

# AutoCAD and Its Applications **Advanced**

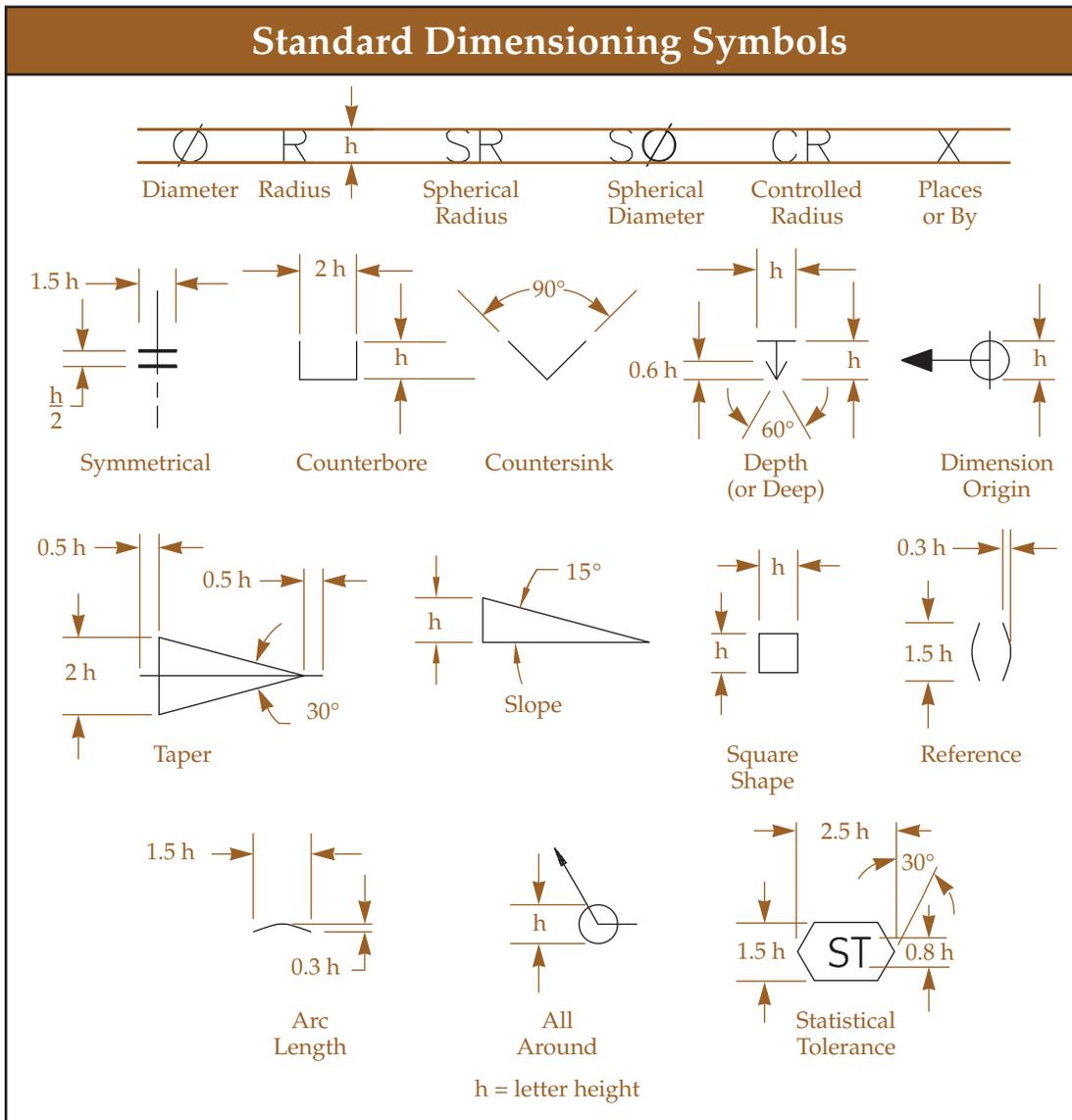
## Reference Material

### Drafting Symbols

Symbols provide a “common language” for drafters all over the world. However, symbols can be meaningful only if they are created according to the relevant standards or conventions. This document describes and illustrates common dimensioning, GD&T, architectural, piping, and electrical symbols.

### Standard Dimensioning Symbols

The size of dimensioning symbols varies with text size, but it should be consistent with the height of the text. In the following illustration,  $h$  = text height.

