L I T I O

V. 1.3 for BricsCAD

User's guide

Description

What LITIO is and does.

LITIO is a sheet metal add-on for BricsCAD (originaly for AutoCAD and also tailored for GStarCAD), that calculates and draws the flat sheet development of ducts, rectangle-to-round transitions, cylinders, cones, pipe intersections, connections, bifurcations, elbows, etc. It is ideal for the sheet metal-processing industry: for HVAC, hoppers, cyclones, dust extraction, ducts, conveying systems, silos, piping, etc.

LITIO is a third-party application addon works within BricsCAD v.8 and higher (either Classic, Pro and/or Platinum) with a high performance/cost ratio.

Warning: Check LITIO compatibility with your BricsCAD system by yourself and make sure it works undisturbedly. LITIO is SHAREWARE, t.i., you can test a DEMO of the program before placing your purchase to get the full-working version. Do not place any license purchase if you are not sure LITIO is good for you.

Warning: Future compatibility of LITIO software with your current or future BricsCAD system depends on BRICSYS compatibility policies.

Note: **Litio** [Eng.: Lithium] is the lightest (easiest) metal. Thus, with the name **LITIO** we mean a light, easy to use sheet metal program for BricsCAD.

Hardware & Software Requirements

What you need to run LITIO.

LITIO2 is an add-on: if you can run BricsCAD v.8 and above (either Classic, Pro and/or Platinum) successfully, you will run LITIO2. You have no need of DFX conversions: Make your developments directly in BricsCAD.

Warning: **IMPORTANT:** LITIO files are not interchangeable: You should download the proper version of LITIO software (either the AutoCAD version (v.2), the GStarCAD version (v.2), or the BricsCAD version (v.1)).

Standards

To calculate unfolded development lengths LITIO 2.0 follows the criteria set forth in the following standards:

The unfolded length of the sheet is calculated according to German standard **DIN 6935**.

DIN 6935: Cold Bending of Flat Rolled Steel Products

DIN 6935 Beiblatt 1: Cold Bending of Flat Rolled Steel Products; Factors for Compensating Value v for Calculating the Flat Length

DIN 6935 Beiblatt 2: Cold bending of flat steel products; calculated compensating values

Remarks

Important facts you should know.

The information herein may be modified without previous warning.

We reserve the right to review and to improve the Program and this publication. This publication might not describe the state of the Program at the moment of its publication, and may not reflect the state of the Program in the future.

All registered trademarks are property of their owners.

See page 5 to see agreement highlights and page 32 to see agreement.

Visit LITIO web page at:

www.litio.si

e-mail:

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Visit LITIO web page for updated contact info.

Agreement Highlights

Downloading of DEMO is deemed as your acceptance of all terms and conditions of the user agreement (as shown on page 32) and as follows:

- You shall agree to all terms.
- This program is copyrighted. You shall not sell, lend, forward, modify, crack, etc. the program.
- Trial is limited to a 60-day term. After that you shall erase all files of the program from your computer, or purchase a license(s).
- We can modify the program or the information without notice.
- The program is provided AS IS and you use it at your own risk.

Program limitations for unregistered users

Evaluation version [Demo] has some limitations. There are thickness limitations (see page 25) and you are not able to input any offset values. Thus, all patterns made using this evaluation version will be centred.

You are not able to make developments of pipes intersecting cones at an angle of 90°. You are not able to make developments of bifurcations of parallel ends. Also conical bifurcations are not available.

Registration and Pricing

Please visit our web page at www.litio.si for price, updated registration information, and multiple-user pricing.

Installation

The program is installed by placing ALL of the following files in the "SUPPORT" directory of **BricsCAD**:

- litio.slb
- litio.dcl
- litio.vlx
- litio.cfg

Warning: The program could not run or not run properly if one or more of the files mentioned is/are missing. Do not place the **.zip** file in the **support** folder; unzip it. Do not place the files in a folder in the **support** folder, but directly in the **support** folder.

Use

First you need to load the program in the current drawing session. After loading you need to call it.

The program is loaded by typing the following in BricsCAD's command prompt:

(load "LITIO")↵

(The parentheses and the quotation marks shall be included; the symbol "↵" of the crooked arrow means the "ENTER" key).

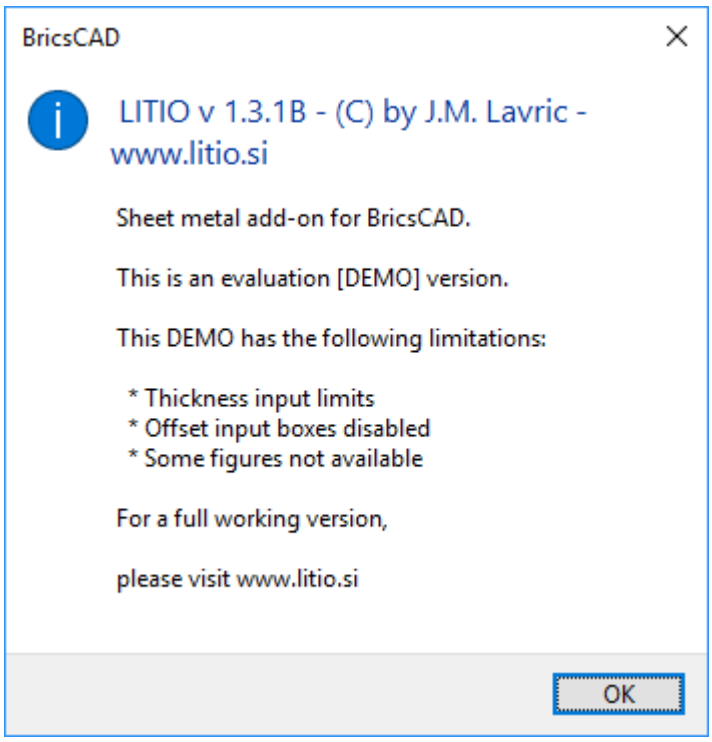
To start the program type:

LITIO↵

Refer to page 30 to load the program using the APPLOAD command.

Dialogue boxes

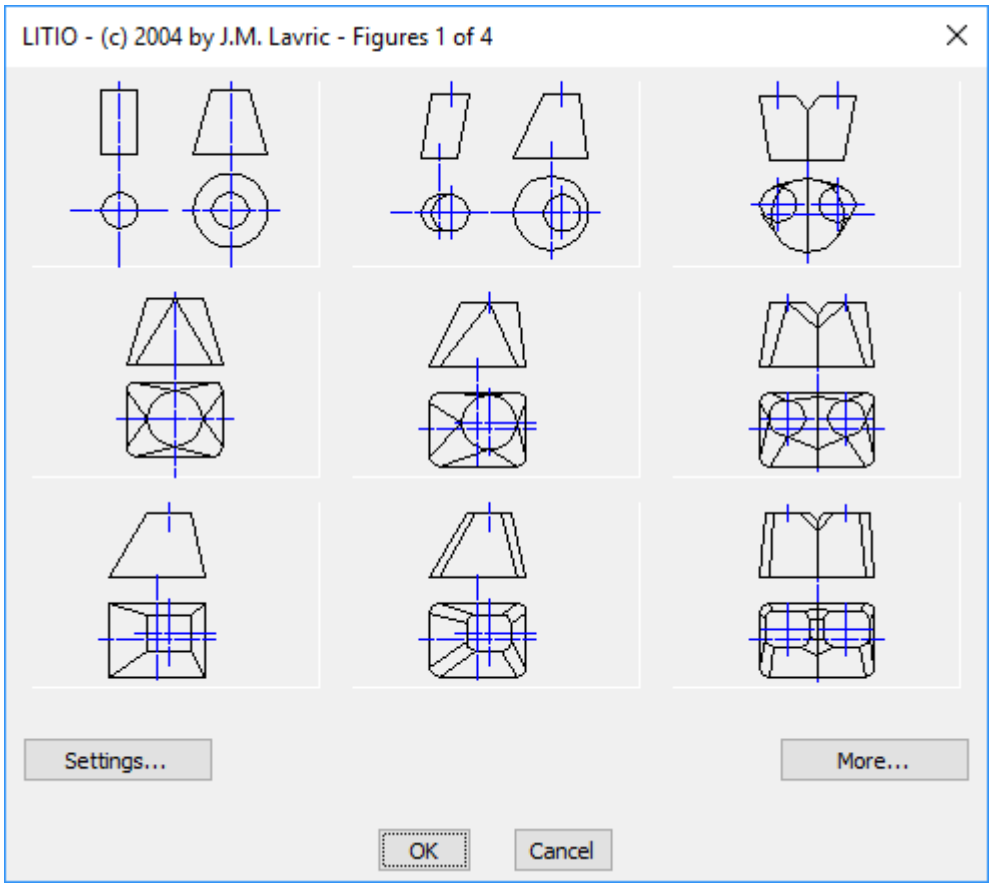
Greeting box



Registered users: Such greeting box (saying you have purchased a registered, full working version) appears only once per each drawing session, at the first run.

Not registered users: This greeting box appears every time you run the program; it can get repeated if you use it repetedly in the current drawing session.

