

Litio 2.0

for AutoCAD and GStarCAD

User's guide
to Version 2.0

Description

What Litio 2.0 is and does.

Litio 2.0 is a sheet metal add-on that calculates and draws the flat sheet development of ducts, rectangle-to-round transitions, cylinders, cones, pipe intersections, connections, bifurcations, elbows, etc. It is easy to use. To be used for HVAC, hoppers, cyclones, dust extraction, ducts, conveying systems, silos, piping, etc.

It is compatible with **AutoCAD** and **GStarCAD**. It works within **AutoCAD R 200X** (and Mechanical Desktop 200X), from release 2000 onwards, and **GStarCAD**.



Warning: Check LITIO2 compatibility with your CAD system by yourself and make sure it works undisturbedly. LITIO2 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 CAD system depends on your CAD system provider's 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 AutoCAD/GStarCAD.

What is new in v.2.0 of Litio 3D?

New version 2.0 has much more patterns, more configuration options, and some very advanced features, which make LITIO2 unique in its category, and which make it competitive to high-priced sheet metal programs.

Some of these new features are:

- **Thickness:** 3D objects are now drawn showing thickness. (You are able to see what kind of bevel preparation you will have to weld 3D objects together).
- **New patterns:** oblique transitions; trifurcations; helices; "S" pieces; conical bends; bends with various cross sections; more branch patterns; intersecting patterns*; free transitions*; etc.
- You can select **in/mid/out** dimensions on both ends of transformations independently.
- You can **trim** (intersect) two 3D objects to get, for example, a conical branch on a square to round transition (or any other combination).*
- You can select in/mid/out **contact** on bend or bifurcation pieces.
- **New 3D developable ruled surfaces generator engine** (you can create your own transitions, just by clicking on any two entities located in your CAD's session 3D space, and which define both ends of the transition).*
- New 3D to 2D **unfolder** engine (you can even unfold your own 3D meshes [N=2], just by clicking on them).
- Easier way to **cut 3D objects with a plane**.* You also get the intersection polyline, for example, to make a cover of a tank, which was cut on an x° plane.
- Enhanced error and dialog **messages** (no more messages like: "Not valid length X1."; now these messages give you much more information).
- Dialogs and error and dialog messages in different **languages** (availability of certain languages. It will be increased in the future.).
- Allowance for **grooved seams** (for thin metal sheet) is made automatically.
- Dimensions that can be either positive or negative, have a "+" symbol drawn in dialog image to show positive direction (E.g., dt X).
- 2D profiles, both pre-set (dialog) profiles or free profiles (picking a 2D polyline).

* Some restrictions apply [see more in this user manual].

Hardware & Software Requirements

What you need to run Litio 2.0.

The program runs within **AutoCAD** and **GStarCAD** (AutoCAD R 200X and/or Mechanical desktop 200X; R2000 or later). LITIO2 is an add-on: if you can run AutoCAD/GStarCAD successfully, you will run LITIO2.



Warning: LITIO software does not run in AutoCAD/GStarCAD Academic, Lite, nor LT versions.



Warning: Check LITIO2 compatibility with your CAD system by yourself and make sure it works undisturbedly. LITIO2 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: IMPORTANT: LITIO2 files are not interchangeable: You should download the proper version of LITIO2 software (either the AutoCAD version or the GStarCAD version).

Standards

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

- **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 34 to see the agreement.

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Visit LITIO web page for updated contact info.

Agreement Highlights

There are some conditions you shall agree to. Downloading of DEMO is deemed as your acceptance of all terms and conditions of the user agreement (as shown on page 34) 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] of LITIO 2.0 has the following limitations:

- DEMO is limited to OFFSET [dtX or dtY] input = 0.0 . If any of them is different to zero, LITIO 2 will draw virtual objects.
- There are also some patterns that are not available in DEMO. LITIO 2 will draw virtual objects [DEMO displays a message in this case].



Note: These virtual objects are not part of the drawing, and will disappear after a ZOOM, REGEN, REDRAW, PAN, etc.



Note: In the case these virtual objects are drawn, text insertions for bending radiuses and/or angles are omitted.

Registration [license purchase]

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 AutoCAD/GStarCAD:

- litio2.slb
- litio2.dcl
- litio2.vlx
- litio2.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.

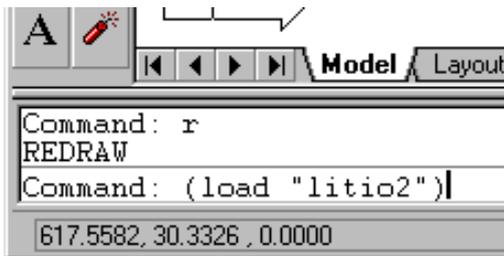
Use

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

The program is loaded by typing the following in AutoCAD/GStarCAD's command prompt:

```
(load "LITIO2")↵
```

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



To start the program type:

```
LITIO2↵
```

Refer to page 32 to load the program using the APPLOAD command.

Refer to page 33 to load the program within AutoCAD 2013 and/or later versions.



Note: Litio v.1.x and Litio v.2.0 can be placed in the same computer, installed in the same AutoCAD/GStarCAD version, and even loaded and run in the same drawing session, without any interference between them.



Warning: In some operating systems, to run LITIO 2 your user needs to have the permissions or privileges to access or modify files in the **SUPPORT** folder (LITIO 2 modifies the **litio2.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 LITIO2 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 AutoCAD/GStarCAD's support files search path.

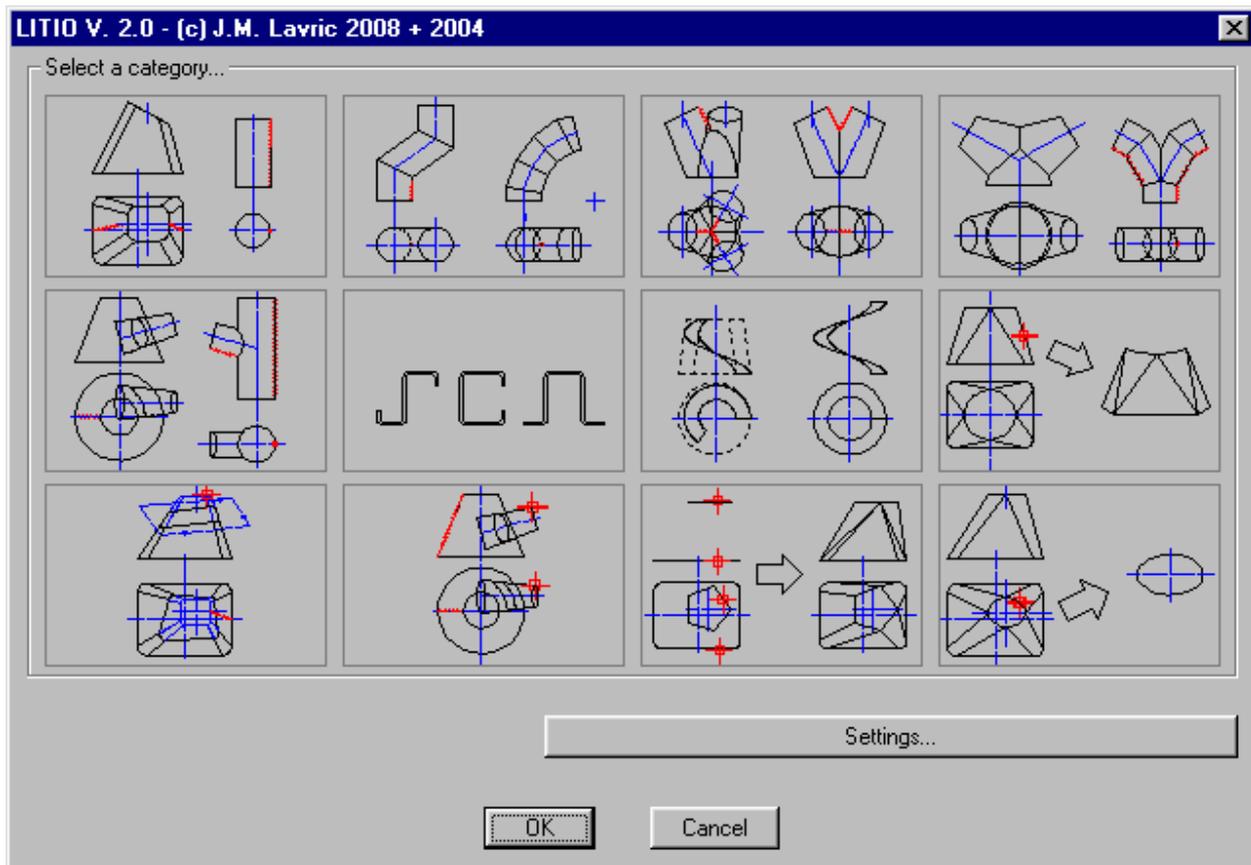
[Dialog boxes](#)

[Greeting box](#)



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

Category selection



This first dialog directs the program to a pattern selection dialog, to a pattern dialog, or directly to an action. It shows the following options:

- [1] Transitions (see page 22).
- [2] Bends and spheres (see page 24). (***)
- [3] Bifurcations [and trifurcations] without a base piece (see page 26).
- [4] Bifurcations with a base piece (see page 27).
- [5] Branches and intersecting 3D objects (see page 28).
- [6] 2D profiles (see page 29 and page 20).
- [7] Helical augers and Helixes (see page 30). (*)
- [8] Existing 3D objects unfold (see page 21). (**)
- [9] Existing 3D objects plane trimmer (see page 20). (**)
- [10] Existing 3D objects intersection trimmer (see page 21). (**)
- [11] 3D developable ruled surfaces generator [free transitions] (see page 18).
- [12] Curve [polyline] extraction from existing 3D objects (see page 20). (**)

