Technical Graphics

Working Drawings

- Assemblies
- Parts / Details
- Other
Isometric Views
Front View
### Part 1: Forward Arm

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FORWARD ARM</td>
<td>1</td>
<td>1020 STEEL</td>
<td></td>
</tr>
</tbody>
</table>

**SCALE:** 1:7.5 (mm)

**GENERAL TOLERANCE = ± 1**

![Diagram of Forward Arm]
Part: 2: Yoke Brace

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>YOKE BRACE</td>
<td>1</td>
<td>1020 STEEL</td>
<td></td>
</tr>
</tbody>
</table>

SCALE: 1:7.5 (mm)  GENERAL TOLERANCE = ±1

R150

2 x #32

R25

2 x R50

#30 ⊥ #45 ⊥ 30

R150

100

300

400

150

50

200

475

(1100)

1000

125

150

50

50

125

(225)

(100)
Part 3: Support Link

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>SUPPORT LINK</td>
<td>1</td>
<td>1020 STEEL</td>
<td></td>
</tr>
</tbody>
</table>

SCALE: 1:7.5 (mm)

GENERAL TOLERANCE = ±1
Part 4: Hex Bolt

SCALE: 1:2 (mm)
GENERAL TOLERANCE = ±1

STANDARD PART
MODIFY AS SHOWN

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>HEX HEAD BOLT</td>
<td>1</td>
<td>STEEL</td>
<td>M30 x 300</td>
</tr>
</tbody>
</table>
Part 5: Hex Bolt (160mm)

Scale: 1:2 (mm)

General Tolerance = ± 1

Standard Part

Modify as shown

<table>
<thead>
<tr>
<th>NO.</th>
<th>Part Name</th>
<th>Qty</th>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Hex Head Bolt</td>
<td>2</td>
<td>Steel</td>
<td>M30 x 160</td>
</tr>
</tbody>
</table>
Part 6: Hex Bolt (260mm)

SCALE: 1:2 (mm)
GENERAL TOLERANCE = ± 1

STANDARD PART
MODIFY AS SHOWN

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>HEX HEAD BOLT</td>
<td>1</td>
<td>STEEL</td>
<td>M30 x 260</td>
</tr>
</tbody>
</table>
## Part 7: Hex Bolt (360 mm)

**SCALE:** 1: 2.5 (mm)

**GENERAL TOLERANCE = ± 1**

**STANDARD PART**

**MODIFY AS SHOWN**

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>HEX HEAD BOLT</td>
<td>1</td>
<td>STEEL</td>
<td>M30 x 360</td>
</tr>
</tbody>
</table>

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Working Drawings
Part 8: Slotted Hex Nut

STANDARD PART
SEE SPECIFICATION FOR PURCHASE

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>SLOTTED HEX NUT</td>
<td>5</td>
<td>STEEL</td>
<td>M30 x 3.5</td>
</tr>
</tbody>
</table>
Part 9: Washer

STANDARD PART
SEE SPECIFICATION FOR PURCHASE

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>WASHER</td>
<td>10</td>
<td>STEEL</td>
<td>M30, REGULAR</td>
</tr>
</tbody>
</table>
Part 10: Cotter Pin

STANDARD PART
SEE SPECIFICATION FOR PURCHASE

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NAME</th>
<th>QTY.</th>
<th>MATERIAL</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>COTTER PIN</td>
<td>5</td>
<td>STEEL</td>
<td>6.3mm x 45mm</td>
</tr>
</tbody>
</table>
Layout Drawing:
1. TYPES OF DESIGN DRAWINGS. (REFER TO DESIGN DRAWINGS EXAMPLE)

<table>
<thead>
<tr>
<th>PAGE NO.</th>
<th>DESIGN DRAWING TYPE(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>AND</td>
</tr>
<tr>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

2. ANSWER THE FOLLOWING QUESTIONS ABOUT DESIGN DRAWINGS IN GENERAL.

A. DETAIL DRAWINGS.
   - DETAIL DRAWINGS MUST INCLUDE ________________, ________________, AND ________________.
   - EXPLAIN THE PURPOSE OF DETAIL DRAWINGS.

B. ASSEMBLY DRAWINGS.
   - EXPLAIN THE PURPOSE OF ASSEMBLY DRAWINGS.
   - WHAT IS THE DIFFERENCE BETWEEN AN ASSEMBLY DRAWING AND A SUB-ASSEMBLY DRAWING.

C. PARTS LIST.
   - EXPLAIN THE PURPOSE OF A PARTS LIST.
   - A PARTS LIST INCLUDES ________________ AND ________________ PARTS.
   - EXPLAIN THEIR DIFFERENCES.

D. OTHER DRAWINGS.
   - EXPLAIN THE PURPOSE OF A LAYOUT DRAWING.
   - EXPLAIN THE PURPOSE OF IDEA AND CONCEPT SKETCHES.
   - COMPARE IDEA AND CONCEPT SKETCHES, INDICATE SIMILARITIES AND DIFFERENCES.

NOTES:

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WORKING DRAWINGS

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3. Refer to the design drawings example to calculate the following.

A. Determine the amount of clearance between parts 1 and 2.
   - Critical dimension's limits of part 1 =
   - Critical dimension's limits of part 2 =
   - Min. clearance = \( d_{\text{min}} - d_{\text{max}} \) =
   - Max. clearance = \( d_{\text{max}} - d_{\text{min}} \) =
   - According to this design, is there always going to be some clearance between parts 1 and 2, yes or no?

B. Determine the amount of clearance between parts 1 and 3.
   - Critical dimension of part 1 =
   - Critical dimension of part 3 =
   \( d_{\text{max}} = \), \( d_{\text{min}} = \)
   - Min. clearance = \( d_{\text{min}} - d_{\text{max}} \) =
   - Max. clearance = \( d_{\text{max}} - d_{\text{min}} \) =

C. Refer to the detail drawing of part 2. (Front view)
   Nominal horizontal distance between holes =
   Nominal vertical distance between holes =
   Center to center distance between holes:
   Measured =
   Calculated =

D. The dimensions of part 2 can be found on page ____ of the text. Determine the following dimensions.
   - Nominal bolt diameter =
   - Length of bolt =
   - Body diameter limits =
   - Width across flats =
   - Width across corners =

E. List measurements that will verify the fit of part 2 with the rest of the assembly. (Don't calculate, just list.)