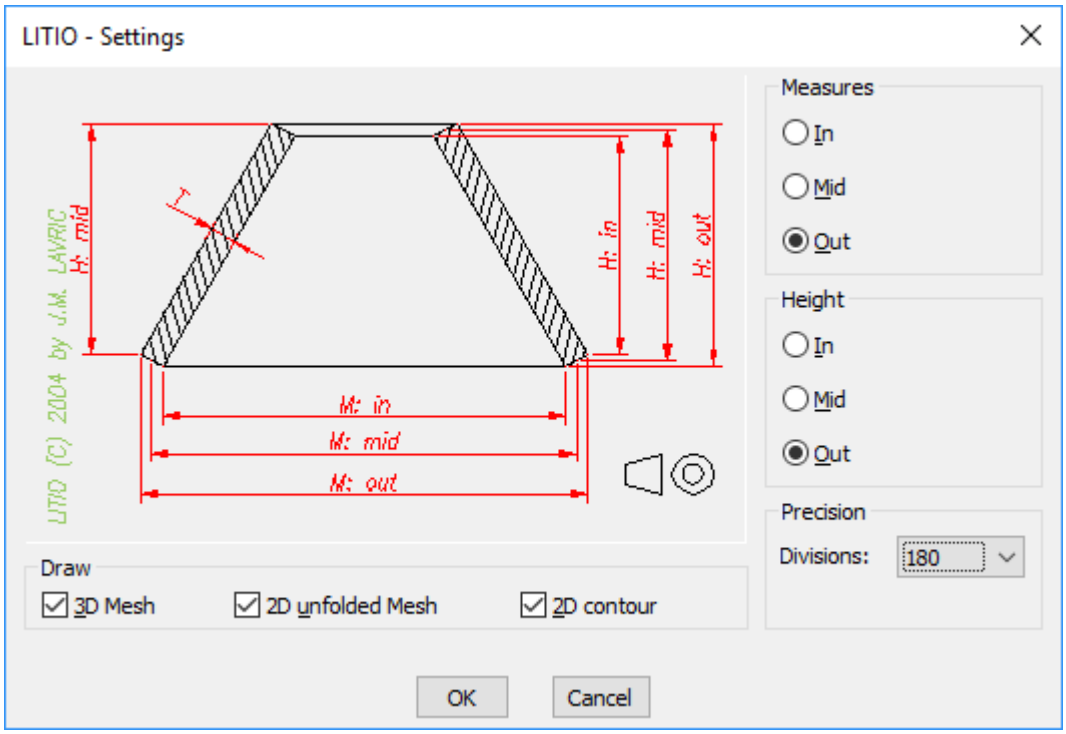
Pattern selection



Here you select the 3D surface you want to unfold. Pressing the **"More..."** button more patterns are shown.

If you press the **"Settings..."** button, you leave this dialogue to go to the **Settings dialogue**.

Settings

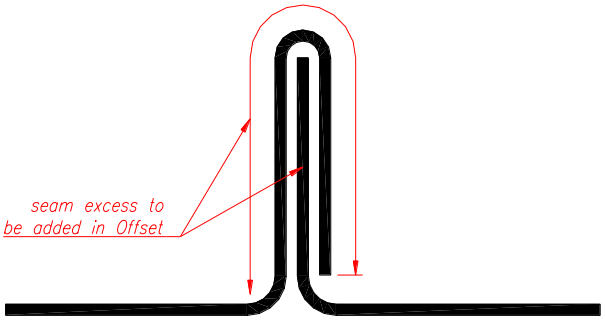


Here you can select to use either inside, outside, or mid cross sectional dimensions.

You can select to use either inside, outside, or mid height specifications.

Ticking the proper option you can select to draw or not the original 3D surface, and the unfolded sheet. The unfolded sheet can be drawn as a mesh (to help you when bending the sheet) or as 2D contour (to ease cutting). See page 29 to find which of these options are available for each pattern.

> ***Tip:*** Seams can be welded or folded, depending on the sheet thickness. For a folded seam, you can offset the resulting 2D contour with BricsCAD **OFFSET** command, using an offset distance equivalent of the seam unfolded length. (See next figure).



You can also select the precision of the calculation of the developments. Note that the higher the precision, the slower the process, and the more powerful your computer should be. Too small precision numbers can lead to poor quality developments and to lack of accuracy. It also depends on the kinds, sizes and thickness of your patterns. We consider that a value of 72 is enough for most standard applications.

If you finish the dialogue by pressing **"Cancel"**, none of the selected settings will become effective.

But if you finish the dialogue by pressing **"OK"**, the selected settings will become effective for all the following patterns and they will be saved in the configuration file.

Warning: In some operating systems, to run LITIO your user needs to have the permissions or privileges to access or modify files in the SUPPORT folder (LITIO modifies the litio.cfg file when you make configuration [settings] changes).

To solve this problem, you need to be logged-in as an administrator, or, you need to get the necessary permissions or privileges. (If not, when making configuration [settings] changes, they will not have any effect, and LITIO will crash).

Another solution is to place all LITIO.* files in a directory (folder) you have permissions to modify, and add the folder to the BricsCAD's support files search path.

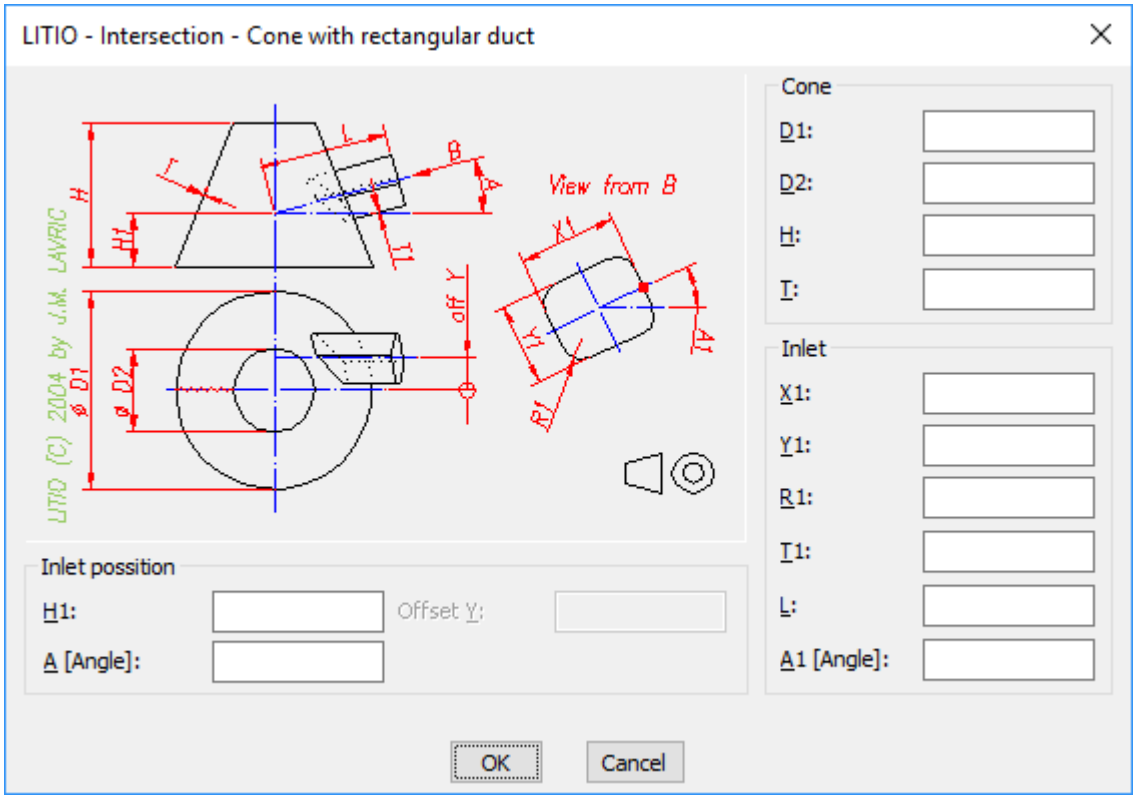
Metric Units/Imperial units: the program automatically sets the units according to the units used in the current drawing session (according to the values of MEASUREMENT and LUNITS system variables). (Refer to your BricsCAD user manual for further information on Metric and Imperial units, and on the use of MEASUREMENT and LUNITS system variables).

Parameters: Input boxes

Note: A detailed explanation of all the possible dialogues was deemed not necessary. A typical pattern is used as a general example.

See page 18 for a complete list of patterns and their drawings.

Dialogue: Intersection - Cone with rectangular duct



Input boxes:

T, T1: Input the value of the sheet metal thickness. It must be a positive value (greater than zero).

H, H1: Input the value of the pattern height, or of the intersection.

D, D1, D2: The diameter of a circular end.

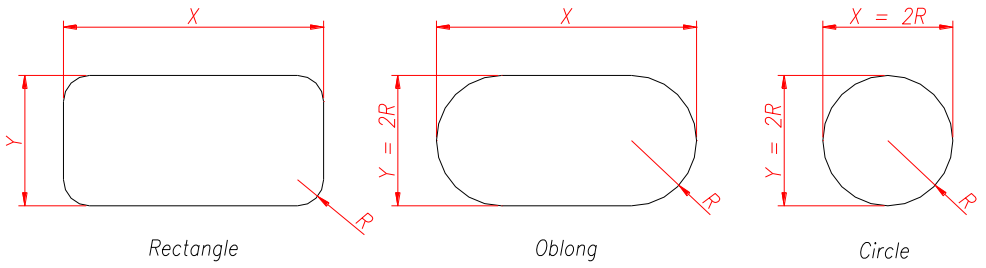
> ***Tip:*** Some patterns accept circular shapes on a rectangular input: If that is the case, input the value of the diameter in X and Y boxes and d/2 in the R box. But we recommend to use the specific input box, if available. (see more below).