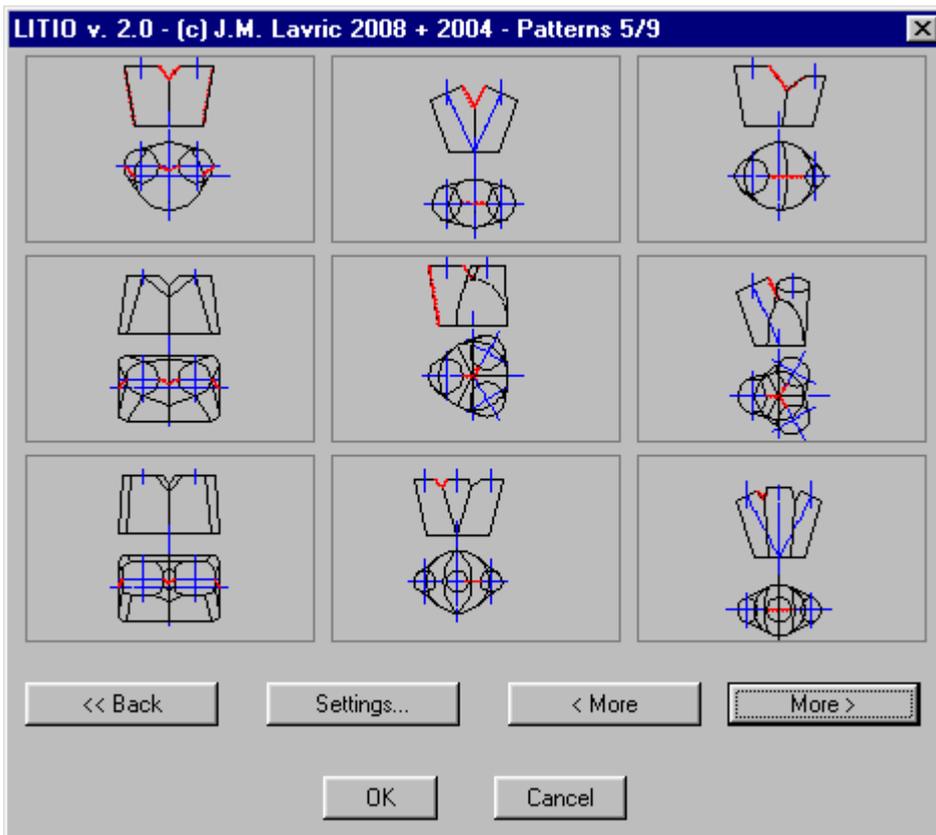
The "Settings..." button directs the program to the Settings (configuration) dialog (see page 10).

Warning: Helixes (*) are not developable surfaces. Any development is just an approximate solution of the 3D surface.

Warning: These features (**) are not available for AutoCAD/GStarCAD native 3D solids.

Warning: Spheres (***) are not developable surfaces. Any development is just an approximate solution of the 3D surface.

Pattern selection



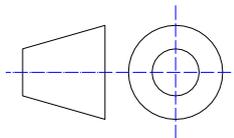
Here you select the pattern you want to generate and unfold. Pressing the "More >" or "< More" button more patterns are shown, and even other categories' patterns are shown.

"<< Back" button goes back to category selection dialog.

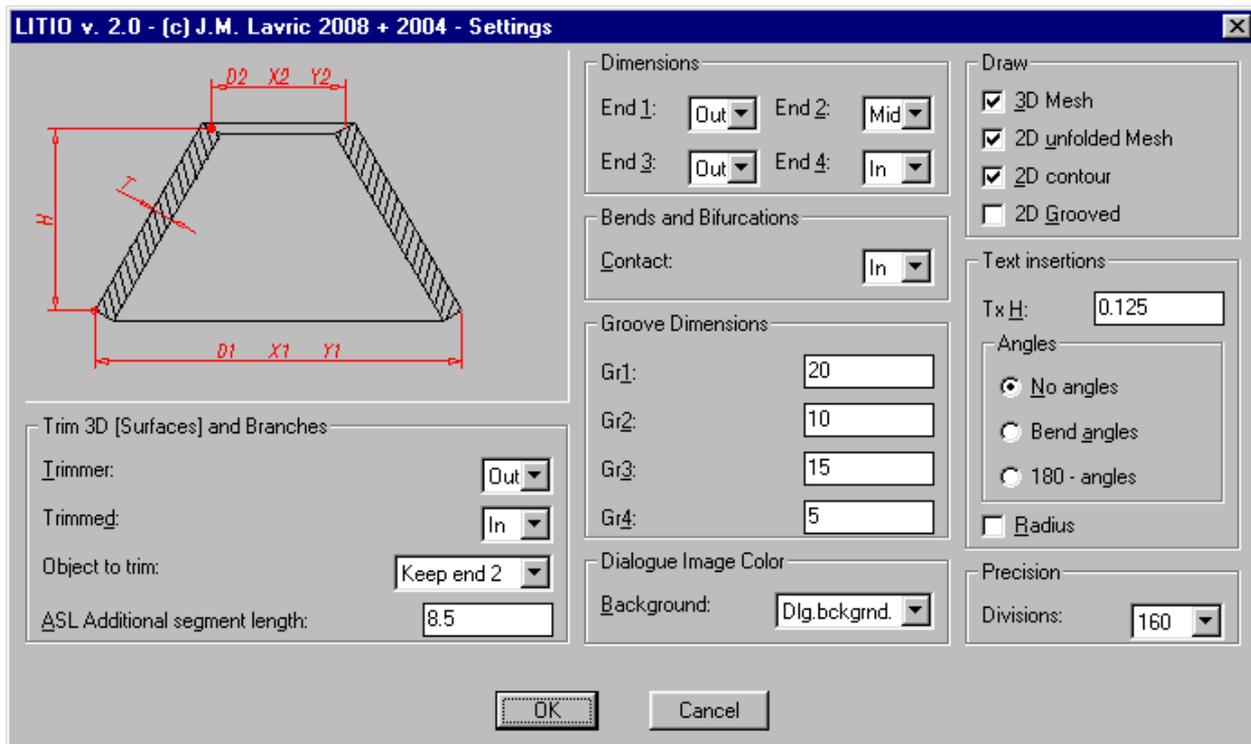
If you press the "Settings..." button, you leave this dialog to go to the **Settings dialog**.



Note: All dialog images are in ISO-E projection.



Settings



Trim 3D [Surfaces] and Branches



Warning: This feature is not available for AutoCAD/GStarCAD native 3D solids.

Trimmer: You can choose either the out/mid/in surface of the trimmer object (either of a dialog or an existing 3D object picked) as the trimmer surface. This is important for bevel preparation for welding. Note that, if plane trim is performed, this control is not used, since the cutting (trimming) plane has a Thickness = 0.0.

Trimmed: You can choose either the out/mid/in surface of the object to be trimmed (either of a dialog or an existing 3D object picked) as the trimmed surface. This is important for bevel preparation for welding. This control is also used if plane trim is performed.

Object to trim: You can choose to keep end 1 or Keep end 2 (as defined in the dialog in which the object was created; if an object was generated by picking two 3D objects, end 1 is the end of the first object picked...).

ASL Additional segment length: For a 3D object trimmed by another 3D object (either in a dialog box or by picking them). Here the program adds some additional generatrices, for the plane faces of the 3D object to be trimmed, to enhance accuracy.

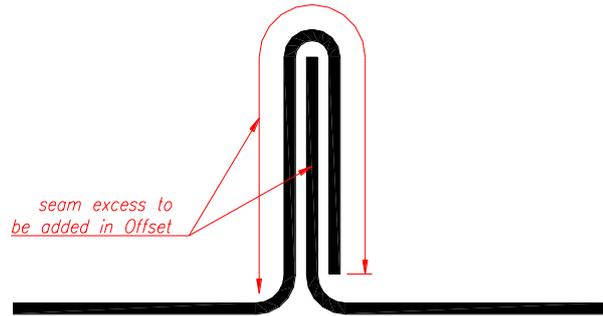
Dimensions:

You can select to use either inside, outside, or mid cross sectional dimensions, independently for ends 1, 2, 3 and/or 4. "1" applies to pipes; lower end of dialog transitions; or first picked entity. "2" applies to upper end of dialog transitions; or second picked entity. "3" applies to branch pipes. "4" is used for second end of a cone to be trimmed by another cone (or cylinder if $D1=D2$). This side is generally trimmed off.

Bends and Bifurcations

Contact: For bends and bifurcations, you can select if the parts have contact on the in/mid/out surface. This is important for bevel preparation for welding.

Groove measures: Seams can be welded or folded, depending on the sheet thickness. You can input, if they are relevant, dimensions for groove preparation allowance. This is particularly useful for very thin sheet metal tubing. (See next figure).



Dialog Image Color: Depending on your screen background color, dialog images are better or worse seen. Here you can select a dialog background color to enhance dialog image visualization, without changing your favorite screen background color.

Draw: 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), as 2D contour (to ease cutting), or as a 2D contour with an allowance for grooved seams.



Note: Not all of these settings are due for all of the patterns. You may be asked for an insertion point and, if the option is unticked, it may not be drawn. And also, even though an option is unticked, it may be drawn anyway.

Text insertions: New version 2.0 helps you bending or forming your patterns. You can have, on each generatrix of the 2D mesh representation, the angle to bend that generatrix (or the 180°-angle), or the approximate bending radius for each space between generatrices, on both ends.

Precision: 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 128 is enough for most standard applications.

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

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

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 AutoCAD/GStarCAD user manual for further information on Metric and Imperial units, and on the use of MEASUREMENT and LUNITS system variables).



Note: If English units are used in the current drawing session (MEASUREMENT = 0), all inputs will be in feet and inches. If metric (MEASUREMENT = 1), inputs are in millimeters. To change from one to the other, type: **MEASUREMENT** in the command line to enter the new value (0 or 1).