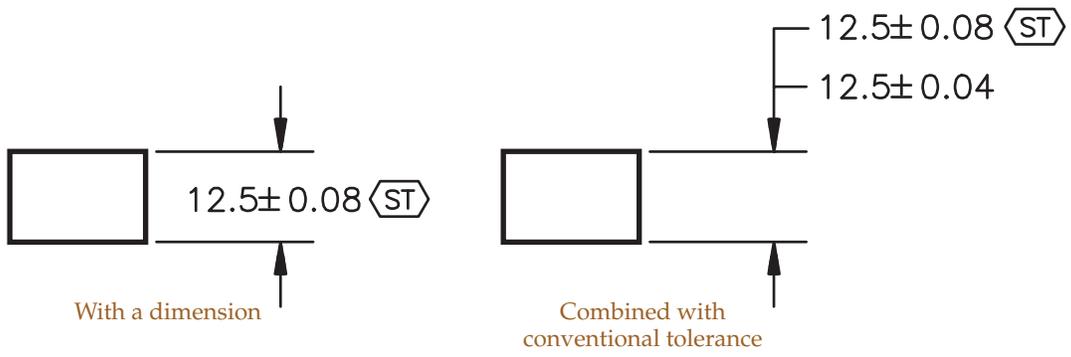
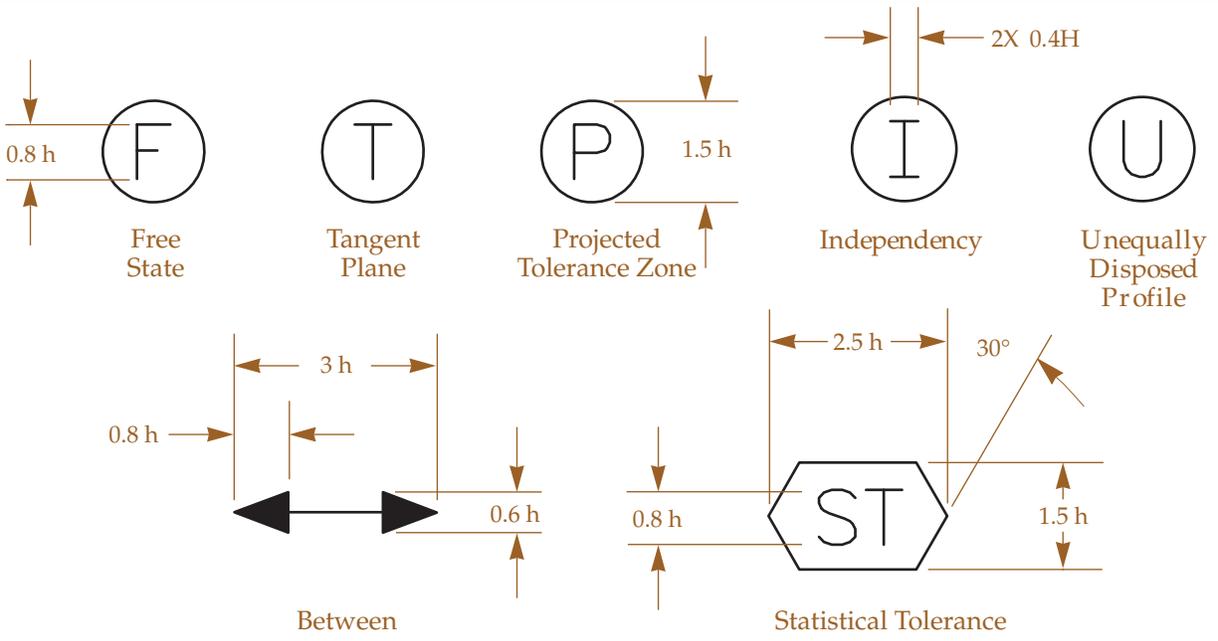


# Geometric Dimensioning and Tolerancing Symbols

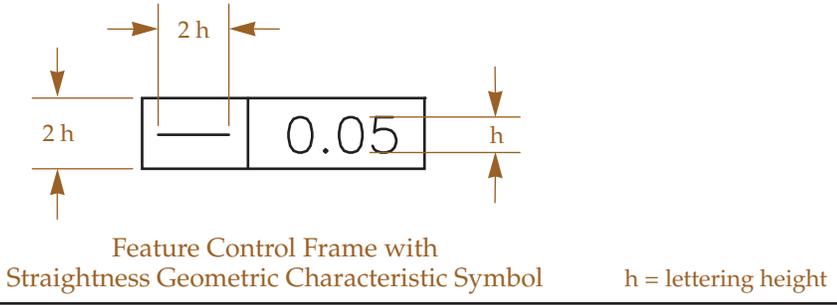
You can either create your own library of GD&T symbols, or use one of AutoCAD's GD&T fonts to insert the symbols as text. The following tables show how to construct the symbols.