L, L1: The length of a pipe branch.

X and Y: Length and width of rectangular end.

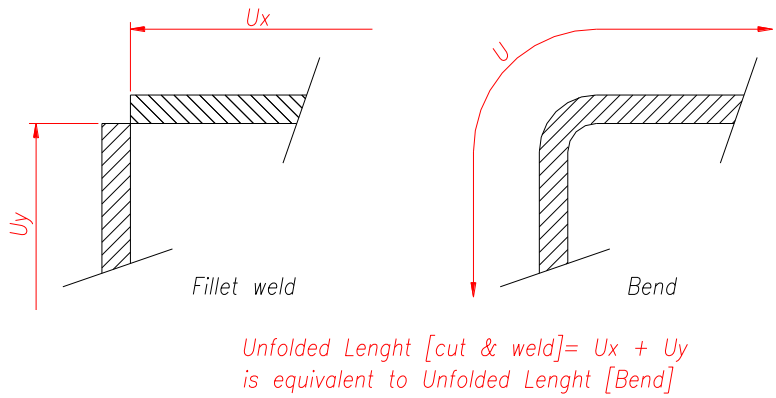
R: Radius of rounded (filleted) rectangular end. It can be the radius of a bend.

> ***Tip:*** You can also have and oblong end, if you make R = X/2 **or** R = Y/2. If X/2 = R **and** Y/2 = R you have a circle.



> ***Tip:*** If you input a negative radius, the program calculates the standard bending radius (according to DIN 6935) and uses it to make all calculations.

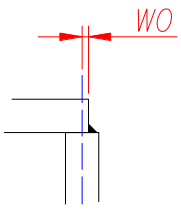
> ***Tip:*** If you input a zero radius (if such input is available) or a radius smaller than the standard bending radius, the program makes all calculations with sharp bends (r = 0). This is equivalent to a development made with the standard bending radius and/or a hopper, the four sides of which are fillet welded each one to the other. [See next Figure and Figure on page 14]. This equivalence is only due for thin sheet patterns (T approximately up to 3 mm [1/8 inch]; with a greater thickness some differences might arise).



Offset X, Offset Y: It refers to the offset of the upper end, relative to the lower end; or of a duct relative to the base of a cone. Thus, the centre of the upper end is at a point located at (x offset; y offset; height) relative to the lower end centre, which is deemed to be at (0.0, 0.0, 0.0); or the relative position of the centre of the inlet pipe end, intersecting a cone, to the base centre of that cone.

A, A1: An angular measure in degrees. It can be the angle between two intersecting pipes (either circular, conical, or of rectangular cross section). Or it can be the rotation angle of the cross sectional axis of a pipe, relative to the horizontal.

WO [weld offset]: Only for rectangular duct bend. WO = 0 means that the end of the side sheet coincides with the centre line of the thickness of the bent sheet. The figure below shows a positive WO value.

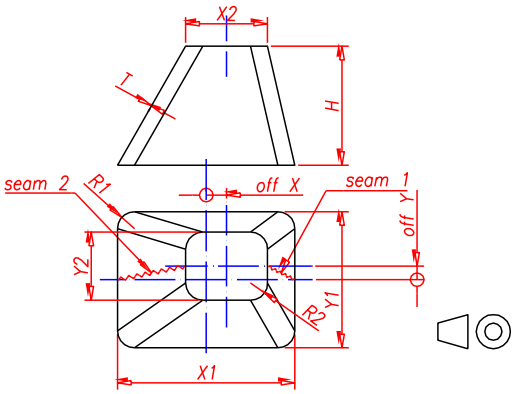


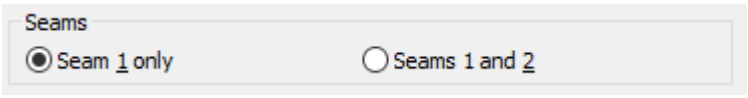
n [whole parts]: Only for round duct bends. n is the number of whole parts, in which the bend is divided (excluding the 2 halves at the ends).

CG [cutting gap]: Only for round duct bends. CG is the distance beetwen two consecutive parts of the bend, to allow cutting without interference. It will be equal or greater than Zero.

Other inputs:

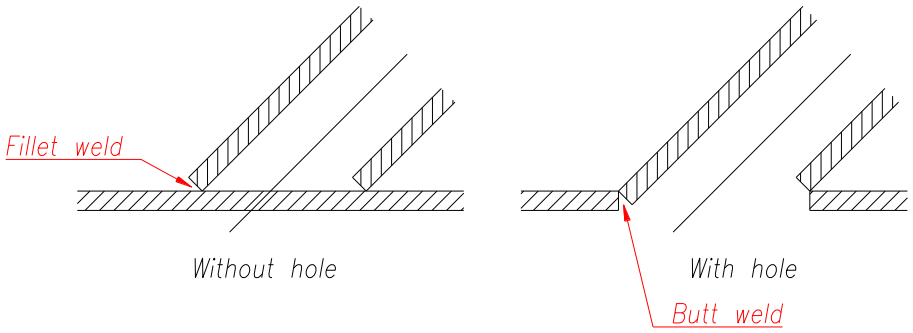
Seam 1 only/Seams 1 and 2: The patterns, for which this option is available, can be drawn in one piece, or in two halves.





Existing pipe: For round pipe bends, branches and bifurcations. If you tick this option, the entity drawn is not a development to cut sheet metal, but a template (for example to be made of paper or a very thin sheet of metal) to wrap around an existing pipe, to mark it and cut it.

Main without hole: For round pipe branches. If this option is ticked, the program will omit to draw the hole on the main, and will draw the according branch (which differs from the branch of a main with a hole). In one case the seams are butt welds, and in the other fillet welds [if thick sheet is used]. See the next figure.

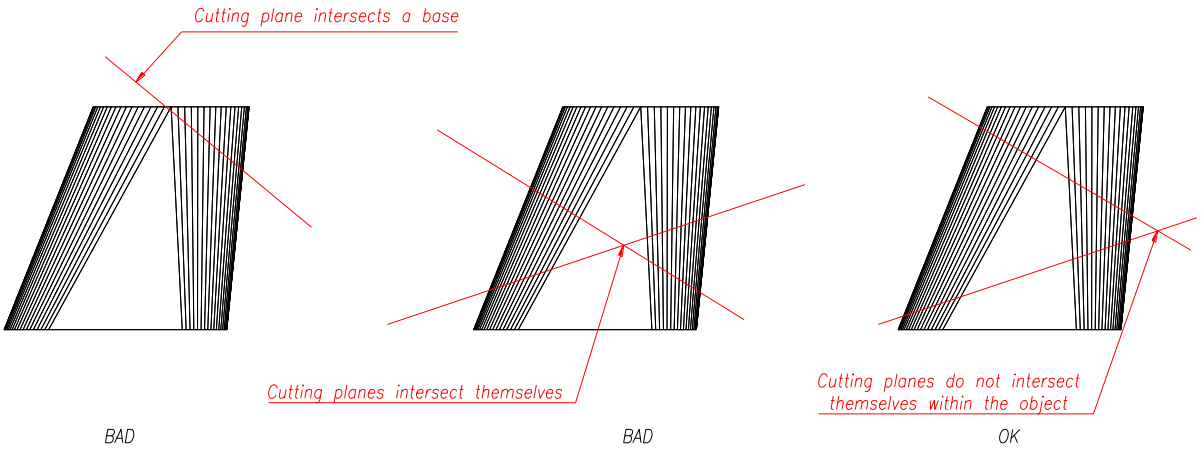


Note: Sheet metal is generally cut perpendicularly to the surface of the sheet. That is intrinsical to the cutting technology (e.g.: plasma cutting, shears, laser cutting, etc). Thus, the drawing on the right also shows what is to be considered when welding patterns [two halves of a bifurcation, the pipe intersecting a cone, the sides of a hopper, etc.]

Two halves/One piece: For the one-angle inlet on cone (N° 20). The inlet can be drawn in one piece or in two halves.

Cutting planes: This option allows you to cut off a part of a pattern, that is above or below a cutting plane, or both. The definition of these planes is made with three points, or a point and an angle; the points are all referred to the centre of the lower end, which is thus to be considered at (0.0, 0.0, 0.0).

Cutting planes requirements: The cutting planes shall not intersect themselves within the pattern. Plane 2 shall be above plane 1. The planes shall not intersect any of the bases [see next figures].



If any of these requirements is not met, the program will display an error message [not valid cutting planes; or cutting planes intersect themselves, etc.]. See page 31, error Messages.

After finishing the input of parameters, the program makes a first verification, to see if they are within the range of

validity of the program algorithms. For ranges of validity of the input values see page 24. If any of these parameters is not correct, the program asks the user to modify it.