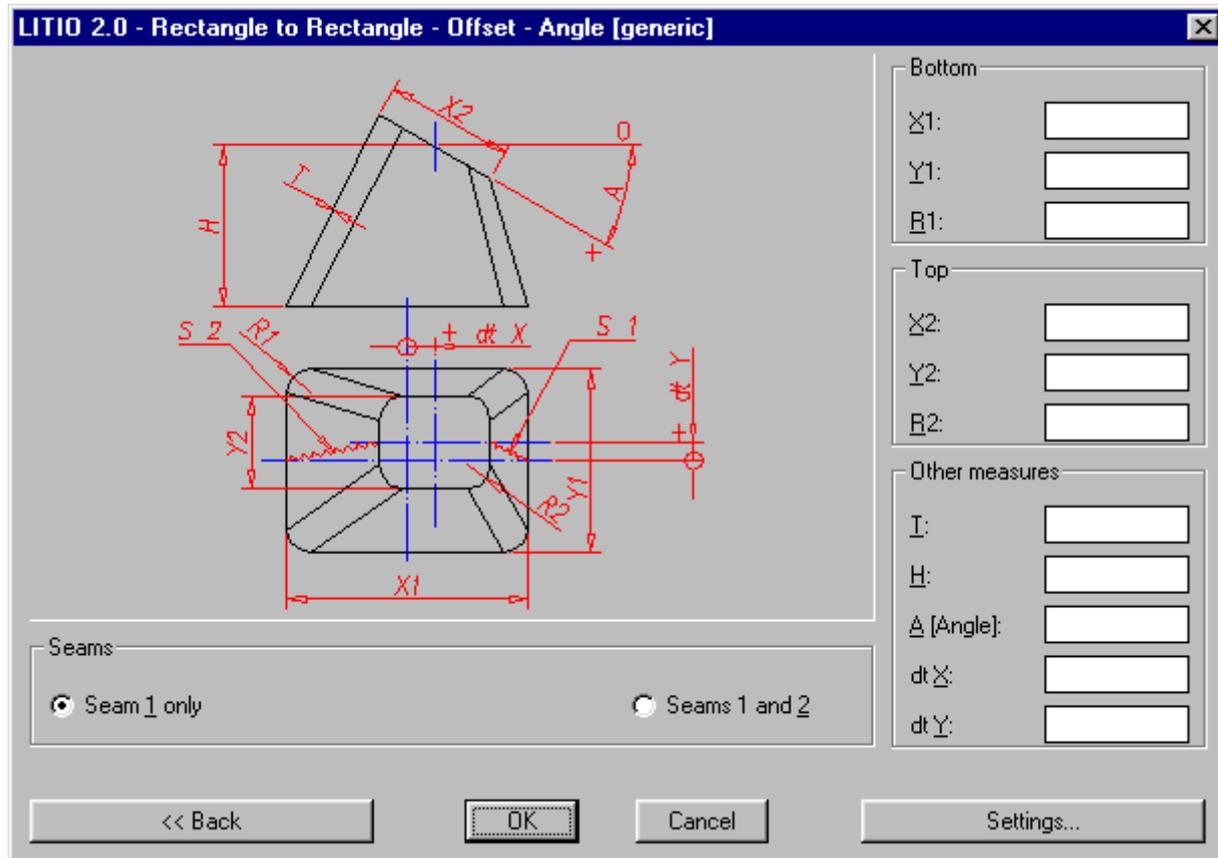
Parameters: Input boxes



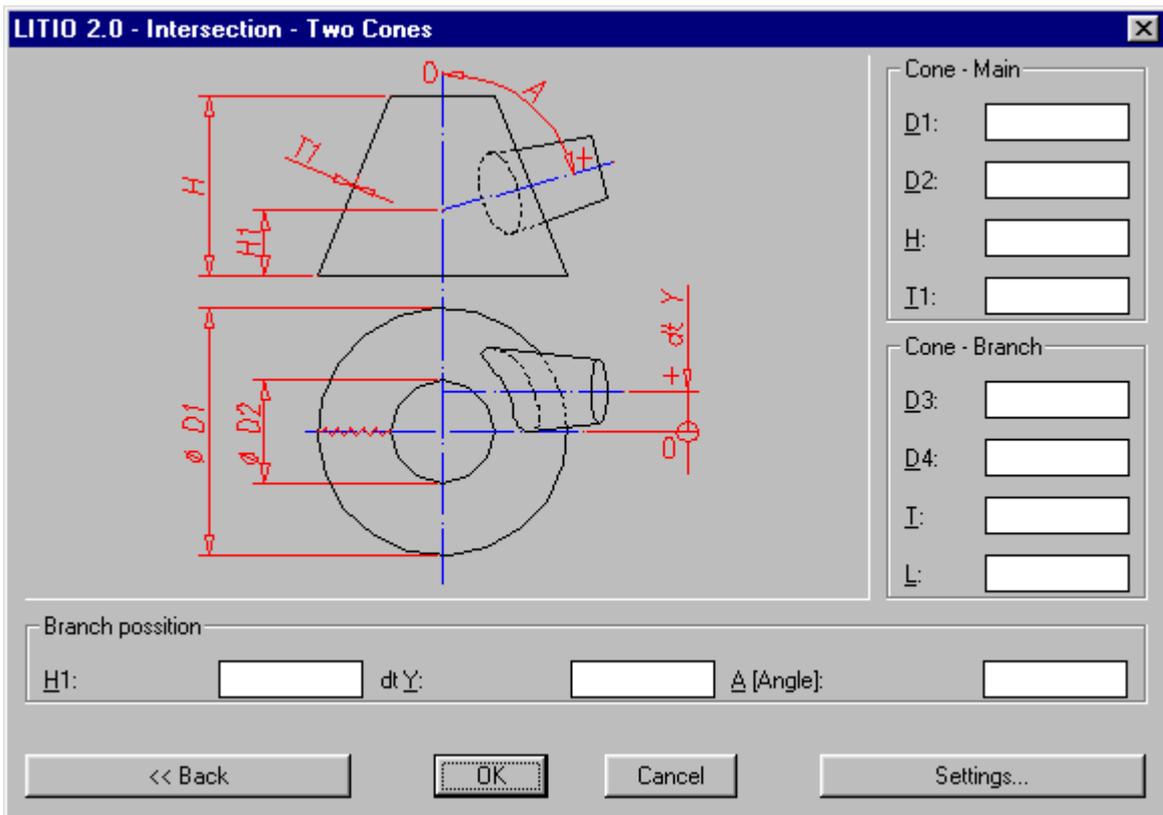
Note: A detailed explanation of all the possible dialogs is deemed not necessary. Some typical patterns are used as general examples.

See page 22 for a complete list of patterns.

Example dialog: Transition – Rectangle to rectangle – Offset - Oblique



Example dialog: Intersection - Cone with cone



Input boxes

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

H, H1, H2: Input the value of the pattern height, or of the intersection.

D, D1, D2, D3, D4: The diameter of a circular end.



Tip: Some patterns accept circular figures 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.

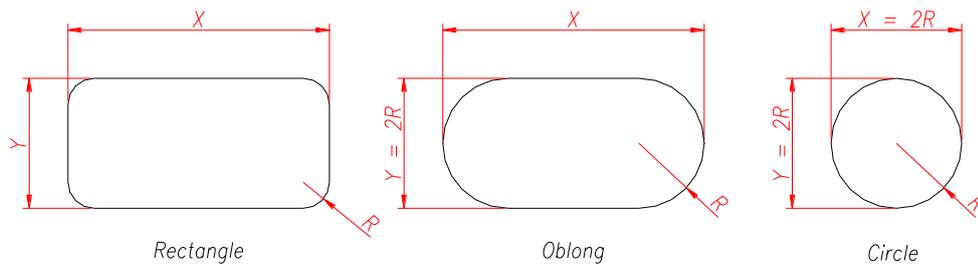
L, L1: The length of a pipe branch.

X and Y (X1, X2, X3; Y1, Y2, Y3): Length and width of rectangular end.

R (R1, R2, R3): Radius of rounded (filleted) rectangular end. It can be the radius of a bend.



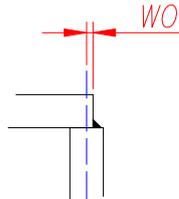
Tip: You can also have an oblong end, if you make $R = X/2$ or $R = Y/2$. If $X/2 = R$ and $Y/2 = R$ you have a circle.



dt X, dt 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. In this case, the center of the upper end is at a point located at (dt x; dt y; height) relative to the lower end center, which is at (0.0, 0.0, 0.0); or the relative position of the center of a branch pipe end, intersecting a cone, to the base center 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 center line of the thickness of the bent sheet. The figure below shows a positive WO value.

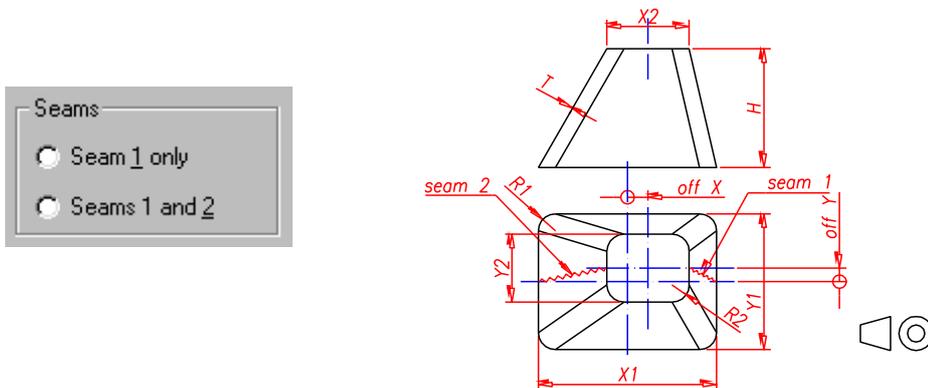


n [parts]: For duct bends of any cross section, n is the number of whole parts, in which the bend is divided (excluding the 2 halves at the ends). For conical bends, it is the amount of parts in which the bend is divided. For polygon cylinders, it is the number of sides of the polygon.

CG [cutting gap]: Only for round duct bends. CG is the distance between 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/Seams 1, 2 and 3: The patterns, for which this option is available, can be drawn in one piece, in two parts, or in four parts.



Existing pipe: For round pipe bends, offset pipes, 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 and cut it.

After finishing the input of parameters, the program makes a first verification, to check that the input would not lead to a 3D object without interferences or geometrical incongruences. If any of these parameters is not correct, the program asks the user to modify it.

 **Note:** Version 2.0 is much more flexible with input parameters than v.1.3.

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.

