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Machinist's Top Drawer™

V5.0 Palm OS

V4.0 Windows

v1.6 Pocket PC

Help Documentation

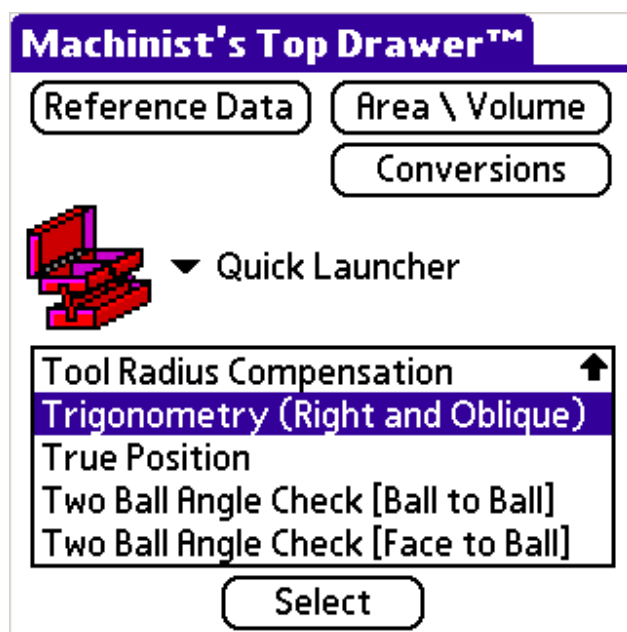
*Note this documentation is for all three versions:

MTD for Palm OS

MTD for Pocket PC

MTD for Windows

The screen shots show a palm device so it may not match your device but the instructions are basically identical for all versions.



38 main categories, many with sub categories are available:

Ball Drop

Ball Substitution

Bolt Circle

Circle Data

Circle Divided
Circle Segments
Conversions
Countersink
Cusp Height<-->Step Over
DD <--> DMS
Distance Between Two Points
Dove Tails
Drill Tip Compensation
Gage Pin in a Diamond Shape
Grid Hole Pattern
I K - I J Arc Center
Intersection of Two Lines
IPM <--> IPR
Material Weight & Length
Middle of Two Points
Min. & Max. Ball Diameters
Polar Coordinates
Polygons
Reference Data
SFM <--> RPM
Shift and Rotation of Points
Sine Plate
Slope and Angle of a Line
Tangency Points & Distances
Tap Drill Sizes
Tapers
Three Point Arc Center
Three Wire Check
Tool Radius Compensation
Trigonometry(Right and Oblique Triangle)
True Position
Two Ball Angle Check [Ball to Ball]
Two Ball Angle Check [Face to Ball]

And forty one Area and Volume calculations:

Acute Angle Triangle
Barrel (arc of circle)
Barrel (arc of parabola)
Circular Ring

Circular Ring Sector
Circular Sector
Cone
Cube
Cycloid
Cylinder
Ellipse
Ellipsoid
Frustrum of Cone
Frustrum of Pyramid
Hexagon
Hollow Cylinder
Hollow Sphere
Hyperbola
Obtuse Angle Triangle
Octagon
Parabola
Parabola Segment
Parallelogram
Polygon
Portion of a Cylinder
Prism
Pyramid
Rectangle
Right Triangle
Spandrel or Fillet
Square
Square Prism
Sphere
Spherical Sector
Spherical Segment
Spherical Wedge
Spherical Zone
Torus
Trapezium
Trapezoid
Wedge

SETTINGS

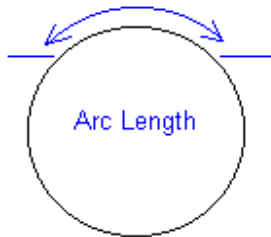
*From the main screens menu select options , settings and from there you can set the decimal place to round to for the answers in MTD this setting will be retained until you select another setting. (DD angle answers are set internally for sixth dec. place)
Also you can set up to four of your most frequently used items to launch from the quick launch popup by selecting the item you want to set from the list then setting the quicklaunch item number and selecting the Set Quick Launch button.*

Circle Segments

Two combinations are not solvable, Arc & Chord or Arc & Height
CURRENTLY ANGLES MUST BE ENTERED AS DECIMAL
DEGREES ONLY

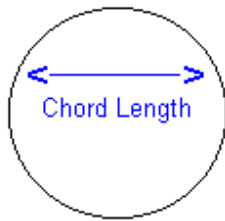
ARC LENGTH

Enter any two items of known:
Height, Chord, Angle, Radius
to calculate arc length



CHORD LENGTH

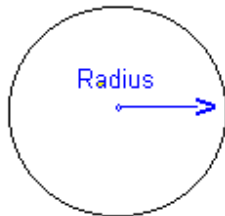
Enter any two items of known:
Height, Arc, Angle, Radius (except Arc & Height)
to calculate chord length



RADIUS

Enter any two items of known:

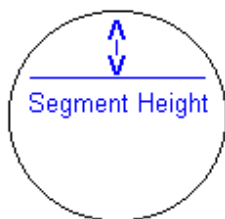
Height, Arc, Chord, Angle (except Arc & Chord or Arc & Height)
to calculate radius



HEIGHT

Enter any two items of known:

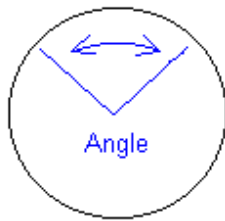
Radius, Arc, Chord, Angle (except Arc & Chord)
to calculate height



ANGLE

Enter any two items of known:

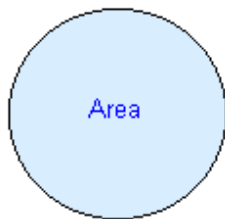
Radius, Arc, Chord, Height (except Arc & Height or Arc & Chord)
to calculate angle



Circle Data

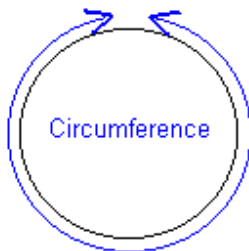
AREA

Enter any one item of known:
Radius, Diameter
to calculate area



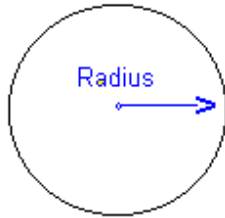
CIRCUMFERENCE

Enter any one item of known:
Radius, Diameter
to calculate circumference



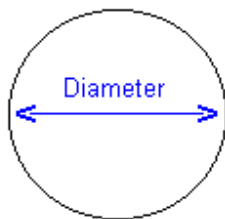
RADIUS

Enter any one item of known:
Area, Circumference
to calculate radius



DIAMETER

Enter any one item of known:
Area, Circumference
to calculate diameter



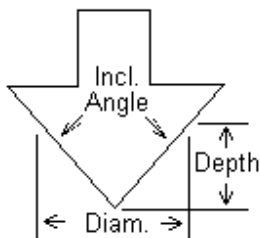
Countersink

Enter any two of known:

Included Angle, Diameter, Depth to solve for the third item, obviously you must choose a countersink large enough to create the output dimensions.

This calculates as a sharp point you may wish to use Drill Tip

Compensation function depending upon what you are trying to solve.



Circle Divided

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309

Divide a 360 degree circle into the requested amount of positions starting from your angle input

Enter the desired start angle (0 degrees or greater) and the number of positions to get the positions
in Dec. Deg. and DMS

You will also be given the degree increment in DD and DMS.

Select the DMS checkbox if entering DMS

Polygons

SQUARE

Enter one known of these three:

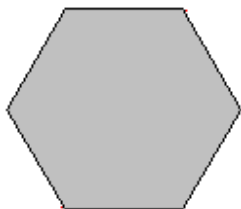
Across Sides, AcrossPoints, Flat Width(same as across sides)
to solve for others.



HEXAGON

Enter one known of these three:

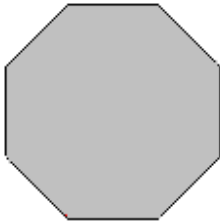
Across Sides, AcrossPoints, Flat Width
to solve for others.



OCTAGON

Enter one known of these three:

Across Sides, AcrossPoints, Flat Width
to solve for others.



Tangency Points & Distances

If you select the DMS checkbox from the main tangency points screen then you may enter any angles in any tangency screen as DMS don't forget if you have this option selected.

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)

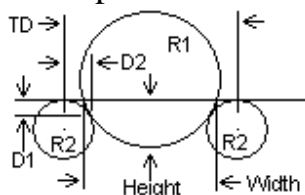
Seven different utilities to solve dozens of different tangency and distance calculations for radius to angle blends and much, much more.

In this form the data is much more versatile in that you can use the data for lathes, mills etc. without be tied to a specific calculation (i.e. face to O.D. or O.D. to face or Milling a flange etc. which would require dozens of different configurations) with minimal input you can get the data you need and apply it to your circumstances quickly at the machine without CAD/CAM assistance

using only simple addition, subtraction and multiplication.

(Future versions will also include partial radius to radius with angle. and Rad to Rad to Rad(following same arcs))

1. rad pRad rad



This will give the tangency points for a radius to partial radius to radius for lathe, mill etc.

LATHE EXAMPLE

(programming diameter if you are using radius don't double values)
An OD groove on a lathe if we are using a .031 radius tool and we want .02 corner radii and a .125 center radius then enter .094 for radius #1 (.125-.031)
and .051 for radius #2 (.031+.02) and the height is .075 (given on print or subtracted the two diameters) Answer is TD=.254 D2=.0447 D1=.0264
So if the OD is 1.0 then and centerline of radius #1 is .825 from face (taken from print)

ZERO IS TAKEN FROM THE CENTER OF TOOL RADIUS IN THIS EXAMPLE, COMPENSATE FOR TOOL IF ZERO IS TAKEN FROM TOOL INSERT END

```
Z-.952 (.825+ (.254/2))  
X1.0(start point add extra to height as needed to stay away)  
G03orG02 X.9472(1.0-(2*.0264))Z-.9073(.952-.0447)R.051  
G03orG02 X.85(1.0-(2*.075))Z-.825R.094  
G03orG02 X.9472Z-.7427(.825-((.254/2)+.0447)R.094  
G03orG02 X1.0Z-.698(.825- (.254/2))R.051
```

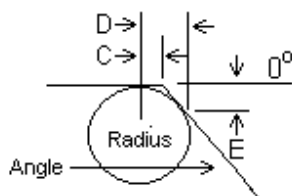
This is just one example you can use this utility to calculate only one radius blend etc. just ignore any unneeded data.