When this first verification (which is only preliminary and approximate) is finished, the program performs mathematical calculations, which lead to the 3D entity and the respective development.

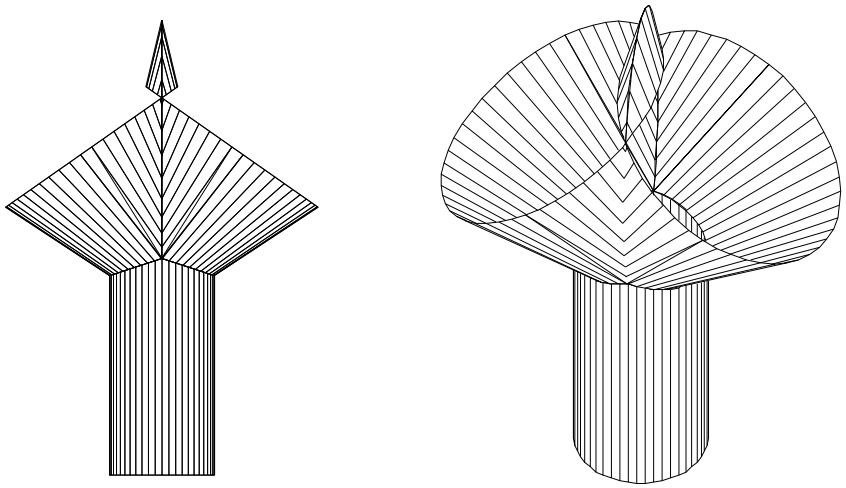
The unfolded sheet can be drawn as a mesh (to help you when bending the sheet), as 2D contour (to ease cutting), or both. (See page 29 to find which of these options are available for each pattern.)

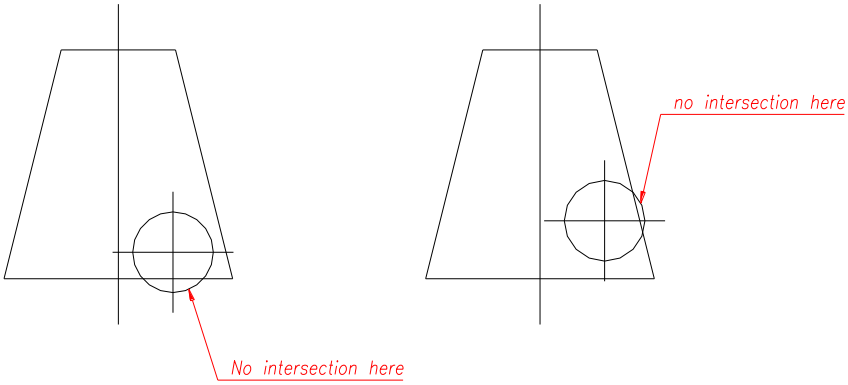
Afterwards, you can use the 2D developments for CAM cutting (plasma, laser, etc.) or manual cutting, by plotting them 1 to 1 (1 d.u. = 1 mm or 1 d.u. = 1 inch), and using them to mark sheet and cut.

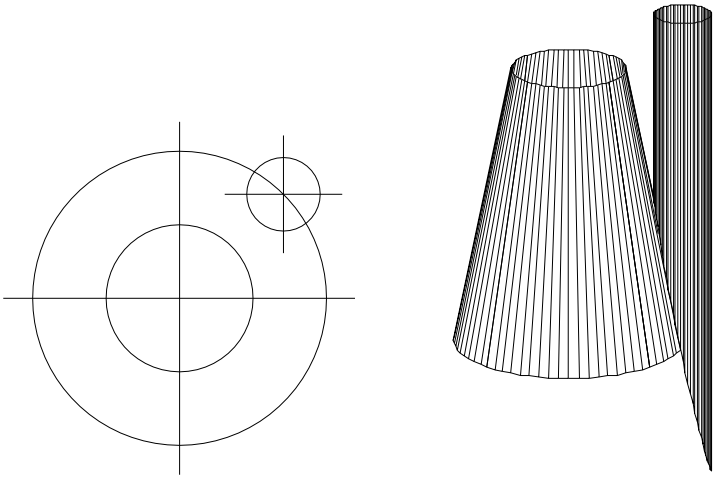
Note: The 3D entity the program draws, is an entity without thickness (thickness = 0). All other dimensions are according the input parameters. Its measures are those of the input (either out, in or mid).

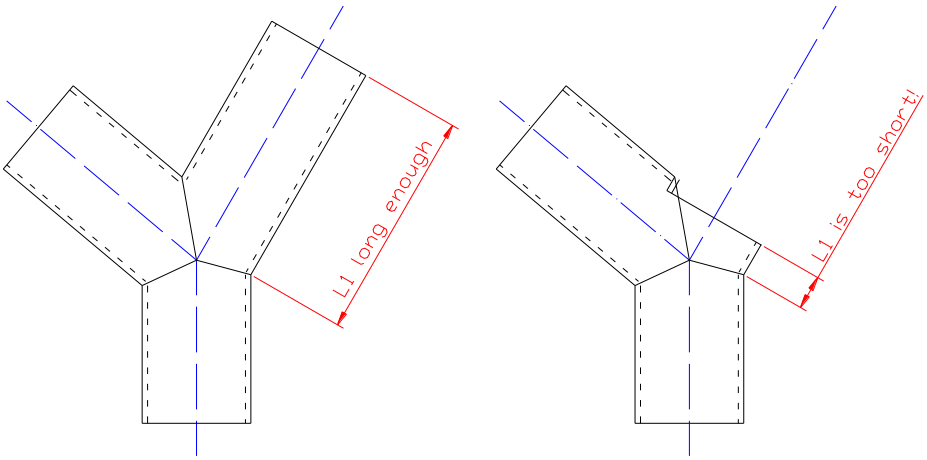
During the development calculation, the program may realise that the pattern is geometrically impossible, that is, that the pattern cannot actually be made. In that case the following error message is displayed: **Error. The pattern is geometrically impossible.**

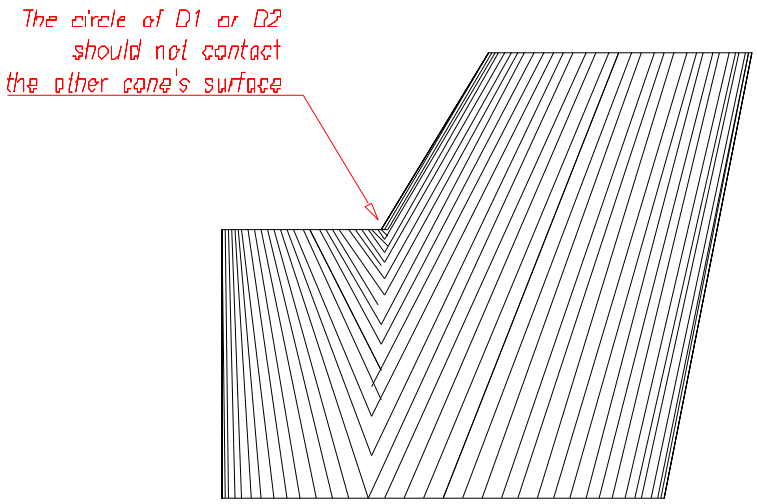
See Figures below for patterns that are geometrically impossible.



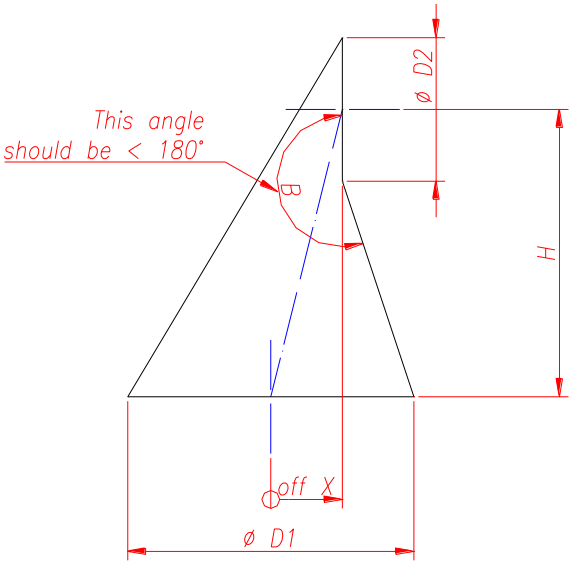

no intersection here
No intersection here




L1 long enough
L1 is too short!