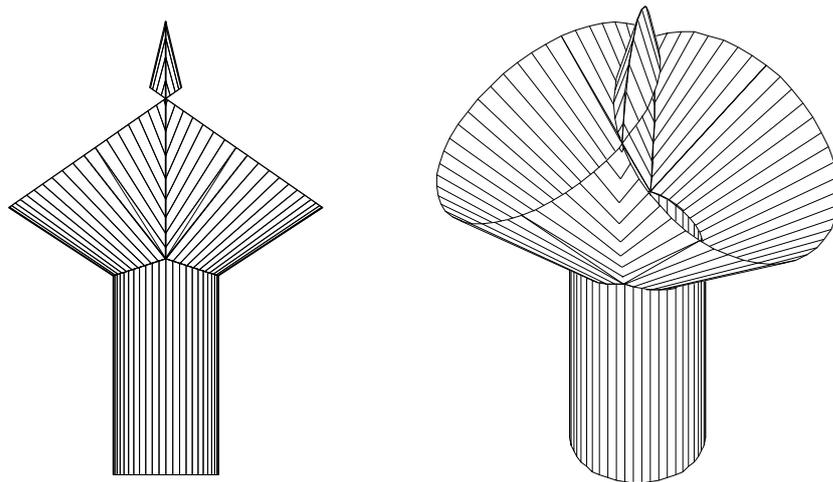
[.si 2014: agregar advertencia, que la representación de agujeros no se hace en el cuerpo 3D, pero si se ahce en el desarrollo]

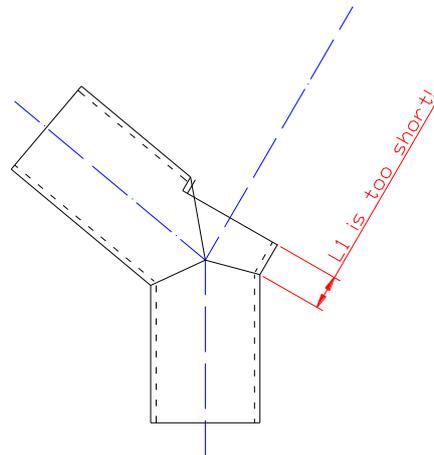
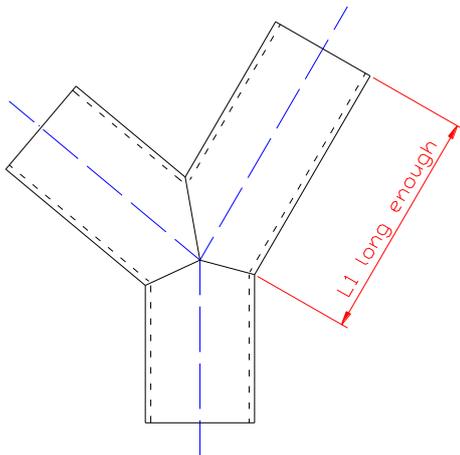
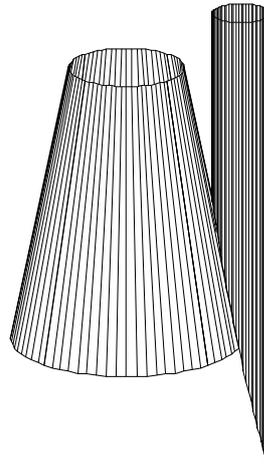
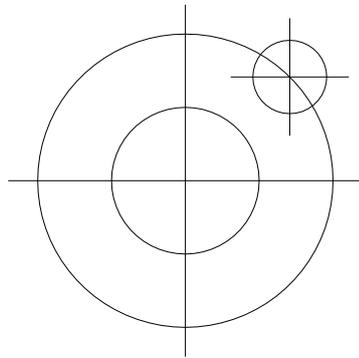
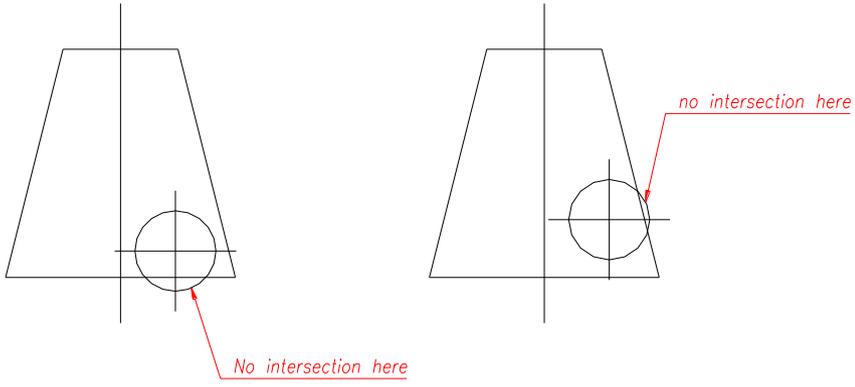
Afterwards, you can use the 2D developments for CAM cutting (plasma, laser, etc.) or manual cutting, by plotting them 1 to 1 (1 d.u. = 1 mm or 1 d.u. = 1 inch), and using them to mark sheet and cut.

 **Note:** The 3D entity version 2.0 draws, is an entity with thickness. All dimensions are according the input parameters.

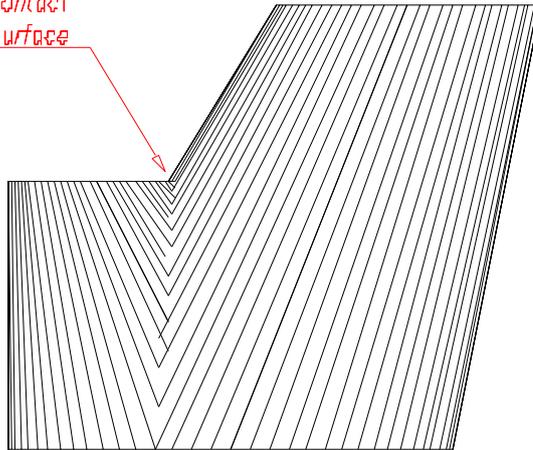
During the development calculation, the program may realize that the pattern is geometrically impossible, that is, that the pattern cannot actually be made. In that case the program warns the user about this.

See Figures below for patterns that are geometrically impossible.

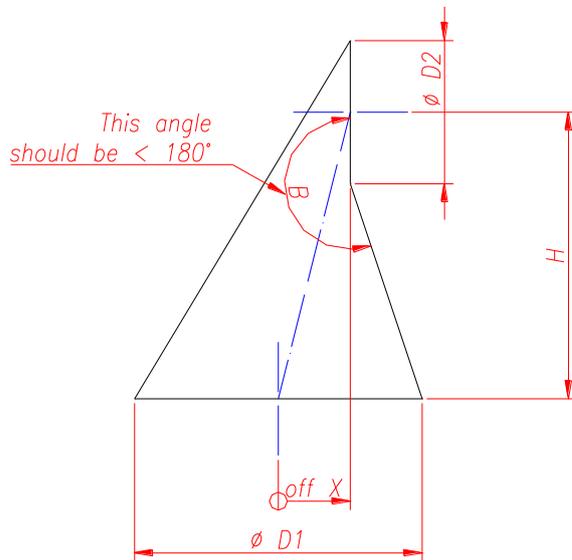




The circle of D1 or D2
should not contact
the other cone's surface



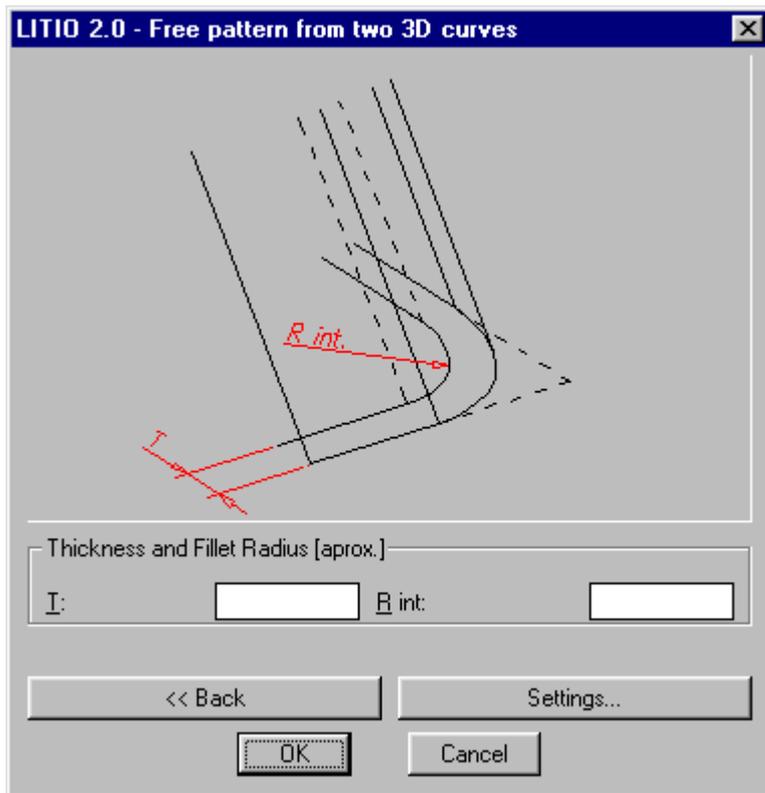
Round to Round Bifurcation – Non symmetrical



Offset Cone - Unparallel

Rectangle to Round – Offset - Unparallel

Free pattern from two 3D curves



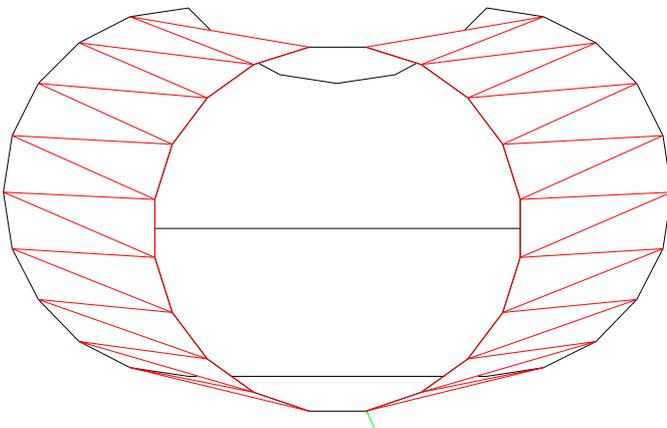
New v.2.0 has a new feature, a 3D developable ruled surfaces generator engine. You can create a transition just by clicking on two entities (3D meshes created by Litio 2.0; 2D and 3D polylines; or circles) located in your CAD's 3D space. These two entities being the ends of the transition.