If you know the width of the radius (from the print or calculated) then you can select width pushbutton and enter the width instead of the height.

Add .001 or more as needed to start diameter when calculating with height to stay away from the part as needed.

Mills use the same principal but no doubling of distances.

2. Rad to Angle



This can be used to calculate radius to angle blends and many other uses one example is as follows

A part for a lathe needs a radius on the face at the 23 degree angle (to OD)

the start point is given (or you have trigged it out) lets say 1.32 (after we have compensated for our tool radius) and you want a .05 radius blend to the angle and your tool has .007 radius enter .057 for the radius and 23 degrees for the angle answer gives

C=.0116 D=.0223 E=.0045 so

Z0

X1.2968(1.32-(2*.0116))

G02X1.3414(1.2968+(2*.0223))Z-.0045(0+.0045)R.057

G01X?Z? (finish point)

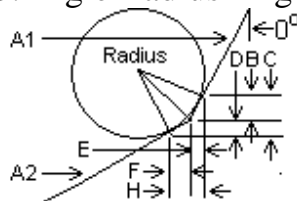
If you want another radius at the end repeat this process just make sure you are coming from the correct plane for the angle this is important, the angle would be 67 from the other plane in this case.

(added .007 for tool but if using auto comp on machine this is not needed)

G codes depend on your machine

Mills use the same principal but no doubling of distances.

3.Angle Radius Angle



This will give the tangent points of an angle to radius to angle it looks like alot of info and it is but look closely and it will be clear just use the data you need to make a angle radius angle blend the first angle can be less than the first

When you know the point where the two angles meet then F, D, B, E give the amount to shift the start positions then C and H give the arc length for G02 or G03 Arc radius.

The second angle does not need to be more than the first angle

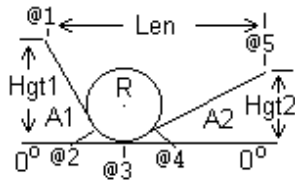
Angle #1 = 56 Angle #2 =31 is ok.

Use the Rad to Angle example as a guide how to use the dimensions.

G codes depend on your machine

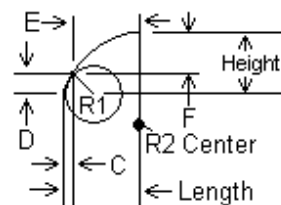
Mills use the same principal but no doubling of distances.

4. Ang Rad Ang 2



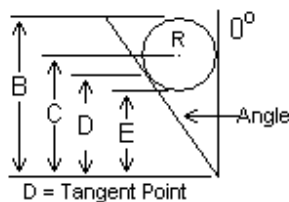
This gives tangent points for an Angle to Radius to Angle you must enter the height from the bottom of the radius to the end of the angle for both sides and enter both angles, the radius must also be entered. Upon solving you will be given point to point dimensions (@1 to @2 etc.) which represent your axis travel X, Y etc. all Hgts follow the angle height and all Lens follow the overall length.

5. Rad to Rad



This gives tangent points for Radius to Radius following the same direction arc you must enter the length which is from the center of radius #2 (the larger rad.) to the far end of radius #1 you will be given letter dimensions which represent your axis travel X, Y etc. the height from the center of Radius #1 is also given.

6. Sharp Corner to Radius [One Angle]



This can be used for dozens of applications to calculate the distance loss when putting a radius on a tool, calculating end mill size to use, gauging parts etc.

sharp corner diameters when checking parts and much more.
Just enter radius and angle to get distances from sharp corner.

also when making tooling its very handy, there are dozens of applications.

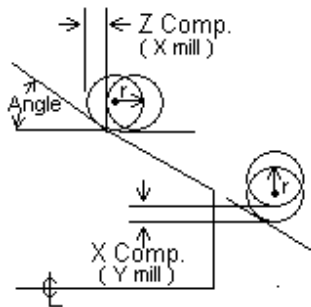
we know Radius is .2 so enter Y distance .1 X distance .05 Radius .2

gives the two pairs I.1468 J.1359 and I.1968 J.0359 we the latter pair for our part.

Tool Radius Compensation

If you select the DMS checkbox then you may enter the angle directly as DMS.

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)



When you don't use the auto comp function of your machine or you are doing conventional machining then you can use this to compensate for the tool radius.

Enter angle and tool radius to get X and Z comp (lathe) X and Y comp (mill) and crossover amount if you go past the angle.

Tap Drill Sizes

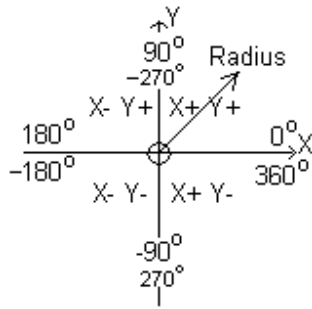
Gives minor diameter for tap according to percent of thread and tap type. Tap choices are cutting or roll taps.

If "using tap #" checkbox is selected just enter tap # and enter TPI in the pitch field, else tap diameter and TPI in the pitch field.

If "metric tap" checkbox is selected then a 2.2-.45 tap would be entered as 2.2 in the tap diameter field and .45 in the pitch field

Polar Coordinates

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309



Enter Distance and Angle (0 to 360, or 0 to -360) to solve for X and Y (polar to rectangular) or X and Y (positive or negative values) to solve for radius and angle (rectangular to polar) you will be given the positive and negative angle values.

