tr>
<tr>
<td>LRD150-10</td>
<td>10</td>
<td>110</td>
<td>30</td>
<td>210</td>
<td>260</td>
<td>125</td>
<td>141</td>
<td>30</td>
</tr>
<tr>
<td>LRD150-15</td>
<td>15</td>
<td>110</td>
<td>30</td>
<td>210</td>
<td>260</td>
<td>125</td>
<td>141</td>
<td>30</td>
</tr>
<tr>
<td>LRD150-20</td>
<td>20</td>
<td>110</td>
<td>30</td>
<td>210</td>
<td>260</td>
<td>125</td>
<td>141</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Max. Work Force, Slide Travel, Mechanical Spring Return Force, Nitrogen Spring Return Force, Maximum Tooling Weight, Maximum Tooling Envelope, Approx. Cam Unit Weight

<table>
<thead>
<tr>
<th>Max. Work Force</th>
<th>Slide Travel</th>
<th>Mechanical Spring Return Force</th>
<th>Nitrogen Spring Return Force</th>
<th>Maximum Tooling Weight</th>
<th>Maximum Tooling Envelope</th>
<th>Approx. Cam Unit Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons)</td>
<td>(mm)</td>
<td>Final (Kg/Lbs) [Two Springs]</td>
<td>Final (Kg/Lbs) [Two Springs]</td>
<td>Weight (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm)</td>
</tr>
<tr>
<td>223/25</td>
<td>110</td>
<td>N/A</td>
<td>680/1498</td>
<td>N/A</td>
<td>12/26</td>
<td>150</td>
</tr>
</tbody>
</table>

---

1. Optional nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.

---

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Ask Customer Service for design templates on our website or CD. 
Picture not representative of all angles.

Long Reaching (Extra Travel)
Die Mount Cam – 200 mm

Dowel holes are press fit.
All dimensions are for reference only.
No tolerance is stated or implied.
### Long Reaching (Extra Travel) Die Mount Cam – 200 mm

**NUMBERING EXAMPLE**

- **Part Work Work Number Angle Travel A B C D E F**
- **LRD200-00 0 110 90 270 320 65 81 25**
- **LRD200-05 5 110 90 270 320 65 81 25**
- **LRD200-10 10 110 90 270 320 65 81 25**
- **LRD200-15 15 110 30 210 260 125 141 30**
- **LRD200-20 20 110 30 210 260 125 141 30**

**Max. Work Force** | **Slide Travel** | **Mechanical Spring Return Force** | **Nitrogen Spring Return Force** | **# Optional Nitrogen Cylinder Pockets** | **Return Force per Nitrogen Spring** | **Maximum Tooling Weight** | **Maximum Tooling Envelope** | **Approx. Cam Unit Weight** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(KN/Tons) (mm)</td>
<td></td>
<td>Final (Kg/Lbs) [Three Springs]</td>
<td>Final (Kg/Lbs) [Two Springs]</td>
<td></td>
<td>Final (Kg/Lbs) Mechanical Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Weight (Kg/Lbs) Nitrogen Spring</td>
<td>Protrusion (mm)</td>
</tr>
<tr>
<td>312/35 110</td>
<td>N/A 680/1498</td>
<td>1 340/749</td>
<td>N/A</td>
<td>20/44</td>
<td>175</td>
<td>45</td>
<td>231/510</td>
<td></td>
</tr>
</tbody>
</table>

---

1. Nitrogen cylinders do not have a pre-load. Listed nitrogen ratings are at the end of their stroke.
2. Three spring pockets built into the cam, two nitrogen springs supplied with nitrogen spring configuration. Spring return calculated based on the standard spring quantity. Customer can add an additional spring for more return force.
3. Exceeding the maximum tooling envelope will reduce cam performance and shorten the life of the cam.
Calculation of Load and Stroke

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Theta_1$</td>
<td>DRIVING ANGLE OF INCLINATION</td>
</tr>
<tr>
<td>$\Theta_2$</td>
<td>WORKING ANGLE</td>
</tr>
<tr>
<td>$F$</td>
<td>FORCE REQUIRED (PIERCING/TRIMMING/FLANGING FORCE + PAD FORCE + SPRING RETURN FORCE)</td>
</tr>
<tr>
<td>$P$</td>
<td>PRESS FORCE</td>
</tr>
<tr>
<td>$V$</td>
<td>LOAD ON SLIDING SURFACE OF DRIVER</td>
</tr>
<tr>
<td>$Q$</td>
<td>LOAD ON SLIDING SURFACE OF SLIDE</td>
</tr>
<tr>
<td>$S$</td>
<td>WORKING STROKE</td>
</tr>
<tr>
<td>$S_1$</td>
<td>SPRING STROKE (SLIDE TRAVEL)</td>
</tr>
<tr>
<td>$L$</td>
<td>PRESS STROKE</td>
</tr>
</tbody>
</table>

\[ P = F \times \frac{\cos \Theta_1}{\sin (\Theta_1 + \Theta_2)} \]
\[ Q = F \times \frac{1}{\sin (\Theta_1 + \Theta_2)} \]
\[ V = F \times \frac{1}{\tan (\Theta_1 + \Theta_2)} \]
\[ L = S \times \frac{\sin (\Theta_1 + \Theta_2)}{\cos \Theta_1} \]
\[ S_1 = S \times \frac{\cos \Theta_2}{\cos \Theta_1} \]
\[ S = S \times \frac{\cos \Theta_1}{\cos \Theta_2} \]
The IEM Value Proposition

I. IEM is recognized as the leader in manufacturing quality die sets and related products to the global parts forming industry. Our reputation has been built by satisfying customer needs, and we are very strong in the automotive and appliance industries.

II. IEM offers outstanding delivery on a consistent basis. Choosing us as a supplier means that our customers have a competitive advantage in delivering their products to the market.

III. IEM has complex machining capabilities on die sets at several strategically located facilities. Various locations means lower shipping costs and allowing IEM to machine complex die sets means the customer’s machining centers have additional capacity.

IV. IEM’s vast breadth of products assures innovative solutions. We strive to address customer problems by utilizing our research and development department as well as other technical professionals.

V. IEM has a technically trained sales force and distributor channels with engineering support. Sales, marketing and engineering professionals are available to support our product lines.

➢ Competitive Prices
➢ Reliability and Performance

...A LEADING MANUFACTURER AND INNOVATOR OF DIE SETS AND DIE COMPONENTS SUPPLIED GLOBALLY TO THE METAL FORMING INDUSTRY...

➢ High Quality Design & Construction
➢ Outstanding Service & Support