36 Round to Round Bifurcation – Non symmetrical

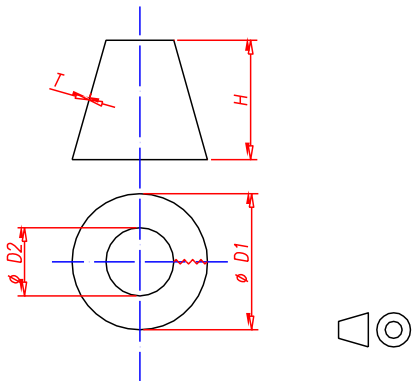


34 Offset Cone - Unparallel

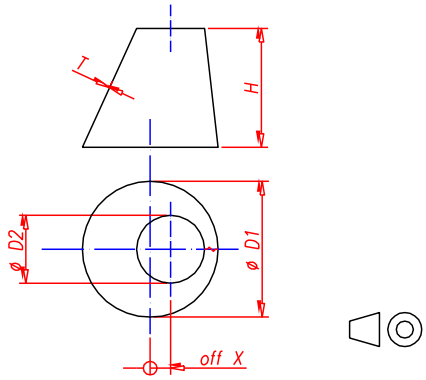
35 Rectangle to Round – Offset - Unparallel

Patterns available

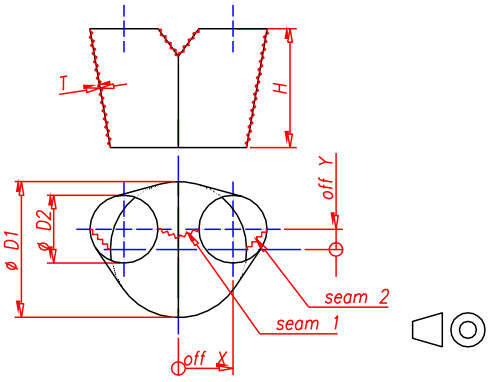
1. Cone



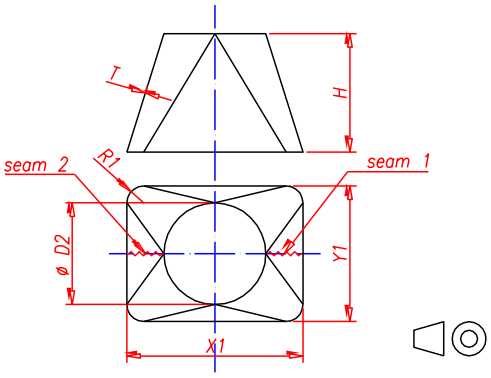
2 Offset cone



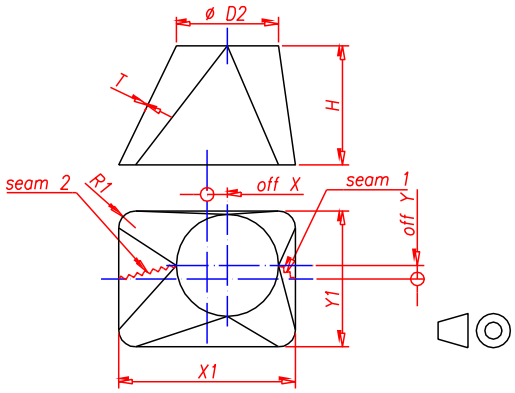
3 Round to round - Bifurcation



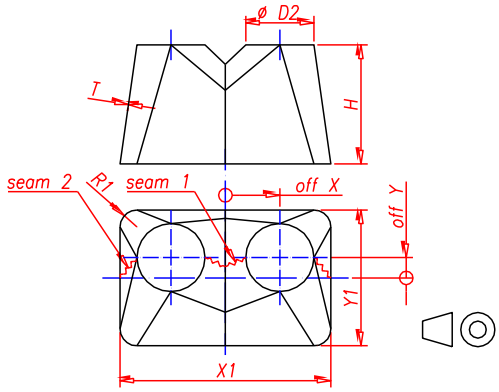
4 Rectangle to round



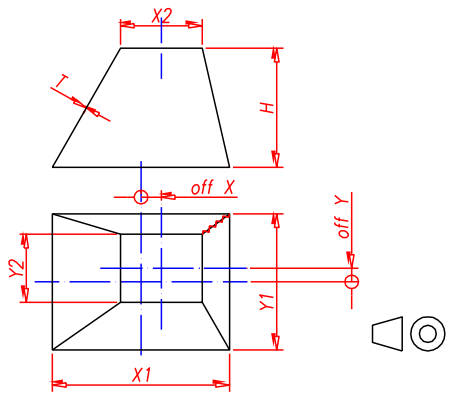
5 Rectangle to round - Offset



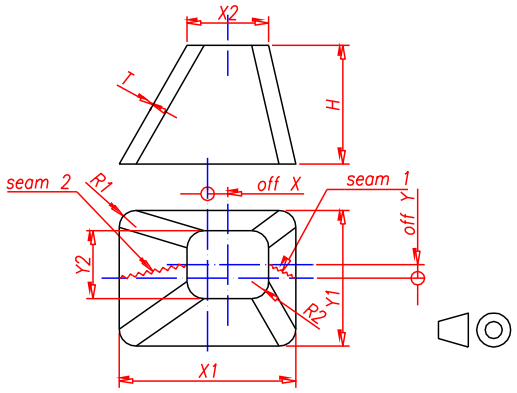
6 Bifurcation - Rectangle to round



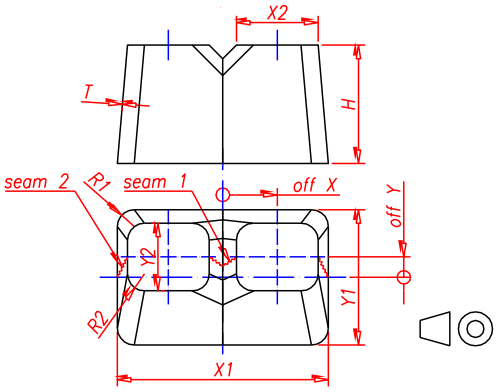
7 Rectangle to Rectangle - Hopper



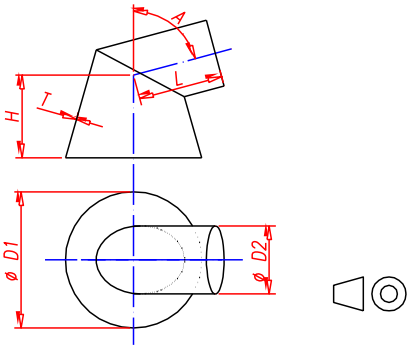
8 Rounded rectangle to rounded rectangle



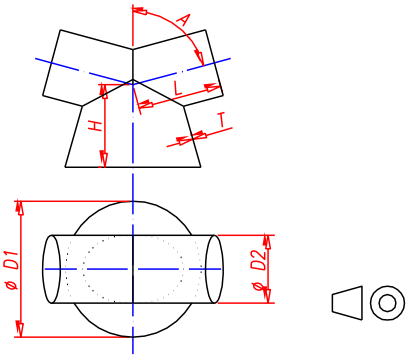
9 Bifurcation - Rounded rectangle to rounded rectangle