GD&T Symbol Creation																																																																																						
<p style="text-align: center;">Datum Feature Symbol</p>	<p style="text-align: center;">Filled or unfilled</p>																																																																																					
<p style="text-align: center;">Datum Target Symbol</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 10%; text-align: center;">Form</td> <td style="width: 10%; text-align: center;">{</td> <td style="width: 10%; text-align: center;">—</td> <td style="width: 10%; text-align: center;">Straightness</td> <td style="width: 10%;"></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">▭</td> <td style="text-align: center;">Flatness</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">○</td> <td style="text-align: center;">Circularity</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">⊘</td> <td style="text-align: center;">Cylindricity</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Profile</td> <td style="text-align: center;">{</td> <td style="text-align: center;">⌒</td> <td style="text-align: center;">Profile of a line</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">⌒</td> <td style="text-align: center;">Profile of a surface</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Location</td> <td style="text-align: center;">{</td> <td style="text-align: center;">⊕</td> <td style="text-align: center;">Position</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">◎</td> <td style="text-align: center;">Concentricity</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">≡</td> <td style="text-align: center;">Symmetry</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Orientation</td> <td style="text-align: center;">{</td> <td style="text-align: center;">//</td> <td style="text-align: center;">Parallelism</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">⊥</td> <td style="text-align: center;">Perpendicularity</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">∠</td> <td style="text-align: center;">Angularity</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Runout</td> <td style="text-align: center;">{</td> <td style="text-align: center;">↗ or ↘</td> <td style="text-align: center;">Circular runout</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td style="text-align: center;">↗↘ or ↗↘</td> <td style="text-align: center;">Total runout</td> <td></td> </tr> </table> <p style="text-align: center;">Geometric Characteristic Symbols</p>			Form	{	—	Straightness					▭	Flatness					○	Circularity					⊘	Cylindricity			Profile	{	⌒	Profile of a line					⌒	Profile of a surface			Location	{	⊕	Position					◎	Concentricity					≡	Symmetry			Orientation	{	//	Parallelism					⊥	Perpendicularity					∠	Angularity			Runout	{	↗ or ↘	Circular runout					↗↘ or ↗↘	Total runout	
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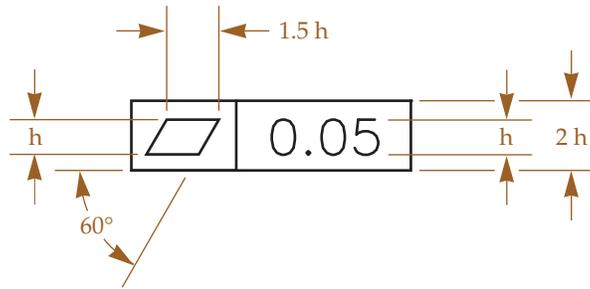
# GD&T Symbol Creation



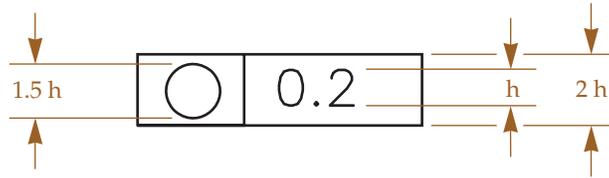
In the feature control frame  
Statistical Tolerancing Methods



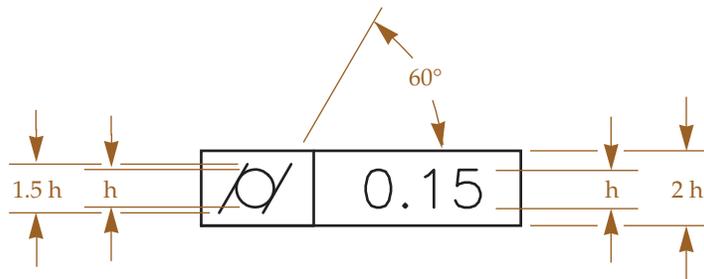
# GD&T Symbol Creation



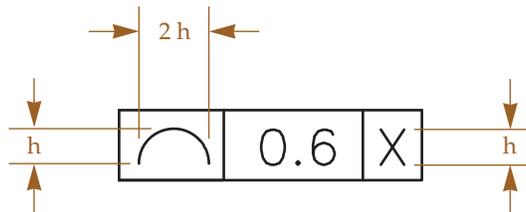
Feature Control Frame with Flatness  
Geometric Characteristic Symbol