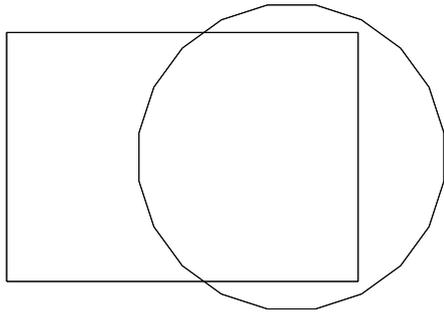
Note: The following entities are not accepted: arcs [convert arcs to polylines using the PEDIT command] nor ellipses [use ellipse pattern of LITIO 2.0].

Some restrictions apply:

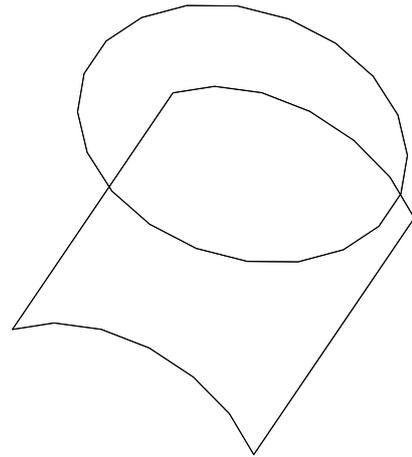
- Resulting object cannot have a concavity. See figure.



Curve has a concavity.



It seems OK in plane view...
plane view



...but looking well, it shows a concavity.
oblique view

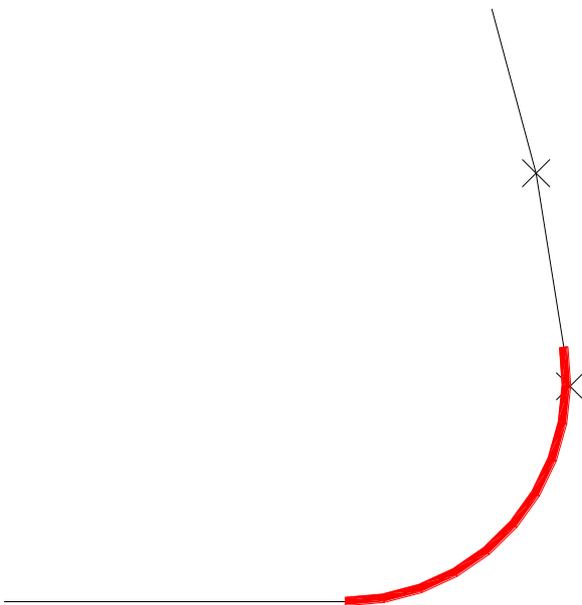


Warning: If a picked object has too many points (was created with a high precision number, or it was the result of a 3D trim, the new 3D object might not be able to be generated).

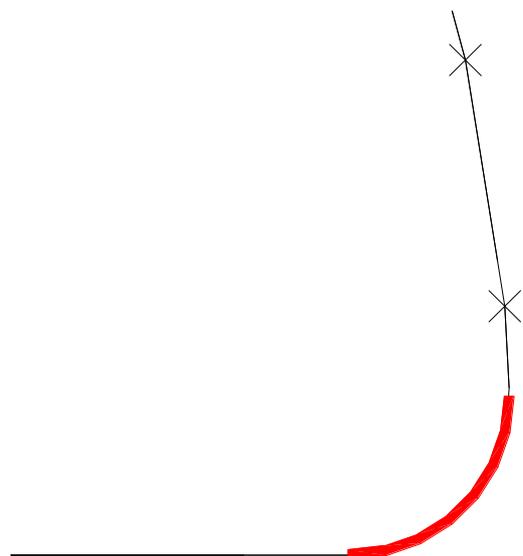
After selecting both entities, point extraction is performed. The program converts the arc segments in a set of points of linear segments, according to the selected precision number. The program then fillets all sharp angles. You are asked for the inner fillet radius and for the object thickness. Note that Dimension type selection applies also here (1: in/mid/out; 2: in/mid/out).



Warning: Object cannot be created either, if an arc segment has to be filleted, and there is interference (linear arc segment too short for fillet radius). If this happens, you should use a smaller fillet radius or a smaller precision number. Or have it fillet before.



Too many divisions or too big radius (fillet does not fit in last segment).



OK. Fillet radius fits well in last segment of curve.



Tip: Sometimes LITIO2 may say, an object is not possible (due to the reasons detailed herein); pick the 2 objects in the inverse order, for a try.



Note: The radius is not the actual bending radius, but a fillet radius; for a different bending radius, create the generatrix curve accordingly.

3D trim with plane

Any 3D object (with thickness) generated by the program can be cut by a plane. First you are asked to click the object to be trimmed and then you are asked to pick three points, defining the cutting plane. Points shall not be coincident nor aligned.

Plane can cut all object generatrices or one of both ends. The cutting plane shall not cut both ends. If so, the program exists with an error message.

You get the new 3D object (cut), its development and the cutting path (for example, to make a cover for a tank cut at an x° angle).



Note: Here the in/mid/out trimmed surface settings are due.



Warning: This feature is not available for AutoCAD/GStarCAD **native 3D solids**.



Warning: In **GStarCAD** both the trimmed and untrimmed objects remain (in **AutoCAD** the untrimmed object is deleted to only keep the trimmed one; due to compatibility reasons it cannot be deleted In **GStarCAD**).



Warning: **Do not mirror** nor **3D mirror** 3D objects generated by Litio 2.0. Mirrored 3D objects will lead to erroneous developments if they are trimmed 3D with a plane or with other 3D object.

Free 2D profiles [2D profiles created from 2D polylines]

Some 2D profiles are provided with dialog boxes (see page 29). But you can develop your own customized profiles with just some clicks!

With LITIO 2.0 you can just pick a 2D polyline, which defines the profile form [out/mid/in], to get your 2D profile in 3D space and its 2D development.

After having selected a 2D polyline, point extraction is performed. The program converts the arc segments in a set of points of linear segments, according to selected precision number. The program then fillets all sharp angles. You are asked for the inner fillet radius, the profile thickness and profile height.



Note: Dimension type selection applies also here (END 1: in/mid/out).



Warning: Since for some profiles it is not simple to define and out or in side, the following rule applies for ALL profiles: starting from first vertex, OUT side is defined as the one on the right of the polyline, and IN is on the left. For example, if your End 1 definition is set as OUT, the profile will be generated being the OUT side the selected polyline and the other [IN] on the left [starting from the first vertex].



Warning: 2D profile cannot be created, either if the fillet radius does not fit in curve segmentation [in which case a smaller radius or less divisions should be used, or the polyline should be filleted before running the program], or the radius is not big enough for the sheet-metal Thickness.

Curve [polyline] extraction from existing 3D objects

Just pick an object you have already created with LITIO 2.0 and you can get the 3D path (in the form of a 3D polyline) of any end (or intersection or contact path) for further use.



Warning: This feature is not available for AutoCAD/GStarCAD **native 3D solids**.



Tip: This feature can be used in association with the “Free pattern from two 3D curves” feature as shown on page 18.

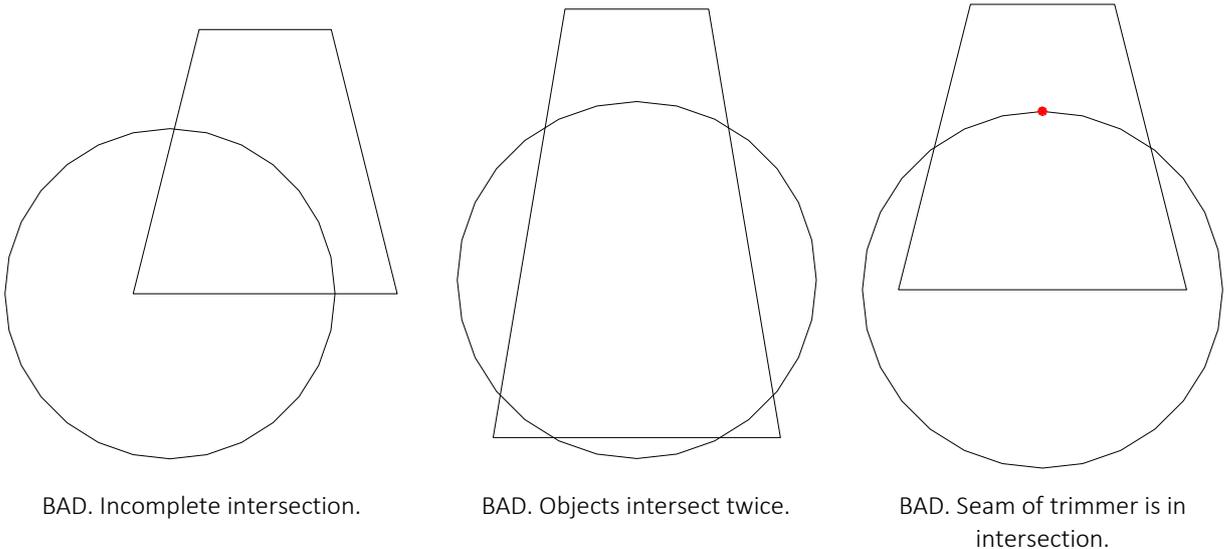
3D trim of 3d object with another 3D object

 **Note:** This applies also to branch dialogs and intersection dialogs.

Any two 3D objects (with thickness) generated by the program can be cut among themselves. First you are asked to click the trimmer object and then you are asked to pick the trimmed one.

The following restrictions apply:

- Trimmer object shall completely intersect trimmed object (all generatrices of the trimmed object shall be intersected by the trimmer).
- Trimmed object shall intersect trimmer only once.
- Trimmer object seam shall not be in the intersection.



Example: Cone intersected by a cylinder (lateral view)

You get the Trimmer object development with the intersection hole, the new 3D object (cut), and its development.