(You can enter a user defined start point in the Present X axis and Present Y axis data fields. *A few users requested this option if you don't need this just leave them at the default zero values, pressing the Clear All button sets them back to zero.*)

Angle can be input in DD or DMS by selecting the appropriate checkbox. Angle output is in DD and DMS.

DD<-->DMS

Select desired option then enter Decimal Degrees to solve for DMS or enter degrees minutes seconds to solve for DD

Shift and Rotation of Points

Select how many points to rotate then enter the shift location (new X Y coordinates) and angle then enter points continue entering points until all have been entered and automatically you will be taken back to the new data selecting view old points will show the original data.

Rotation starts at 3o'clock position and goes in counterclockwise direction, entering a negative angle to go in clockwise direction.

True Position

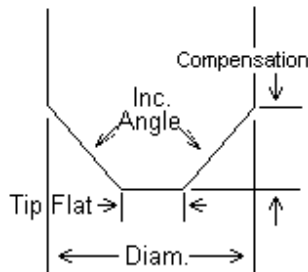
Enter X and Y difference to get true position tolerance.



Drill Tip Compensation

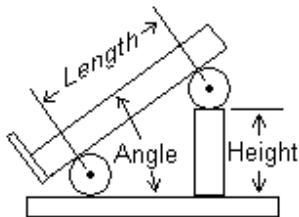
(You may prefer using the **Countersink** function depending on what you are trying to solve)

Enter the drill diameter and drill tip included angle and point flat (0 if none) to get the compensation



Sine Plate

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309



Enter Sine plate length and Incline of angle to get gauge block height or enter Sine plate length and Gage Block Height to get angle.

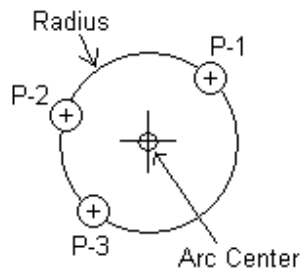
Angle can be input in DD or DMS by selecting the appropriate checkbox. Angle output is in DD and DMS.

SFM<->RPM

Select RPM or SFM then enter cutter size or part diameter and RPM or SFM to get conversion.

Three Point Arc Center

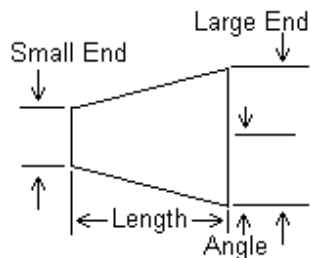
Enter three points (six data fields X1 X2 etc.) to get arc center and radius.



Tapers

Select from seven sets of known data to solve various unknown data.

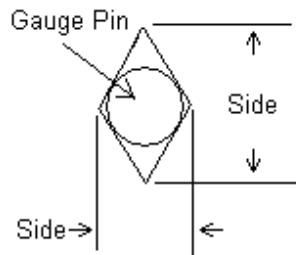
Tpf is Taper per Foot



- 1.Small End & Tpf & Length
gives large end diameter and angle
- 2.Large End & Tpf & Length
gives small end diameter and angle
- 3.Small End & Tpf & Large End
gives taper length and angle
- 4.Small End & Large End & Length
gives taper per foot and angle
- 5.Length & Tpf
gives taper amount
- 6.Taper Per Foot
gives angle
- 7.Angle Per Side (select DD or DMS for input)
gives taper per foot

Gage Pin in a Diamond Shape

Enter the dimensions of the two sides (size over the points) to find pin size



Slope and Angle of a Line

Calculates the slope (tangent) and angle of a line when entering the coordinates of that line, will also give the line length.

IPM<->IPR

Reverse calculation to retrieve IPM or IPR, feed per tooth SFM or RPM etc., if entering RPM select the rpm checkbox.

For IPR to IPM inches per revolutions field is feed for a complete revolution

not per tooth, you will be given IPM and per tooth answer (ipr field / no. of flutes)

Min and Max Ball Diameters

If you select the DMS checkbox then you may enter the angle directly as DMS.

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)

Calculates for the minimum and maximum gage balls(or rolls) that can be used according to the data entered.

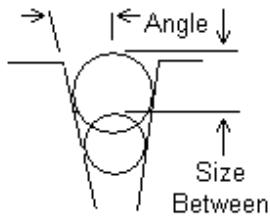
Enter sharp corner diameter thru hole and angle, if no thru hole enter zero.

Two Ball Angle Check [Ball to Ball]

GAGE BALLS OR ROLLS MAY BE USED

Calculates the angle when the small and large ball diameters(OR ROLLS) and the size between them is entered.

Invalid input(where angles are greater than 90 deg etc.) will receive an invalid input message

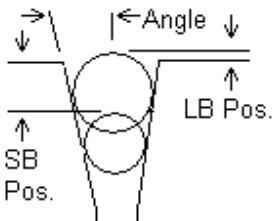


Two Ball Angle Check [Face to Ball]

GAGE BALLS OR ROLLS MAY BE USED

Calculates the angle and sharp corner diameter when the small and large ball diameters (OR ROLLS) and the small and large ball (OR ROLL) positions are entered.

Invalid input (where angles are greater than 90 deg etc.) will receive an invalid input message.