Feature Control Frame with Circularity  
Geometric Characteristic Symbol



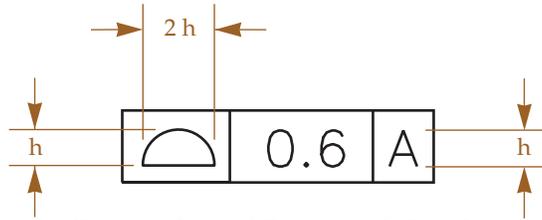
Feature Control Frame with Cylindricity  
Geometric Characteristic Symbol



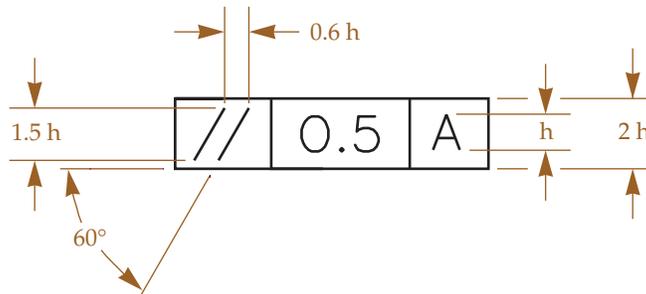
Feature Control Frame with Profile  
of a Line Geometric Characteristic  
Symbol and a Datum Reference

$h$  = lettering height

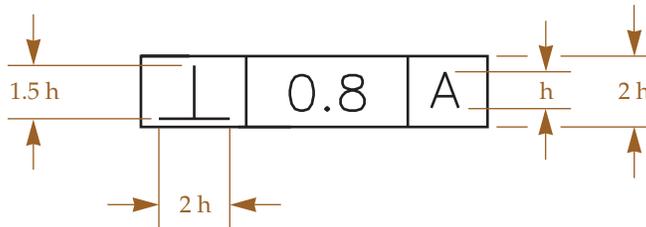
# GD&T Symbol Creation



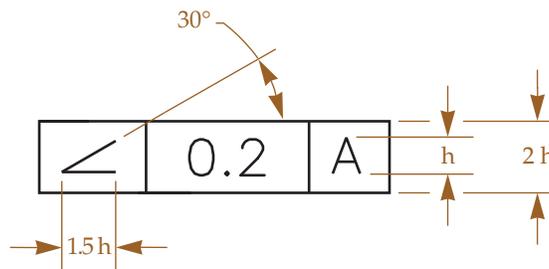
Feature Control Frame with Profile of a Surface Geometric Characteristic Symbol and a Datum Reference



Feature Control Frame with Parallelism Geometric Characteristic Symbol and a Datum Reference



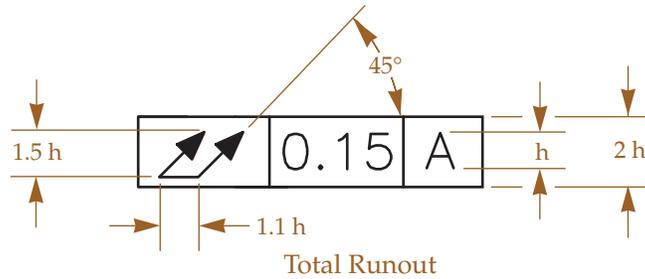
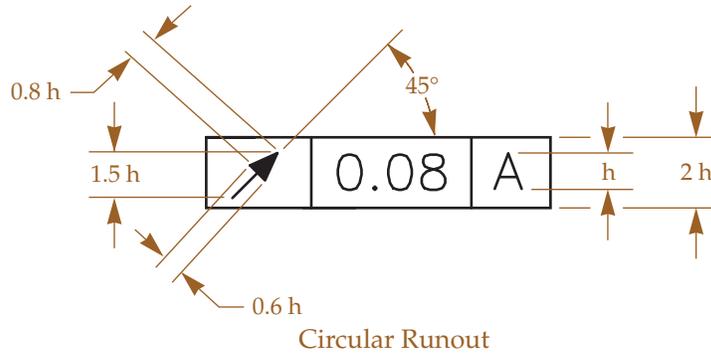
Feature Control Frame with Perpendicularity Geometric Characteristic Symbol and a Datum Reference



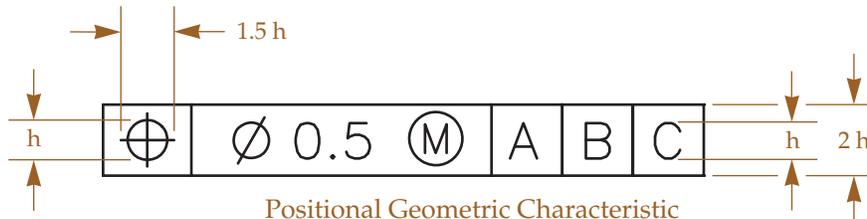
Feature Control Frame with Angularity Geometric Characteristic Symbol and a Datum Reference