 **Note:** Here the in/mid/out trimmed and trimmer surface settings apply.

 **Warning:** This feature is not available for AutoCAD/GStarCAD native 3D solids.

 **Warning:** In GStarCAD both the trimmed and untrimmed objects remain (in AutoCAD the untrimmed object is deleted to only keep the trimmed one; due to compatibility reasons it cannot be deleted In GStarCAD).

 **Warning:** Do **not mirror** nor **3D mirror** any 3D objects generated by Litio 2.0. Mirrored 3D objects will lead to erroneous developments if they are trimmed 3D with a plane or with another 3D object.

Existing 3D objects unfold

Just pick an object you have already created with LITIO (either v.1.x or 2.0) and LITIO 2.0 unfolds it for you. You can also pick 3D meshes (N=2) you have created (for example with RULESURF).

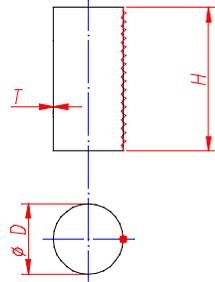
 **Warning:** In the case of meshes created with RULESURF and in the case of 3D meshes created with Litio 1.x, the surface will be unfolded as if it has a Zero thickness (T=0).

 **Warning:** In general surfaces generated with RULESURF are not developable. Their development might not be actually possible. We recommend using the free transition generator engine (see page 18). See also FAQs page in our website for more information about non developable ruled surfaces.

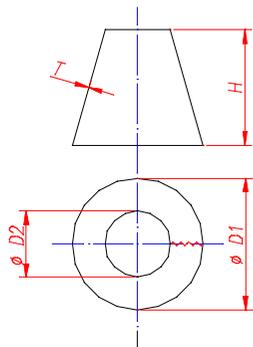
 **Warning:** This feature is not available for AutoCAD/GStarCAD native 3D solids.

Patterns available

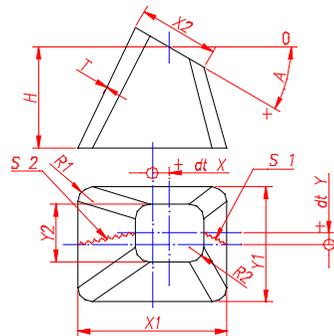
Round Cylinder



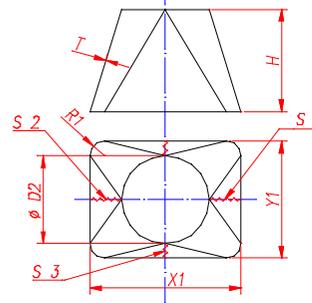
Cone



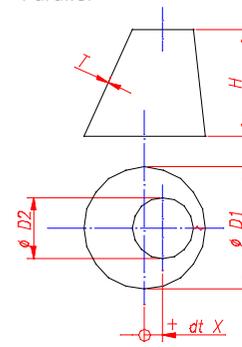
Rectangle to Rectangle - Offset - Angle [generic]



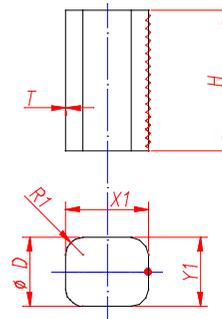
Rectangle [fillet] to round



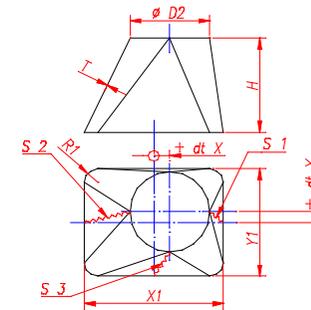
Offset Cone – Parallel



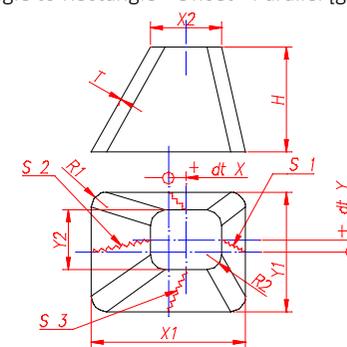
Cylinder - Fillet rectangle



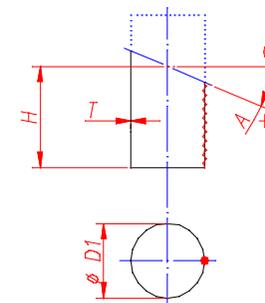
Rectangle [fillet] to round - Offset



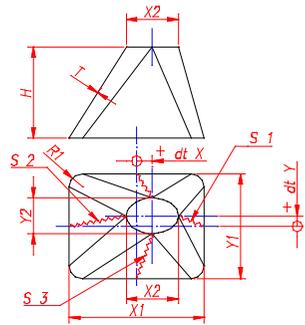
Rectangle to Rectangle - Offset - Parallel [generic]



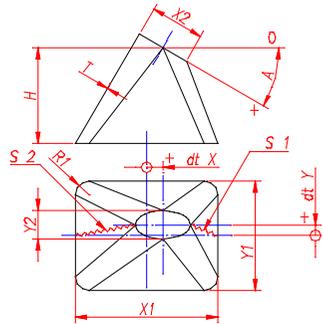
Round Cylinder - Cut once



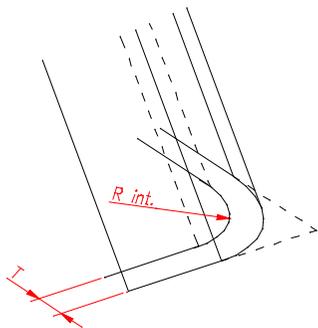
Rectangle [fillet] to Ellipse - Offset



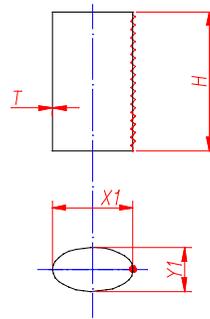
Rectangle [fillet] to Ellipse - Offset - Angle



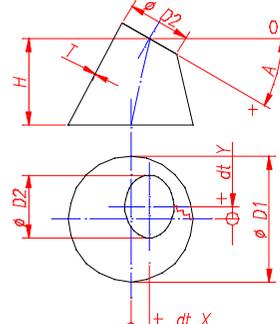
Free pattern from two 3D curves



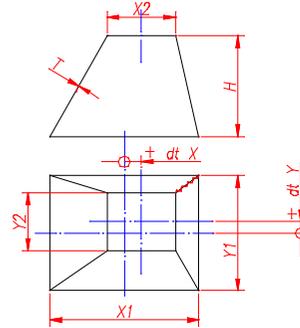
Cylinder - Ellipse



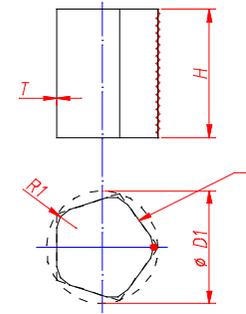
Offset Cone - Angle



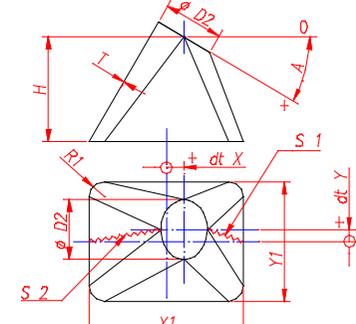
Rectangle to Rectangle - Offset [Hopper]



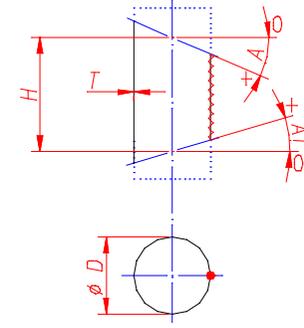
Cylinder - Polygon



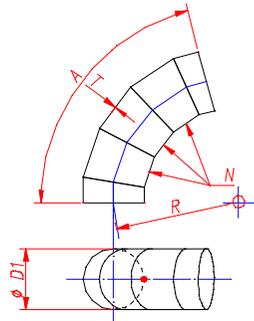
Rectangle [fillet] to round - Offset - Angle