Ball Drop

Five selections to choose from:

S/C diameter (Sharp corner diameter)

Ball Drop

Hole Depth

Chamfer Diameter

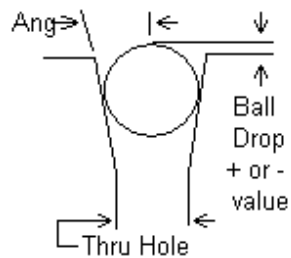
Angle Length

Sharp Corner size or Ball Drop

GAGE BALLS OR ROLLS MAY BE USED

If you select the DMS checkbox then you may enter the angle directly as DMS.

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)



Calculates for sharp corner size or Ball Drop(or Roll) distance according to the selection you have chosen and will also provide additional information.

IF SOLVING FOR SHARP CORNER SIZE ENTER POSITIVE OR NEGATIVE DROP VALUES

Example Ball Drop:

Angle= 11

Ball Dia= 1

Sharp Corner Dia.=2

Thru Hole=.2

results will be

Ball Drop -2.0241

Best Ball 1.6487

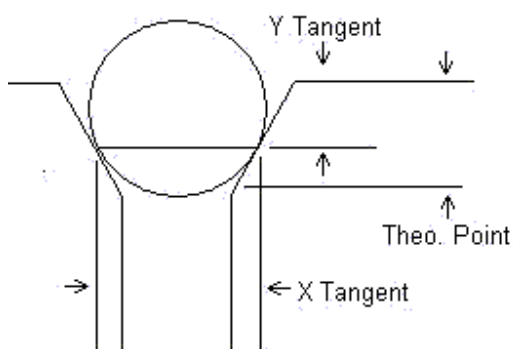
X Tan .9816

Y Tan -2.6195

TIP -3.014

TIP is a theoretical point where the thru hole would interfere with the ball. Best ball is the best size gage ball(or roll) to use for this case (to be flush with surface).

X Tangent and Y Tangent see image below

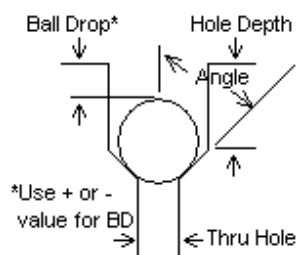


Hole Depth

Gives hole depth to angle start point.

You must enter five data items Angle, Ball Diameter, Hole Diameter, Thru Hole Diameter and Ball Drop (positive or negative value) selecting the Ball Tolerance button will give the minimum diameter ball to use (ball must contact the taper area) the max is for reference only (will show larger than your hole diameter, the same calculation is used for S/C Diameter) your max would be less than your hole diameter

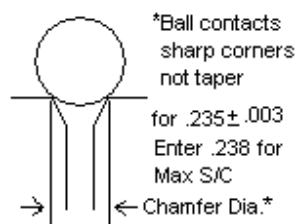
(Using the Best Ball suggestion would give a direct depth reading when suggested ball fits hole)



Chamfer Diameter

The ball must contact sharp corners and **NOT** taper surface.

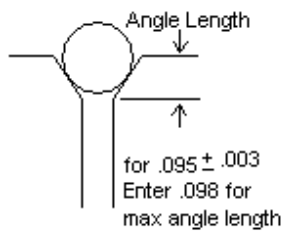
You must enter four data items Angle, Ball Diameter, Ball Drop (always a positive value), Max Sharp Corner Diameter (high end of your tolerance) selecting the Ball Tolerance button will give the absolute minimum diameter ball to use you should use a ball at least 10% larger than the absolute minimum diameter to be certain to capture the sharp corners correctly.



Angle Length

Calculates the angle length from face.

You must enter five data items Angle, Ball Diameter, Max Angle Length (high end of your tolerance), Thru Hole Diameter and Ball Drop (positive or negative value) selecting the Ball Tolerance button will give the minimum and maximum diameters ball to use.



Dove Tails

If you select the DMS checkbox then you may enter the angle directly as DMS.

WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)

Calculates the sharp corner or over rolls dimension depending on which item is selected.

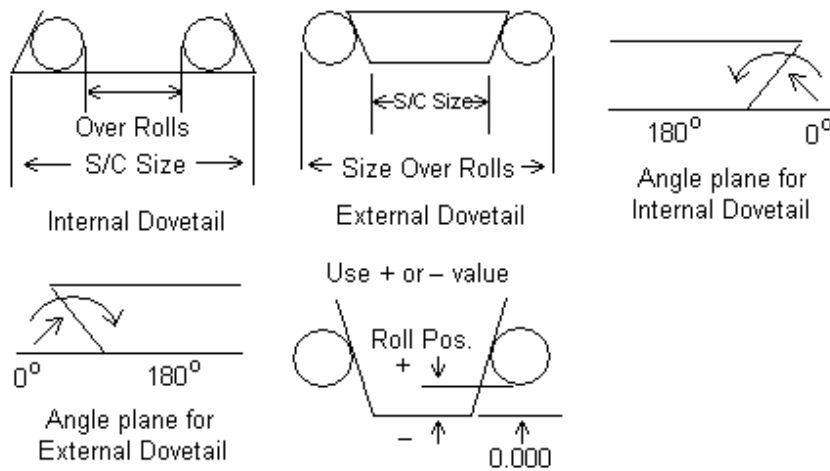
Select the internal dovetail checkbox if measuring an internal dovetail.

Check the one sided taper checkbox when the only one side has a taper or you are calculating from centerline.