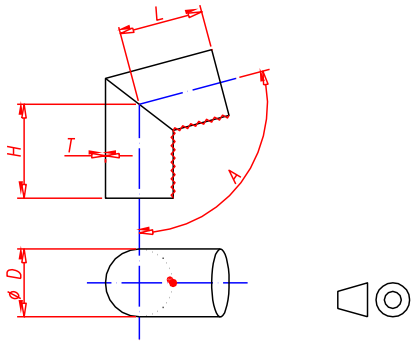
10 Cone to Cylinder - Bend



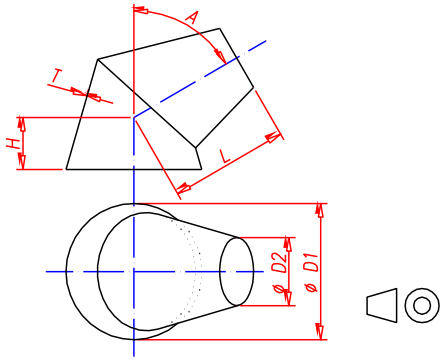
11 Cone to Cylinder - Bifurcation



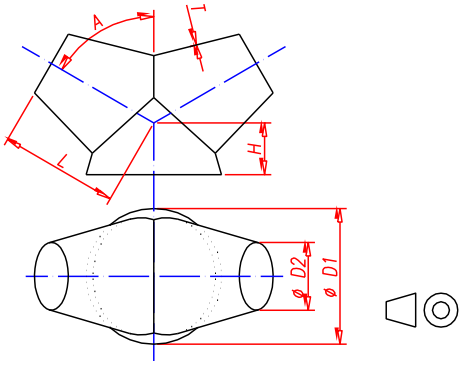
12 Bend - Cylinders



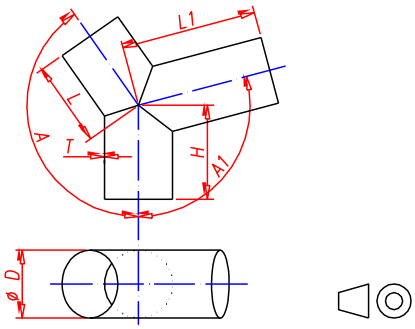
13 Cone to Cone - Bend



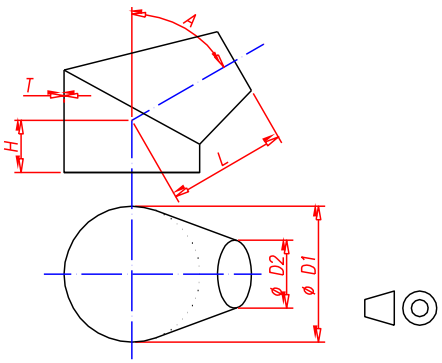
14 Cone to Cone - Bifurcation



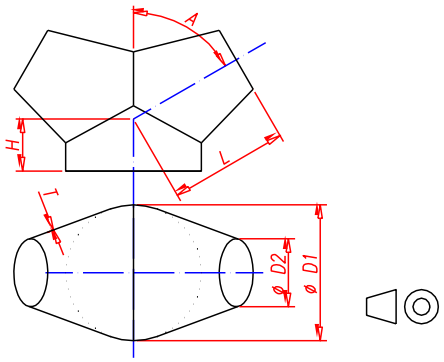
15 Bifurcation - Cylinders



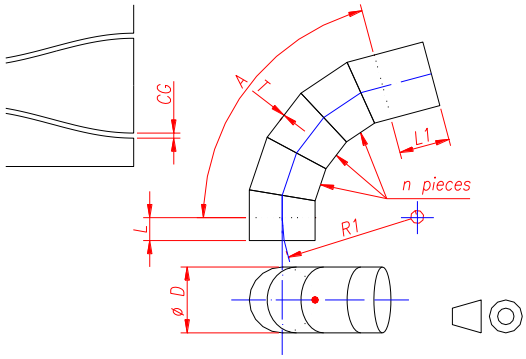
16 Cylinder to cone - Bend



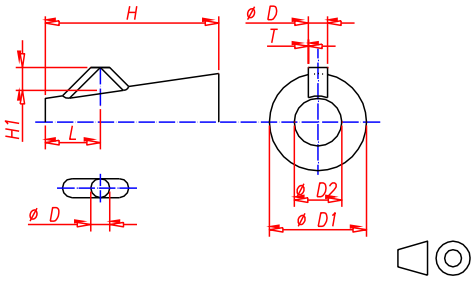
17 Cylinder to cone - Bifurcation



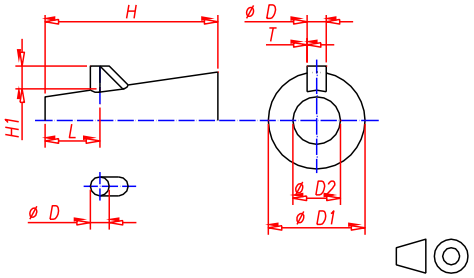
18 Bend - Cylinders



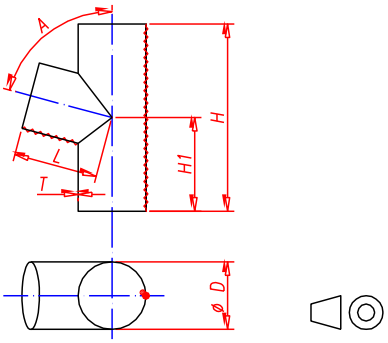
19 Inlet on Cone



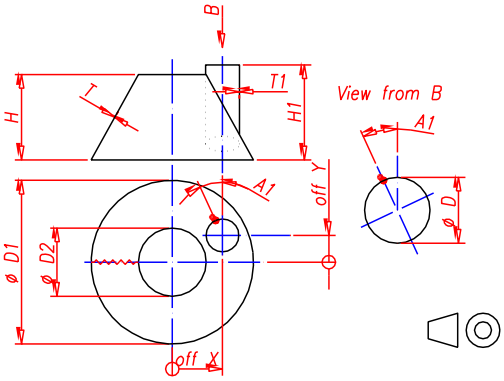
20 Inlet on Cone



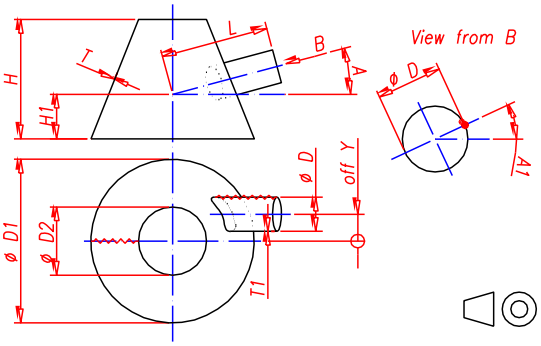
21 Branch - Cylinders



22 Intersection - Cone with round duct - 90°

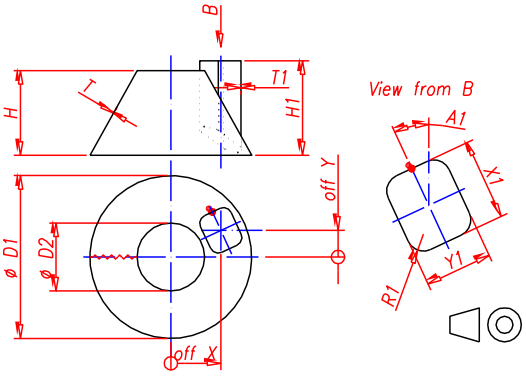


23 Intersection - Cone with round duct - angle

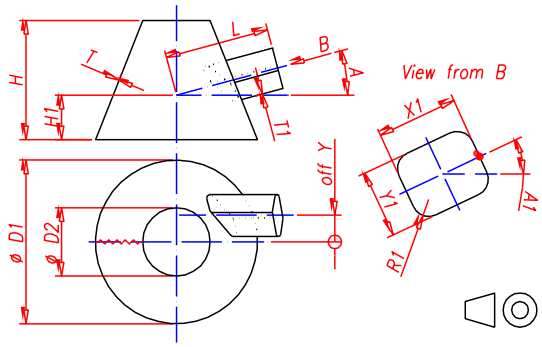


24 Reserved

25 Intersection - Cone with rectangular duct - 90°

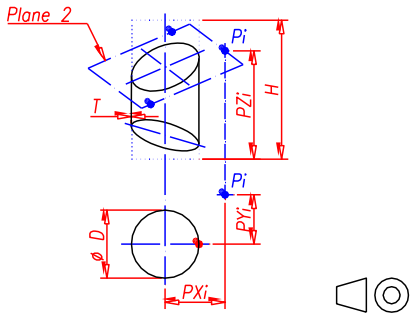


26 Intersection - Cone with rectangular duct - angle

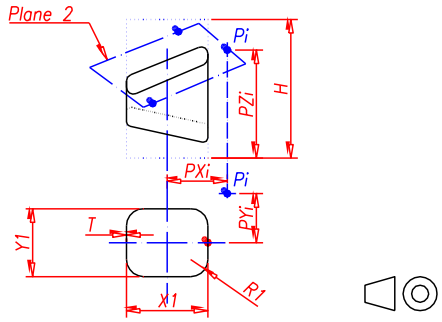


27 Reserved

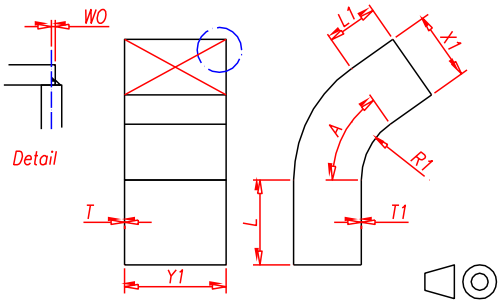
28 Cut Cylinder



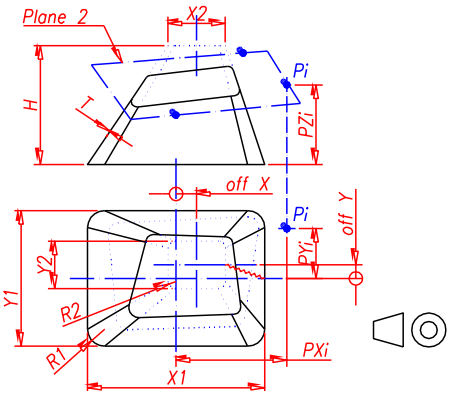
29 Cut Cylinder - Rounded rectangle



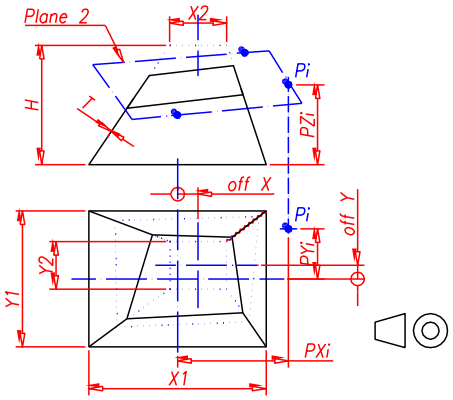
30 Rectangular duct - Bend



31 Rounded rectangle to rounded rectangle - cut

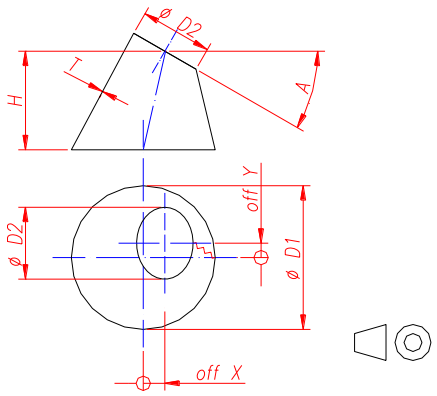


32 Rectangle to Rectangle - Hopper - Cut

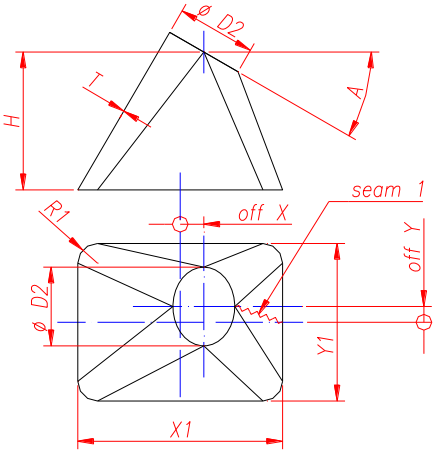


33 Reserved

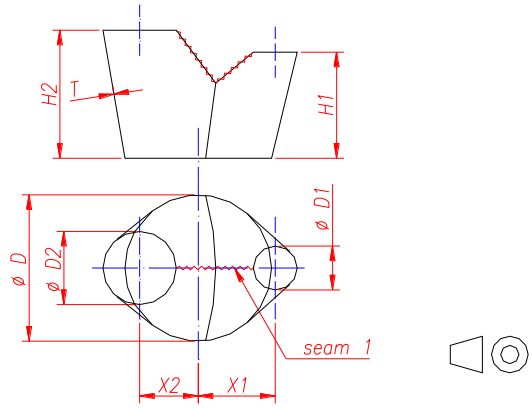
34 Offset Cone - Unparallel



35 Rectangle to Round – Offset - Unparallel



36 Round to Round Bifurcation – Non symmetrical



Note: X2 as drawn, is positive.