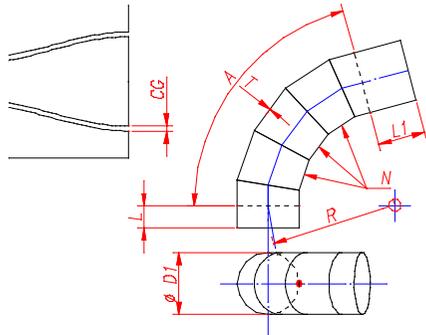
Round Cylinder - Cut twice



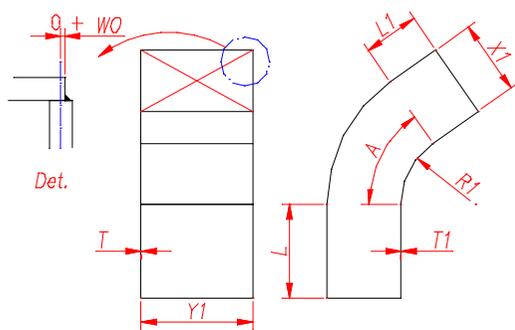
Bend - Round - N parts



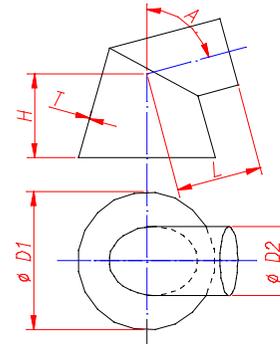
Bend - Round - N parts - Optimized



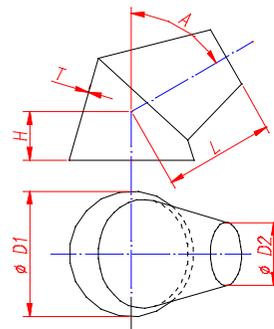
Rectangular duct - Bend



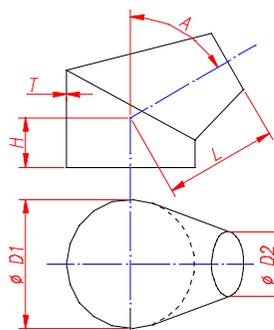
Cone to Cylinder Bend



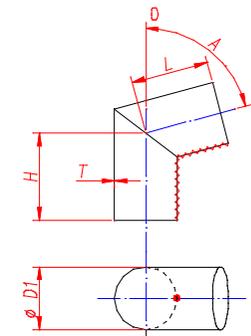
Cone to Cone Bend



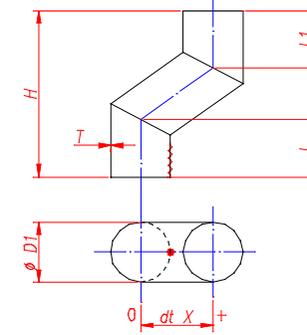
Cylinder to Cone Bend



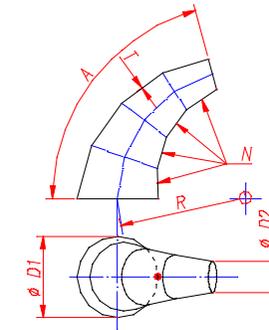
Bend - Circular Cylinder



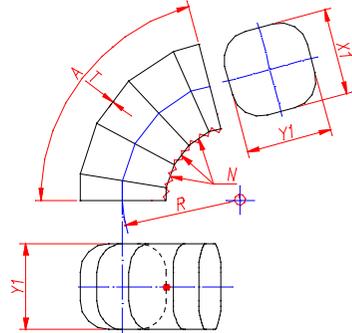
Offset Pipe [S] - Circular Cylinder



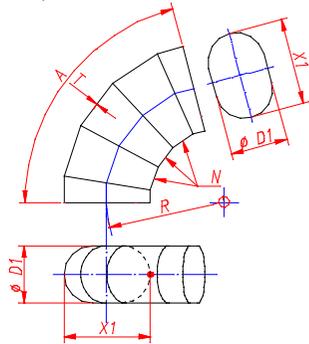
Bend - Conical - N parts



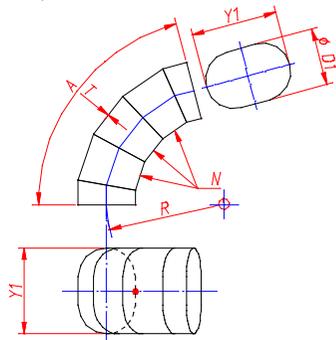
Bend - Rectangular [fillet] Cylinder - N parts



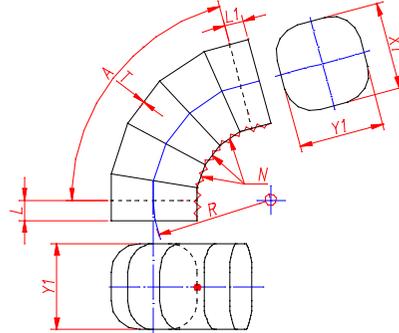
Bend - Oblong X - N parts



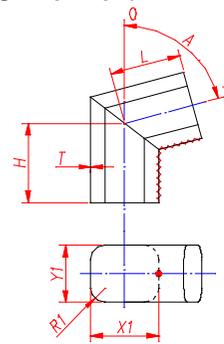
Bend - Oblong Y - N parts



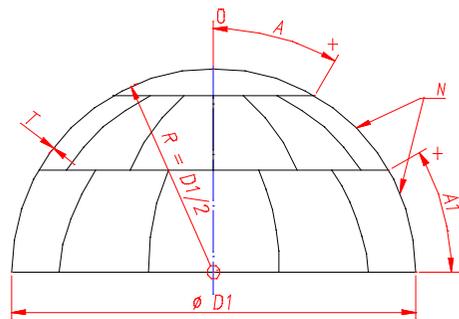
Bend - Rectangular [fillet] Cylinder - N parts



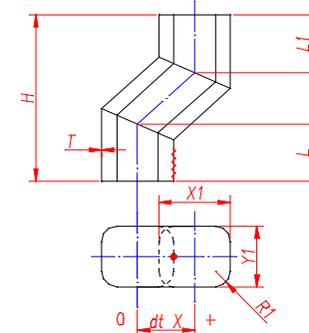
Bend - Rectangular [fillet] Cylinder



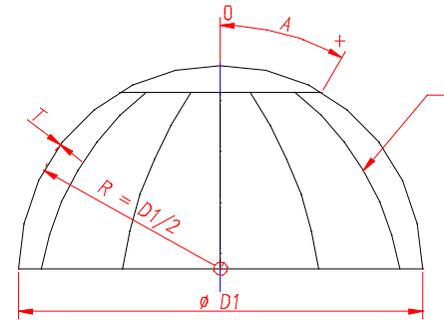
[Semi]Sphere - 2 rows



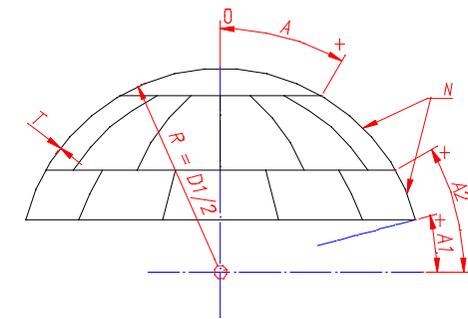
Offset Pipe [S] - Rectangular [fillet] Cylinder



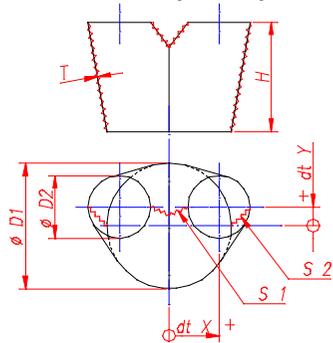
[Semi]Sphere - 1 row



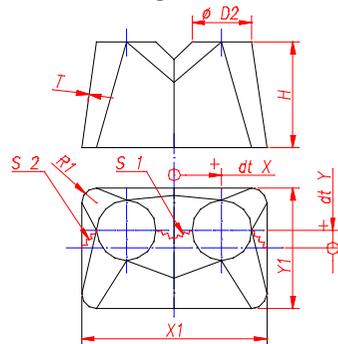
[Sector of] Sphere



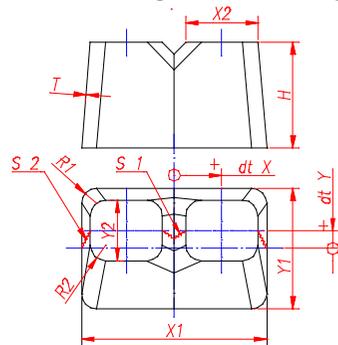
Bifurcation - Circle to Circle [2 Cones]



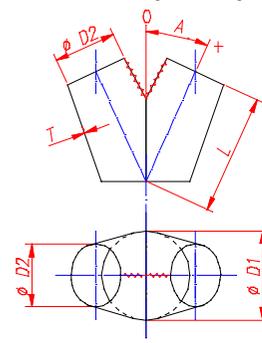
Bifurcation - Fillet Rectangle to Circle



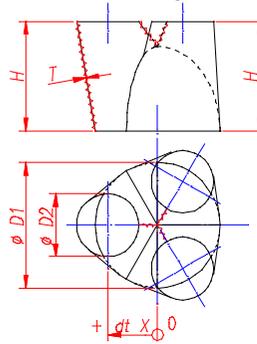
Bifurcation - Fillet Rectangle to Fillet Rectangle



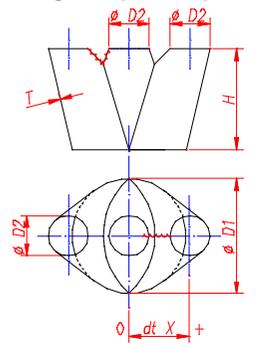
Bifurcation - Circle to Circle [2 Cones] - Non parallel



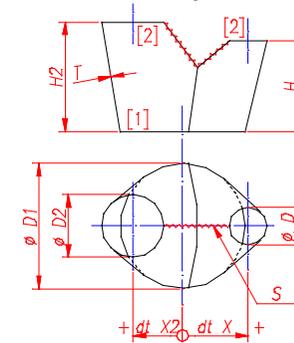
Trifurcation - Circle to Circle [3 Cones]



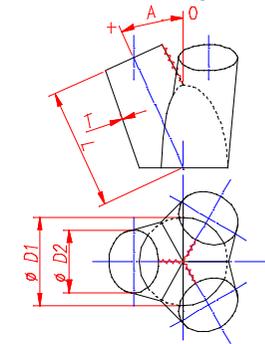
Trifurcation - Aligned - [3 Cones]



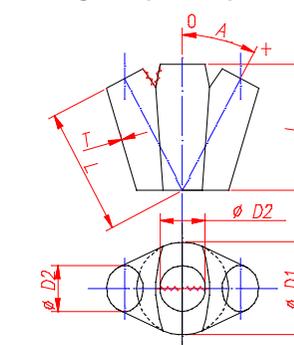
Bifurcation - Circle to Circle [3 Diameters] - Non symmetric



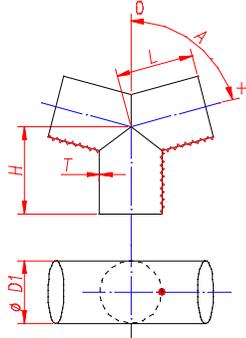
Trifurcation - Circle to Circle [3 Cones] - Non parallel



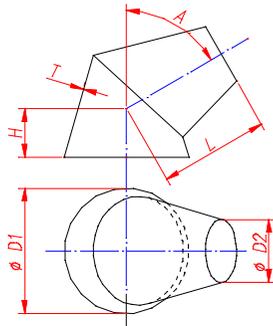
Trifurcation - Aligned - [3 Cones] - Non parallel



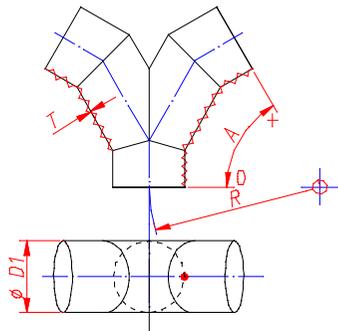
Bifurcation - Circular Cylinder



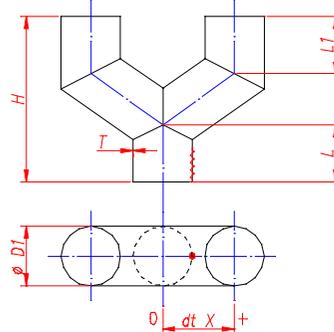
Bifurcation - Circular Cylinder - Non Symmetric