ENTER POSITIVE OR NEGATIVE ROLL POSITION VALUES ACCORDING TO WHICH WAY YOU ARE COMPENSATING ONLY AFTER YOU GET YOUR INITIAL ANSWER, YOU WILL THEN NEED TO RECALCULATE YOUR OVER ROLL OR SHARP CONER DIAMETER IF YOU NEED IT.

Normally the roll position is zero unless you are leaving stock etc.

The angle can be 0 to 180 (see image below) for Internal or External dovetails.



NC Quick Code Module

Bolt Circle

If you select the DMS checkbox then you may enter the angle directly as DMS.

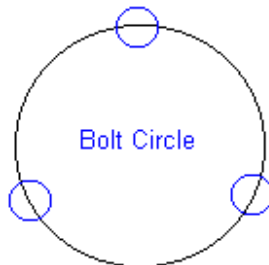
WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309 (22.03 will read as 23.0300 and 23.3 as 22.3000)

Enter the five data items to calculate bolt circle positions

Diameter, Number of Holes, X Coordinate, Y Coordinate, Angle

0 deg start angle is at 3 o'clock, positive angle values start before the 3 o'clock position (Y pos).

you can enter a negative start angle position to start after the 3 o'clock position (Y neg).



Grid Hole Pattern

Calculates a grid hole pattern for drilling milling etc.

Example:

with X start= 1

Y start= 1

holes X= 4

holes Y= 3

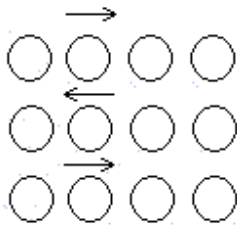
X Step Distance= .5

Y Step Distance= .5

will return X and Y coordinates for a pattern

in the direction of arrows shown below

**USE NEGATIVE OR POSITIVE STEP DISTANCES TO CONTROL
DIRECTION OF PATTERN**



Thread Milling

Generates thread mill nc code for single point or hob/mill for I.D. or O.D.

Fill the eight data fields :

Tool Diameter

X position

Y position

Z start

Z depth (always from Z0 point)

Pitch (1/TPU)

Major Diameter

Feedrate

Lathe Drilling

Generates lathe drilling nc code

Three cycle types are available:

Chip Break

Deep Drill

% Peck Deep Drill

Chip Break

At the end of each peck the drill retracts the amount of the value in the chip clearance data field until the finish depth is reached.

Deep Hole

At the end of each peck the drill retracts to the value in the R Plane data field then rapids back to the last peck depth minus the value in the chip clearance data field until the finish depth is reached.

% Peck Deep Hole

At the end of each peck the drill retracts to the value in the R Plane data field then rapids back to the last peck depth minus the value in the chip clearance data field, each peck will be the % peck value of the last peck, the peck value will not fall below the minimum peck value and will continue until the finish depth is reached.

Lathe Threading / G92

G76 is almost always the best choice but sometimes the G92 cycle comes in handy.

Generates G92 lathe threading nc code for I.D. or O.D.

The default mode calculates a 60 degree UN thread

Manual SDT is used to set the single depth of thread and Manual passes is to set a predetermined number of passes.

If X start is smaller than Major an I.D thread is calculated else an O.D. thread is calculated

Three Wire Check

At this time 7 types are available

ANSU 60 deg

Whitworth 55 deg

Sharp V 60 deg

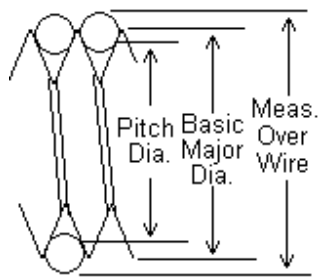
Acme 29 deg

Löwenherz 53 deg 8 min

British Assoc. 47 deg 30 min

ISO Metric 60 deg

More types will be added in future versions.



Calculates Pitch Diameter, Measurement Over Wire, or Basic Measurement Over Wire depending on what you have selected.

After choosing the type of thread you want and have entered the TPI or pitch

you may tap the Thd. Depth button to get the single depth of thread or tap Best Wire to get the best, smallest and largest wire size that can be used.

IF YOU CHOOSE A WIRE SIZE OUTSIDE THE RANGE THEN WHEN YOU CALCULATE YOU WILL GET AN INVALID WIRE SIZE MESSAGE IF YOU WISH TO CONTINUE (NOT RECOMMENDED) SELECT YES

Answers will be in English units with metric in brackets[]

Enter three data items to calculate one of the three options.

1.Measurment Over Wire

2.Pitch Diameter

3.Basic Dimension Over Wire

If you select metric input then all input must be metric wire size etc.

You can enter TPI (Threads per Inch) or pitch (1/TPI for eng. units) by selecting the Entering pitch checkbox.

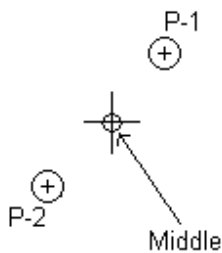
If you want to solve for metric 60 degree thread then select ANSU (the form is indential)then select the pitch and metric checkboxs and enter your data ALL input must be metric wire size included.