Input parameters for each pattern

	T [thickness]	T1 [thickness]	H [height]	H1 [height]	L [length]	L1 [length]	off X [offset]	off Y [offset]	WO [weld offset]	CG [cutting gap]	D [diameter]	D1 [diameter]	D2 [diameter]	A [angle]	A1 [angle]	X1 [length]	Y1 [width]	R1 [radius]	X2 [length]	Y2 [width]	R2 [radius]	n [whole parts]
1 Cone	*		*									*	*									
2 Offset cone	*		*				*					*	*									
3 Round to round - Bifurcation	*		*				*	*				*	*									
4 Rectangle to round	*		*										*			*	*	*				
5 Rectangle to round - Offset	*		*				*	*					*			*	*	*				
6 Bifurcation - Rectangle to round	*		*				*	*					*			*	*	*				
7 Rectangle to Rectangle - Hopper	*		*				*	*								*	*		*	*		
8 Rounded rectangle to rounded rectangle	*		*				*	*								*	*	*	*	*	*	
9 Bifurcation - Rounded rectangle to rounded rectangle	*		*				*	*								*	*	*	*	*	*	
10 Cone to Cylinder - Bend	*		*		*							*	*	*								
11 Cone to Cylinder - Bifurcation	*		*		*							*	*	*								
12 Bend - Cylinders	*		*		*						*			*								
13 Cone to Cone - Bend	*		*		*							*	*	*								
14 Cone to Cone - Bifurcation	*		*		*							*	*	*								
15 Bifurcation - Cylinders	*		*		*	*					*			*	*							
16 Cylinder to cone - Bend	*		*		*							*	*	*								
17 Cylinder to cone - Bifurcation	*		*		*							*	*	*								
18 Bend - Cylinders	*				*	*				*	*			*				*				*
19 Inlet on Cone	*		*	*	*						*	*	*									
20 Inlet on Cone	*		*	*	*						*	*	*									
21 Branch - Cylinders	*		*	*	*						*			*								
22 Intersection - Cone with round duct - 90°	*	*	*	*			*	*			*	*	*	*	*							
23 Intersection - Cone with round duct - angle	*	*	*	*	*			*			*	*	*	*	*							
25 Intersection - Cone with rectangular duct - 90°	*	*	*	*			*	*				*	*	*	*	*	*	*				
26 Intersection - Cone with rectangular duct - angle	*	*	*	*	*			*				*	*	*	*	*	*	*				
28 Cut Cylinder	*		*								*											
29 Cut Cylinder - Rounded rectangle	*		*													*	*	*				
30 Rectangular duct - Bend	*	*			*	*			*					*		*	*	*				
31 Rounded rectangle to rounded rectangle - cut	*		*				*	*								*	*	*	*	*	*	
32 Rectangle to Rectangle - Hopper - Cut	*		*				*	*								*	*		*	*		
34 Offset cone - Unparallel	*		*				*					*	*	*								
35 Rectangle to round – Offset - Unparallel	*		*				*	*					*	*		*	*	*				
36 Round to Round Bifurcation – Non symmetrical	*		*	*							*	*	*			*			*			

Input values Limits

Unless otherwise stated, the following limits apply for each input parameter.

Thickness limits

A general rule, with some exceptions, can be the following (please see table for the actual limit):

Limit 1: ducts and concentric patterns

Limit 2: eccentric patterns; cone and duct intersections; duct bends and branches; cut ducts

Limit 3: cut patterns; bend cones; cone bifurcations

Where:

	Registered Users	Not Registered Users
Limit 1	38.4 mm [~ 1 ½ inch]	16 mm [~ $^{5}/_{8}$ inch]
Limit 2	19.2 mm [~ ¾ inch]	8 mm [~ $^{5}/_{16}$ inch]
Limit 3	9.6 mm [~ $^{3}/_{8}$ inch]	4 mm [~ $^{5}/_{32}$ inch]

1 Cone	Limit 1
2 Offset Cone	Limit 2
3 Round to round - Bifurcation	Limit 3
4 Rectangle to round	Limit 1
5 Rectangle to round - Offset	Limit 2
6 Bifurcation - Rectangle to round	Limit 3
7 Rectangle to Rectangle - Hopper	Limit 2
8 Rounded rectangle to rounded rectangle	Limit 2
9 Bifurcation - Rounded rectangle to rounded rectangle	Limit 3
10 Cone to Cylinder - Bend	Limit 3
11 Cone to Cylinder - Bifurcation	Limit 3
12 Bend - Cylinders	Limit 2
13 Cone to Cone - Bend	Limit 3
14 Cone to Cone - Bifurcation	Limit 3
15 Bifurcation - Cylinders	Limit 2
16 Cylinder to cone - Bend	Limit 3
17 Cylinder to cone - Bifurcation	Limit 3
18 Bend - Cylinders	Limit 2
19 Inlet on Cone	Limit 3
20 Inlet on Cone	Limit 3
21 Branch - Cylinders	Limit 2
22 Intersection - Cone with round duct - 90°	Limit 2
23 Intersection - Cone with round duct - angle	Limit 2
24 Reserved	
25 Intersection - Cone with rectangular duct - 90°	Limit 2
26 Intersection - Cone with rectangular duct - angle	Limit 2
27 Reserved	
28 Cut Cylinder	Limit 2
29 Cut Cylinder - Rounded rectangle	Limit 2
30 Rectangular duct - Bend	Limit 1
31 Rounded rectangle to rounded rectangle - cut	Limit 3
32 Rectangle to Rectangle - Cut	Limit 3
33 Reserved	
36 Round to Round Bifurcation – Non symmetrical	Limit 3
34 Offset cone - Unparallel	Limit 3
35 Rectangle to round – Offset - Unparallel	Limit 3

Other input limits

Parameter		Lower limit	Upper limit
General limits			
	height H	10 × T	-
	diameter D2	10 × T	-
	diameter D1	10 × T	-
	diameter D	10 × T	-
	length L	5 × T	-
	height H1	5 × T	H
	length X1	5 × T	-
	length Y1	5 × T	-
	radius R1	-	0.5 × (min X1 Y1)
	length X2	5 × T	-
	length Y2	5 × T	-
	radius R2	-	0.5 × (min X2 Y2)
	offset X	-2 × (max H X1 X2)	2 × (max H X1 X2)
	offset Y	-2 × (max H Y1 Y2)	2 × (max H Y1 Y2)
	angle A	0.0	180.0
	angle A1	-180.0	180.0
	weld offset WO	-0.7 × T1	5 × T1
Specific limits			
1 Cone			
D1 ≥ D2			
2 Offset Cone			
D1 ≥ D2			
	offset X	-2 × (max H D1)	2 × (max H D1)
	offset Y	-2 × (max H D1)	2 × (max H D1)
3 Round to round Bifurcation			
	offset X	2 × T + 0.5 × D2	2 × (max H D1 D2)
	offset Y	-2 × (max H D1 D2)	2 × (max H D1 D2)
6 Bifurcation - Rectangle to round			
	offset X	2 × T + 0.5 × D2	2 × (max H X1 D2)
	offset Y	-2 × (max H Y1 D2)	2 × (max H Y1 D2)
9 Bifurcation - Rounded rectangle to rounded rectangle			
	offset X	2 × T + 0.5 × X2	2 × (max H X1 X2)

(continued)

Parameter		Lower limit	Upper limit
10 & 11 [Cone to Cylinder]			
13 & 14 [Cone to Cone]			
16 & 17 [Cylinder to cone]			
Bifurcation & Bend			
D1 ≠ D2			
12 Bend - Cylinders			
	height H	5 × T	-
15 Bifurcation - Cylinders			
A + A1 ≠ 180.0			
360 - A - A1 ≠ 180.0			
	height H	5 × T	-
	height L1	5 × T	-
	angle A	0.0	360.0
A ≠ 180.0			
	angle A1	0.0	180.0
	angle A1	0.0	360.0 - A
18 Bend - Cylinders			
N ≥ 0			
	radius R1	0.5 × D + 3 × T	-
	length L	0.0	-
	length L1	0.0	-
	cutting gap CG	0.0	-
19 Inlet on Cone			
	cone height H	2 × H1 + D	-
	length L	0.5 × D + H1	H - 0.5 × D - H1
	height H1	10 × T	-
	cone diameter D1	D	-
	cone diameter D2	D1	-
20 Inlet on Cone			
	cone height H	2 × H1 + D	-
	length L	0.5 × D	H - 0.5 × D - H1
	height H1	10 × T	-
	cone diameter D1	D	-
	cone diameter D2	D1	-
21 Branch - Cylinders			
	height H	5 × T	-

