Calypso Construction Features
Construction Features

The Construction dropdown menu contains several useful construction features that can be used to compare two other features or perform special calculations.

Construction features will show up a teal blue color in the CAD window with the parent features highlighted in purple. Also, construction features will have a blue box outlining their symbol in the features list and will list the parent features in parentheses.
A Perpendicular construction feature draws a new feature (typically a line) through the first selected feature and perpendicular to the second selected feature.

As an example, the screenshots on the right show a perpendicular line created through the center of a front through bore (Circle 1) and perpendicular to the top plane (Plane 2).
Construction Features: Intersection

When intersecting a cylinder or cone with a plane in order to find the resulting circle, you must click the “Wall” check box. If Wall is not checked, your result will be a point at which the axis of the cylinder or cone intersects the plane.
Construction Features: Symmetry

A Symmetry feature allows you to draw a feature symmetric to two other features. In this example, a symmetry plane has been drawn between the left and right planes of the part. This creates a plane in the exact middle of the part.
Construction Features: Edge Point

An Edge Point can be used to determine the (X,Y,Z) coordinates of an edge created by two or three planes. This is similar to (but less accurate than) creating an intersection of two or three planes.

Feature 1 and Feature 2 must be points taken on the intersecting surfaces. If a third feature is needed, it may be a point or plane on the third intersecting surface.
A Projection is similar to an Intersection feature, but enables circles to be used as selectable features. This construction feature projects Feature 1 (typically a circle or other point feature) onto or up to Feature 2 (typically a plane).

As an example, the screenshot to the right shows a measured circle being projected up to the top plane surface.
Construction Features: Tangent (Calypso 4.6)

A Tangent construction feature is new in the Calypso 4.6 version.

This allows the user to draw a 2-D line from a point tangent to a circle, or a 2-D line tangent to two circles.
The Tangent construction menu allows the user to select which tangent line they wish to output.
Construction Features: Min/Max Coordinate

A minimum or maximum coordinate feature is used to lock onto the minimum or maximum actual data point within a feature.

An example of when this would be useful is when trying to determine the location of a small step or edge break in a bore.

A 2-D Line can be scanned starting just before and ending just after the small step or edge break. As shown in the screenshot, the actual data results in a shape that comes to a minimum at the location of the small step or break.
As seen in a straightness plot of the 2-D line, the lowest point (marked in the red circle) is the point that the Minimum Coordinate feature will lock onto. This point marks the location of the small step or break.

The maximum or minimum coordinate feature can then be used in a characteristic to find the required information.
Construction Features: Min/Max Coordinate

Please pay special attention to the “REFERENCE” box in the Min/Max Coordinate constructions.

The results will be different depending upon the choice you make.
Construction Features: Min/Max Coordinate

**ACTUAL FEATURE**

- Nominal defined by fit of a perfect feature through raw data
- Max Coordinate point is the highest point relative to the ACTUAL fit feature
- Min Coordinate point is the lowest point relative to the ACTUAL fit feature

**NOMINAL FEATURE**

- Nominal defined by the nominal values entered in the feature
- Max Coordinate point is the highest point relative to the NOMINAL feature
- Min Coordinate point is the lowest point relative to the NOMINAL feature
A Minimum, Maximum, or Average Feature will allow the user to determine the feature with the min/max/average selected quality from a defined list of measured features.

As an example, it is necessary to determine the minimum, maximum, and average diameter of the nine circles in the program shown here.
Construction Features: Min/Max/Average Feature

After choosing Diameter from the extensive list of available qualities, and selecting all of the features using the “Select Existing Features” button, the Maximum Feature will determine which of the selected features has the largest actual diameter and display the feature’s name and information in the Maximum Feature window.

The feature will also highlight in the CAD window.
Maximum, Minimum, and Average Features all look and act the same with the exception of the final result. They are perfect for sorting through several similar features to determine which is the largest, smallest, longest, shortest, highest, lowest, closest, furthest, and so-forth. A list of all possible qualities to sort with can be found on the next slide.
Construction Features: Min/Max/Average Feature

Available feature qualities for Min/Max/Average Features

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<tr>
<td>Cone Angle</td>
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</tbody>
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Distance Symmetry | Curve Length
A Cone Calculation feature allows us to perform many calculations to any cones that you may have.

We can find a diameter at a given length of the cone, find the length of a cone at a given diameter, or simply select another feature and find the diameter of the cone at an intersect with the second feature.
Construction Features: Plane with Offset

A Plane with Offset feature will allow you to choose a plane within your program, then create a new plane at a desired offset distance. This was useful in helping us to find the diameter of a sphere at a given offset distance from the top plane.
A Circle in Contour Best Fit feature will take a plane profile (curve) of elliptical or gothic shape and fit a circle of defined diameter within the curve.

Output of this construction feature includes X,Y,Z position of the circle, tangent points, point at max gap, and X,Y,Z,R of both bend circles.
Construction Features: Circle in Contour Best Fit

If you have a large curve with several possible locations of a best fit circle within the contours of the curve, it will be necessary to copy-paste the original curve and delete data points in order to evaluate only a section of the curve.
When you drop in a Circle in Contour Best Fit feature, Calypso will prompt for a diameter of the best fit circle. In the main window, it is also possible to set the minimum contact angle between contact points. These settings help the feature solve for the desired solution.
Construction Features: Circle in Contour Best Fit

In the results section:

Circle in Contour results include the center coordinates of the circle, the gap between the circle and curve on the bisecting line of the angle between tangent points, the angle of the right and left contact points, and the angle between contact points.

Tangent Points results include the coordinate of the right and left tangent points.

Point at Max Gap results include the coordinate of the point and the gap distance.
Construction Features: Circle in Contour Best Fit

The other two options in the results section are right and left bend circle calculations. This is a way to determine the curvature of the feature curve at the two tangent points.

This can be found using either a specified number of adjacent points to the tangent point, or a specified angle range from the tangent point.