If solving for Lowenherz or British Association then the easiest method is to

select pitch and metric input checkboxes and enter metric data (or convert the metric pitch to TPI and diameter to inch but these are metric unit threads, either way will work dont forget to enter metric wire size if metric input checkbox is selected)

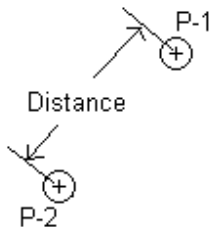
Middle Of Two Points

Enter two points (4 data items X1, Y1 etc.) to calculate middle of the two entered points(X middle, Ymiddle).



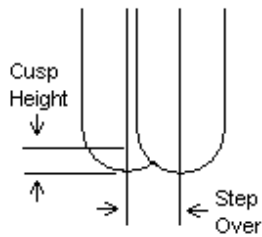
Distance Between Two Points

Enter two points (4 data items X1, Y1 etc.) to calculate the distance between those points.



Cusp Height<->Step Over

Calculates either Cusp Height or Step Over for ball end mill depending on which pushbutton is selected



Material Weight And Length

Calculates the approximate weight, length of material and cost.

Length is to be entered in inches.

Select shape and material type(steel or aluminum) and enter size(s), part quantity and cost per pound to retrieve approximate weight, length and cost of material.

Trigonometry (Right and Oblique Triangle)

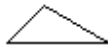
WHEN ENTERING DMS ENTER MINUTES AND SECONDS LESS THAN 10 ENTER WITH A LEADING ZERO 22° 3' 9" as 22.0309

Trigonometry

Select Triangle Type



Right Triangle Trigonometry



Oblique Triangle Trigonometry

Done

Right Triangle

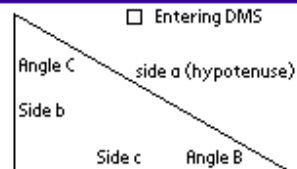
Enter two known items(angle&side, side&side etc.) to solve for other sides and angles also gives inscribed circle and perimeter and area.

Angle answers are given in Decimal Degree and Degrees Minutes Seconds

You may enter Degrees Minutes Seconds by selecting the DMS checkbox.

Right Triangle Trigonometry

☐ Entering DMS



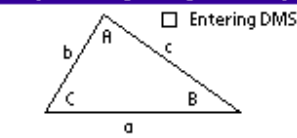
▼ side a & side b

a b

Oblique Triangle

Oblique Triangle Trigonometry

☐ Entering DMS



Sides Angles

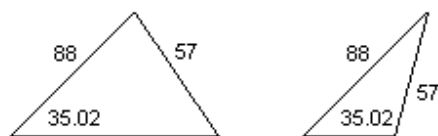
a A

b B

c C

Enter three known items (three angles cannot be entered) to solve for other sides and angles also gives the circumscribed circle, inscribed circle, perimeter and area.

This oblique triangle solver will also solve for the ambiguous case which is when entering two sides and an angle opposite one of those sides there may be two solutions possible as the diagram below explains



while most oblique triangle solvers will not solve for both MTD's will. If this scenario is encountered a message box will alert you to this fact and both solutions will be given (remember two completely separate triangles will be calculated and will take twice as long to calculate)

Intersection Of Two Lines

Enter two lines (8 data items X1 Y1 ,X2 Y2 etc.) to calculate the intersection points.

Ball Substitution

If a print or sketch calls for a gage ball(or roll) that is not available then you can substitute it for another with this function.

You enter both balls the one called for in the print or sketch and the ball you want to replace it with.

Example:

Enter large ball (print or sketch callout or the replacment)

Enter small ball (print or sketch callout or the replacment)

Enter angle (*see Ball Drop for Angle Plane*)

Enter distance (print call out face to ball **enter neg. or pos. values**)

select which ball you are substituting (large or small)

Calculate

You will then be given the new distance from face to ball (+ or - value).

(and plus minus value for ref., this is what was added to the old distance)

Reference Data

Seven reference items for your convenience:

G Codes for Machining Centers

G Codes for Turning Centers

M Codes

Letter Drills

Number Drills

Inch Fractions

Metric Fractions

Tap the menu button to get a drop down menu to return to MTD.

Area \ Volume

Any edition of Machinery's Handbook in the math section (Areas and Volumes) contains diagrams and formulas for

all the items listed below if needed , MTD follows these diagrams,
most do not need a diagram (i.e. Cube enter side) but other
such as trapezium until familiar may need a diagram.

Be sure to enter the radius when specified NOT the diameter .

Acute Angle Triangle

Enter the three sides to get Area

Barrel (arc of circle)

Enter Middle Diameter and End Diameter and Height to get volume

Barrel (arc of parabola)

Enter Middle Diameter and End Diameter and Height to get volume

Circular Ring

Enter Outside and Inside Radii to get Area

Circular Ring Sector

Enter Outside and Inside Radii and Angle to get Area

Circular Sector

Enter any two of Arc Length, Radius, Angle, Area except Angle Area to get the other two.

Cone

Enter Height and Radius or Side and Radius to get Volume Area and the missing item.

Cube

Enter Side to get Volume

Cycloid

Enter Radius of Circle to get Area and Length

Cylinder

Enter Radius and Height to get Area and Total Area and Volume

Ellipse

Enter the Major and Minor Axis to get Area and Circumference

Ellipsoid

Enter the Major and Minor Axis to get Volume

Frustrum of Cone

Enter the Base Diameter and Top Diameter and Height to get Volume

Frustrum of Pyramid

Enter the Base Area and Top Area and Height to get Volume

Hexagon

Enter any one of O.D. or I.D. or Side to get the Area and the two missing items.

