

Machining Blueprint Symbols PDF Guide

CNC Machining Blueprint Symbols Complete Reference Chart

1. Dimensional Symbols

∅	Diameter
R	Radius
↓	Depth
↕	Vertical Dimension
↔	Linear Dimension
±	Tolerance
∠	Angle

2. Hole & Feature Symbols

□	Counterbore (Spotface)
✓	Countersink
⌒	Spotface
M6×1	Metric Thread
¼-20	UNC Thread

3. Surface Texture Symbols

Ra	Roughness Average
//	No machining required
⌀	Machining required
—→	Lay direction (parallel)
X	Lay direction (crossed)

4. GD&T Symbols

⊕	True Position
⊥	Perpendicularity
//	Parallelism
○	Circularity
⌀	Cylindricity
▽	Flatness
⊙	Concentricity
—	Profile of a Line
⌒	Profile of a Surface
↗	Runout
↗↗	Total Runout

Surface Finish (Ra) – CNC Machining Reference Chart

Surface Roughness Values

Ra 12.5 µm	Rough machining
Ra 6.3 µm	General machining
Ra 3.2 µm	Standard CNC finish
Ra 1.6 µm	Fine machining
Ra 0.8 µm	High precision
Ra 0.4 µm	Optical / sealing
Ra 0.2 µm	Ultra precision

Quick Notes:

- Lower Ra = smoother surface
 - Ra appears in surface finish symbols on drawings
 - Often measured using profilometer
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GD&T Standard Symbol Reference Table

Form Controls

▤	Flatness
○	Circularity
⌒	Cylindricity
↗	Straightness

Orientation Controls

//	Parallelism
⊥	Perpendicularity
∠	Angularity

Location Controls

⊕	True Position
⊕	Concentricity
⊙	Symmetry

Profile Controls

⌒	Profile of a Line
⌒	Profile of a Surface

Runout Controls

$\nearrow$	Runout
$\nearrow \nearrow$	Total Runout

CNC Blueprint Reading Guide

1. Start with the Title Block

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- Material
 - Tolerances
 - Revision notes
 - Finishing instructions
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2. Dimensions & Tolerances

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- Linear / angular dimensions
 - $\pm$ bilateral tolerance
 - Unilateral tolerance
 - Limit dimensions
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3. Surface Finish Interpretation

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- Ra values
 - Functional vs non-functional surfaces
 - Lay direction

4. Holes & Thread Understanding

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- $\varnothing$, R, countersinks, counterbores
 - Metric & UNC thread notes
 - Depth and bottom condition
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5. GD&T Interpretation Basics

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- Feature control frames
 - Datum system (A–B–C)
 - Key controls: position, perpendicularity, flatness, runout
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6. Avoid These Mistakes

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- Missing tolerances
 - Misreading hole depth
 - Ignoring hidden GD&T
 - Overlooking surface finish requirements
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A precision CNC machining manufacturer providing rapid prototyping, tight-tolerance machining, and high-quality custom metal parts.