(continued)

Parameter	Lower limit	Upper limit
22 Intersection - Cone with round duct - 90°		
D1 ≥ D2		
diameter D	10 × T1	-
offset X	0.0	0.5 × D1
offset Y	-0.5 × D1	0.5 × D1
23 Intersection - Cone with round duct - angle		
D1 ≥ D2		
diameter D	10 × T1	-
offset Y	-0.5 × D1	0.5 × D1
pipe length	10 × T	-
angle A	-90.0	90.0
25 Intersection - Cone with rectangular duct - 90°		
D1 ≥ D2		
offset X	0.0	0.5 × D1
offset Y	-0.5 × D1	0.5 × D1
26 Intersection - Cone with rectangular duct - angle		
D1 ≥ D2		
offset Y	-0.5 × D1	0.5 × D1
pipe length L	10 × T	-
angle A	-90.0	90.0
30 Rectangular duct - Bend		
length L1	0.0	-
width X1	10 × T1	-
width Y1	10 × T1	-
radius R1	10 × T1	-
length L	0.0	-

- : no limit

Entities drawn for each pattern

After parameter input, the program draws the 3D entity, the 2D unfolded mesh, and/or a 2D contour of the unfolded mesh, according to configuration settings and the following table:

(In general you can choose not to draw the 3D Mesh and you can choose not to draw either the 2D unfolded Mesh or the 2D contour. See note [0].)

	3D Mesh	2D Mesh	2D contour
1 Cone	No	No	Yes [0]
2 Offset Cone	Yes	Yes	Yes
3 Round to round - Bifurcation	Yes	Yes	Yes
4 Rectangle to round	Yes	Yes	Yes
5 Rectangle to round - Offset	Yes	Yes	Yes
6 Bifurcation - Rectangle to round	Yes	Yes	Yes
7 Rectangle to Rectangle - Hopper	Yes	Yes	Yes
8 Rounded rectangle to rounded rectangle	Yes	Yes	Yes
9 Bifurcation - Rounded rectangle to rounded rectangle	Yes	Yes	Yes
10 Cone to Cylinder - Bend	Yes	Yes	Yes
11 Cone to Cylinder - Bifurcation	Yes	Yes	Yes
12 Bend - Cylinders	No	No	Yes [0]
13 Cone to Cone - Bend	Yes	Yes	Yes
14 Cone to Cone - Bifurcation	Yes	Yes	Yes
15 Bifurcation - Cylinders	No	No	Yes [0]
16 Cylinder to cone - Bend	Yes	Yes	Yes
17 Cylinder to cone - Bifurcation	Yes	Yes	Yes
18 Bend - Cylinders	No	No	Yes [0]
19 Inlet on Cone	No	No	Yes [0]
20 Inlet on Cone	No	No	Yes [0]
21 Branch - Cylinders	No	No	Yes [0]
22 Intersection - Cone with round duct - 90°	Yes	No	Yes [0]
23 Intersection - Cone with round duct - angle	Yes	No	Yes [0]
25 Intersection - Cone with rectangular duct - 90°	Yes	Yes [1]	Yes [0]
26 Intersection - Cone with rectangular duct - angle	Yes	Yes [1]	Yes [0]
28 Cut Cylinder	No	No	Yes [0]
29 Cut Cylinder - Rounded rectangle	No	Yes	Yes
30 Rectangular duct - Bend	No	Yes [2]	Yes [0]
31 Rounded rectangle to rounded rectangle - cut	Yes	Yes	Yes
32 Rectangle to Rectangle - Cut	Yes	Yes	Yes
34 Offset cone - Unparallel	Yes	Yes	Yes
35 Rectangle to round – Offset - Unparallel	Yes	Yes	Yes
36 Round to Round Bifurcation – Non symmetrical	Yes	Yes	Yes

References:

[0]: the 2D contour will be drawn although you have chosen not to draw it.

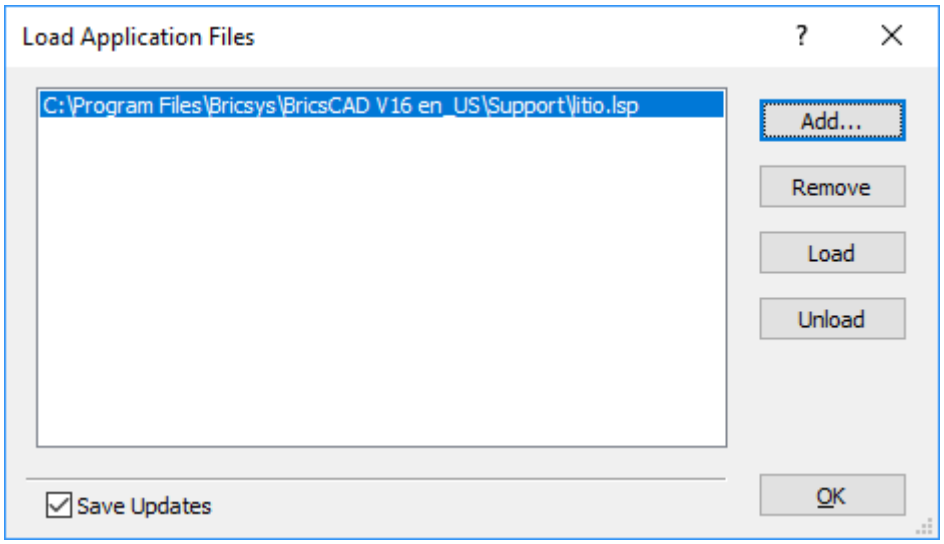
[1]: only the rectangular duct

[2]: only the sides to be bent

Appload

The program can also be loaded by using the **APPLOAD** command.

In the **Load Application File** dialog browse to find the directory where the ***litio.vlx*** file is (usually the **SUPPORT** folder; if not, be sure this directory is included in BricsCAD's search paths). Select the ***litio.vlx*** file, and press the ***load*** button. A message saying "litio.vlx file successfully loaded" should appear in the appropriate message box. Press the ***close*** button. You are ready to use the program.



Error messages

Message	Solution
Cannot find litio.cfg [settings] file It shall be located in an BricsCAD support file search path. Verify file name.	The program is not able to run if this file is missing, corrupted or it is not located in an BricsCAD support file search path. Please refer to BricsCAD user guide.
Cannot find litio.dcl [dialogue] file. It shall be located in an BricsCAD support file search path. Verify file name.	The program is not able to run if this file is missing, corrupted or it is not located in an BricsCAD support file search path. Please refer to BricsCAD user guide.
Cannot find litio.slb [slides] file. It shall be located in an BricsCAD support file search path. Verify file name.	The program is not able to run if this file is missing, corrupted or it is not located in an BricsCAD support file search path. Please refer to BricsCAD user guide.
Cutting planes intersect themselves, or a cutting plane intersects a base.	See page 14 for more details.
litio.cfg [configuration] file corrupted. Verify file integrity.	The file was found but it is corrupted. Download the file again or use your back up files to restore it. If you erase this file [litio.cfg], the program will create a new, uncorrupted file.
litio.dcl [dialogue] file corrupted. Verify file integrity.	The file was found but it is corrupted. Download the file again or use your back up files to restore it.
Error. The pattern is geometrically impossible	See page 15 for more details.
Internal error. Please contact the developer.	The program has made a step that was not foreseen by the author.
Not a valid plane definition. Definition points are aligned or plane is parallel to a generatrix.	See page 14 for more details.
Not a valid plane. Plane is parallel to a generatrix.	See page 14 for more details.
Program execution cancelled	the user has pressed the "Cancel" button, the "esc" key, or otherwise cancelled the execution of the program

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10. Waiver. Failure or neglect by THE DEVELOPERS to enforce at any time any of the provisions of this agreement shall not be construed or deemed to be a waiver of THE DEVELOPERS' rights under this license.

11. Governing law and Severability. This agreement will be governed by and construed according to the laws of the Republic of Slovenia and/or the Republica Argentina and/or any other jurisdiction, at THE DEVELOPERS choice (hereafter THE JURISDICTIONS). The parties irrevocably submit to the jurisdiction of the Courts of THE JURISDICTIONS. This agreement is deemed to have been made in THE JURISDICTIONS. If any provision of this agreement, according to the law of THE JURISDICTIONS, is held invalid, unenforceable or illegal for any reason, this agreement shall remain otherwise in full force apart from such provision or part provision, which shall be deemed, deleted.

12. Entire Agreement. This agreement constitutes the entire agreement between the parties for the subject matter referred to in this agreement. Any prior arrangements, agreements, representations or undertakings are superseded. No modification or alteration of any clause of this agreement will be valid except in writing signed by each party.

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