Hollow Cylinder

Enter the O.D and I.D. and Height to get the Volume

Hollow Sphere

Enter the O.D and I.D. to get the Volume

Hyperbola

Enter the Base and Height and Half Axis Base and Half Axis Height to get the Area

Obtuse Angle Triangle

Enter the three sides to get the Area

Octagon

Enter any one of O.D. or I.D. or Side to get the Area and the two missing items.

Parabola

Enter the Base and Height to get the Area

Parabola Segment

Enter Chord Length and Size Between to get the Area

Parallelogram

Enter the Two Sides to get the Area

Polygon

**ALL THREE ITEMS ENTERED MUST BE LEGITIMATE DATA
ELSE YOU WILL GET AN INCORRECT ANSWER (GIGO!)
THERE IS NO VERIFICATION OF YOUR INPUT!**

Enter three items (# of side is one of the three that must be entered) to get Area and the missing item.

Portion of a Cylinder

Enter the Two Heights and Diameter to get the Area and Volume

Prism

Enter the Area and Height to get the Volume

Pyramid

Enter the Base Area and Height to get the Volume

Rectangle

Enter the Two Sides to get Area and Diagonal Length

Right Triangle

Enter any two items (Side Opposite, Side Adjacent or Hypotenuse) to get the Area and the third side.

Spandrel or Fillet

Enter the Radius OR Chord to get the Area

Square

Enter the Side to get Area and Diagonal Length

Square Prism

Enter the Height and Length and Width to get Volume

Sphere

Enter the Diameter to get the Area and Volume

Spherical Sector

Enter the Radius and Height to get the Area and Volume and Chord

Spherical Segment

Enter the Radius and Height OR the Chord and Height to get Area and Volume and the missing item

Spherical Wedge

Enter the Radius and Angle to get Area and Volume

Spherical Zone

Enter Chord #1 and Chord #2 and Height to get Area and Volume and the Radius OR the Radius and Height to get Area

Torus

Enter Radius #1 and Radius #2 to get the Area and Volume

Trapezium

Enter the five data items to get the Area

Trapezoid

Enter Side #1 and Side#2 and Height to get Area

Wedge

Enter the four data items to get the Volume

Conversions

125 conversions are available

Select main unit type from popup list, then the unit within that categorie, enter value to convert then tap calculate.

(the ³ symbol is for cubic and the ² symbol is for square)

Length=====

in->cm
cm->in
microinch->micron
micron->microinch
in->mm
mm->in
feet->meters
meters->feet
yards->centimeters
centimeters->yards
kilometers->miles
miles->kilometers

Force=====

pounds->kilograms
kilograms->pounds
ton[short]->ton[metric]
ton[metric]->ton[short]
foot lbs->newton m
newton m->foot lbs

Plane Angle=====

degrees->radians
radians->degrees
quadrants->degrees
degrees->quadrants
radians->quadrants
quadrants->radians
grades->degrees
degrees->grades
revolutions->degrees
degrees->revolutions
radians->grades
grades->radians

Power=====

horsepower->kilowatt
kilowatt->horsepower

Speed=====

in/min->mm/min
mm/min->in/min

ft/min->m/min

m/min->ft/min

ft/sec->cm/sec

cm/sec->ft/sec

ft/sec->km/hour

km/hour->ft/sec

ft/sec->m/min

m/min->ft/sec

mph->km/hour

km/hour->mph

Volume=====

oz->ml

ml->oz

quart->liter

liter->quart

in->liters

liters->in³

gallons->liters

liters->gallons

ft liquid->gallons

gallons->ft³ liquid

m³ liquid->gallons

gallons->m³ liquid

cm³->in³

in³->cm³

hogshead->hl

hl->hogshead

Temperature=====

=

fahrenheit->celsius

celsius->fahrenheit

celsius->kelvin

kelvin->celsius

fahrenheit->rankine

rankine->fahrenheit

fahrenheit->kelvin

kelvin->fahrenheit

celsius->rankine

rankine->celsius
reaumur->celsius
celsius->reaumur
fahrenheit->reaumur
reaumur->fahrenheit
rankine->reaumur
reaumur->rankine
kelvin->reaumur
reaumur->kelvin

Pressure=====

=

lb/in²->bar
bar->lb/in²
N/mm²->lb/in²
lb/in²->N/mm²
lb/in²->kgs/m²
kgs/m²->lb/in²
lb/in²->kgs/cm²
kgs/cm²->lb/in²
lb/in²->kPa
kPa->lb/in²
kPa->bar
bar->kPa
dabar or MPa->lb/in²
lb/in²->dabar or MPa
bar->MPa
MPa->bar

Area=====

in²->mm²
mm²->in²
in²->cm²
cm²->in²
feet²->cm²
cm²->ft²
ft²->m²
m²->ft²
yd²->m²
m²->yd²

mi²->km²

km²->mi²

acres->hectares

hectares->acres

acres->mi²

mi²->acres

ft²->acres

acres->ft²

Mass=====

pounds->kilograms

kilograms->pounds

pounds->grams

grams->pounds

ounces->grams

grams->ounces

ounces->kilograms

kilograms->ounces

ounces->pounds

pounds->ounces

grain->centigram

centigram->grain