$h$  = lettering height

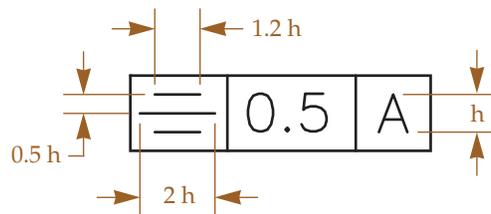
# GD&T Symbol Creation



Runout symbols may be drawn open or filled



Positional Geometric Characteristic Symbol and Tolerance in a Feature Control Frame with Three Datum References



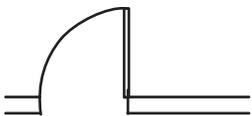
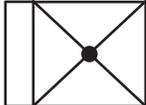
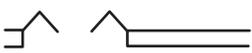
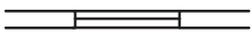
Feature Control Frame with Symmetry Geometric Characteristic Symbol and a Datum Reference

$h$  = lettering height

To create GD&T symbols as text, create a style using the gdt.shx font. Then use the lowercase alphabet to type the symbols. The following table shows the symbol produced by each lowercase letter.

Lowercase Letter	Symbol Produced
a	
b	
c	
d	
e	
f	
g	
h	
i	
j	
k	
l	
m	
n	
o	
p	
q	
r	
s	
t	
u	
v	
w	
x	
y	
z	

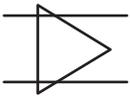
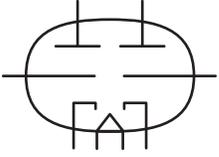
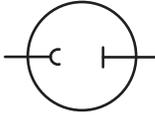
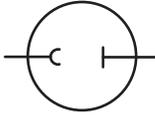
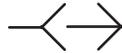
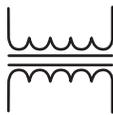
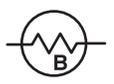
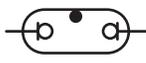
# Common Architectural Symbols

		
Exterior Door	Toilet	Water Heater
		
Interior Door	Wall Hung Toilet	Shower
		
Pocket Door	Urinal	Shower w/ Seat
		
Bifold Door	Oval Vanity Sink	Rectangular Vanity Sink
		
Bypass Door	Single Kitchen Sink	Washer/Dryer
		
Window	Double Kitchen Sink	Range
		
Lighting Outlet	220V Outlet	Refrigerator
		
Recessed Lighting Outlet	Weatherproof Outlet	Fan
		
Wall Lighting Outlet	Thermostat	Conduit
		
Fluorescent Light Fixture	Doorbell	
		
Single Receptacle Outlet	Fan Hanger Receptacle	
		
Duplex Convenience Outlet	Clock Hanger Receptacle	
		
Triplex Receptacle Outlet	TV Outlet	
		
Special Outlet		
		
Floor Single Receptacle Outlet		
		
Floor Duplex Receptacle Outlet		
		
Single Pole Switch		
		
3-Way Switch		

# Single Line Piping Symbols

Name	Screwed			Buttwelded		
	Left Side	Front	Right Side	Left Side	Front	Right Side
90° Elbow						
45° Elbow						
Tee						
45° Lateral						
Cross						
Cap						
Concentric Reducer						
Eccentric Reducer						
Union						
Coupling						

## Common Symbols for Electrical Diagrams

			
Amplifier	Capacitor, Polarized	Twin Triode Using Elongated Envelope	Receiver, Earphone
			
Antenna, General	Circuit Breaker	Voltage Regulator, also, Glow Lamp	Resistor, General
			
Antenna, Dipole	Ground	Phototube	Resistor, Adjustable
			
Antenna, Loop	Chassis Ground	Inductor, Winding, Reactor, General	Resistor, Variable
			
Antenna, Counterpoise	Connectors, Jack and Plug	Magnetic Core Inductor	Transformer, General
			
Battery, Long Line Positive	Engaged Connectors	Adjustable Inductor	Transformer, Magnetic Core
			
Multicell Battery	Triode with Directly Heated Cathode and Envelope Connection to Base Terminal	Ballast Lamp	Shielded Transformer, Magnetic Core
			
Capacitor, General	Pentode Using Elongated Envelope	Fluorescent, 2-Terminal Lamp	Auto-Transformer, Adjustable
			
Capacitor, Variable		Incandescent Lamp	