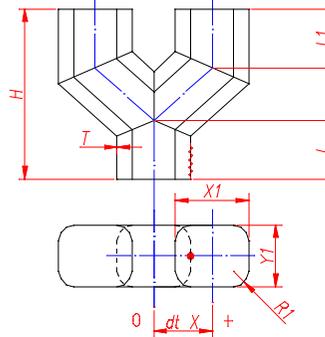
Bifurcation with intermediate part - Circle



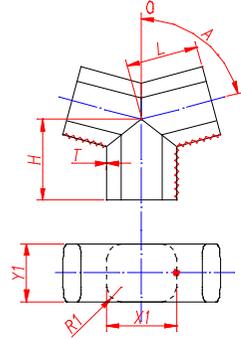
Bifurcation Offset Pipe [S] - Circular Cylinder



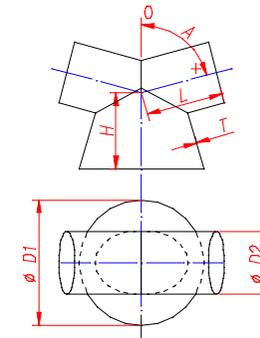
Bifurcation Offset Pipe [S] - Rectangular [fillet] Cylinder



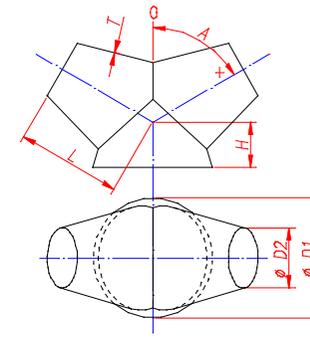
Bifurcation - Rectangular [fillet] Cylinder



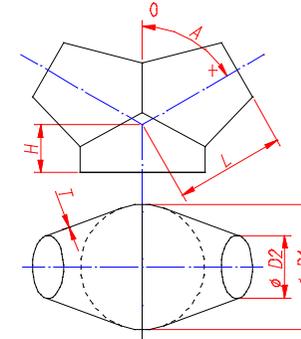
Cone to Cylinder Bifurcation



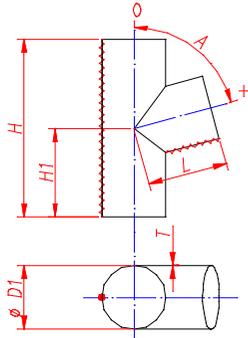
Cone to Cone Bifurcation



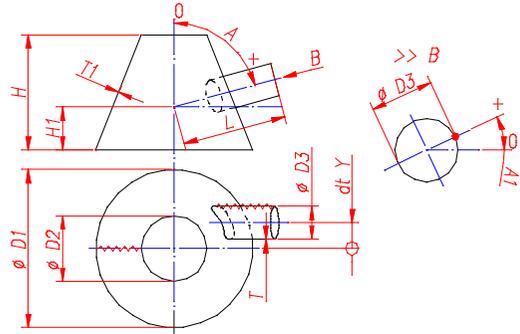
Cylinder to Cone Bifurcation



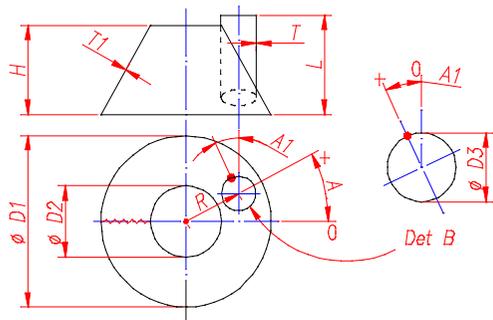
Branch - Cylinders [1 Diameter]



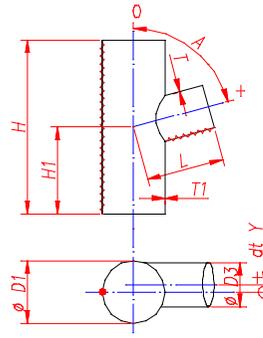
Intersection - Cone with round duct [angle]



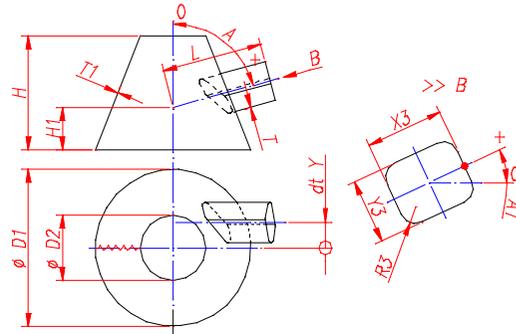
Intersection - Cone with round duct [vertical]



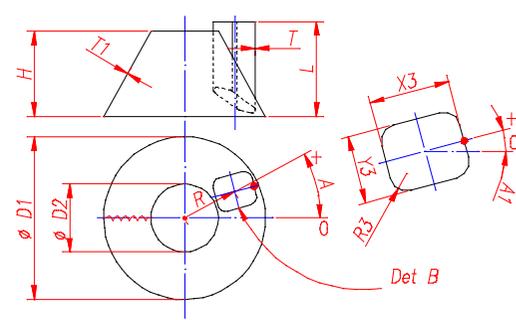
Branch - Cylinders [2 Diameters]



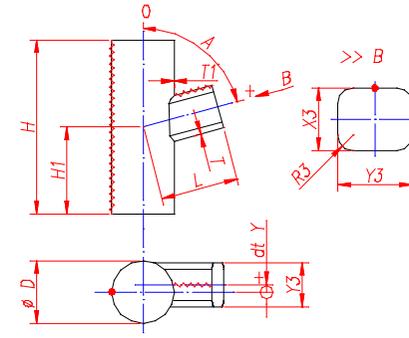
Intersection - Cone with rectangular duct [angle]



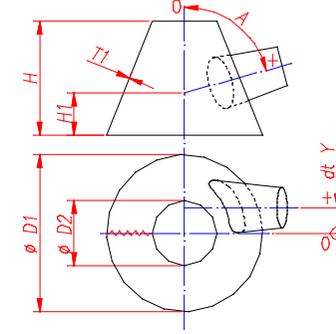
Intersection - Cone with rectangular duct [vertical]



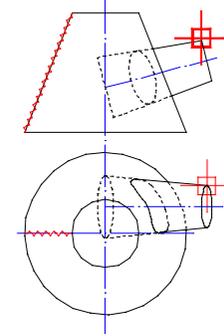
Branch - Cylinder + Rectangle [fillet]



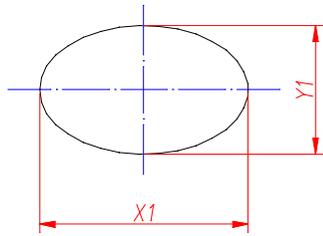
Intersection - Two Cones



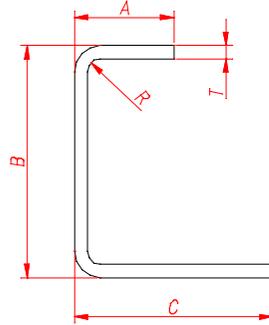
Existing 3D objects intersection trimmer



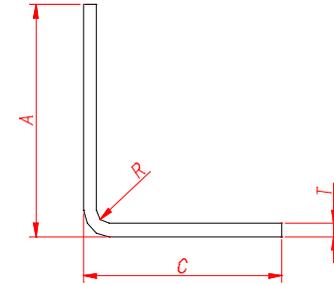
2D polyline – Ellipse



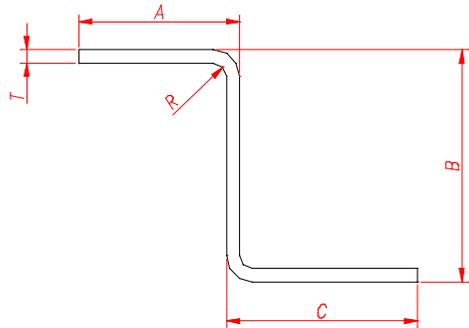
2D profiles – U



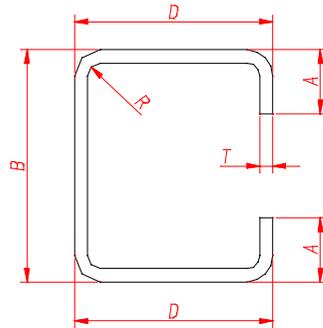
2D profiles – L



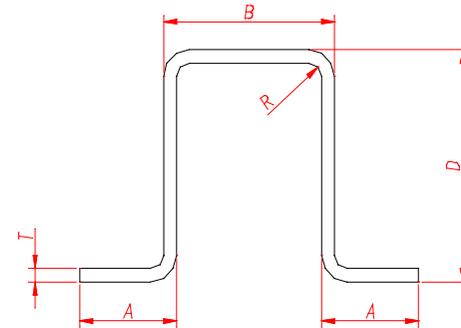
2D profiles – Z



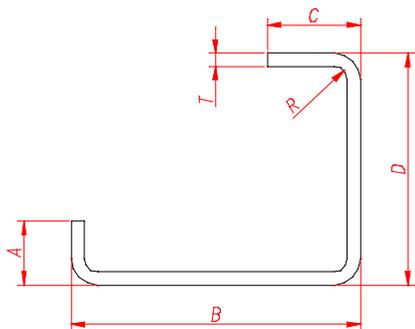
2D profiles – C



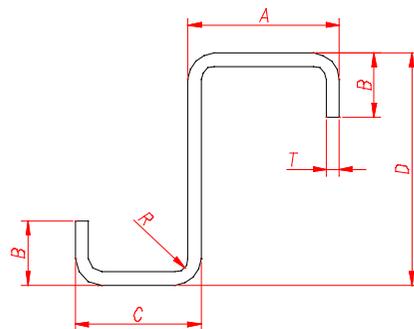
2D profiles – OMEGA



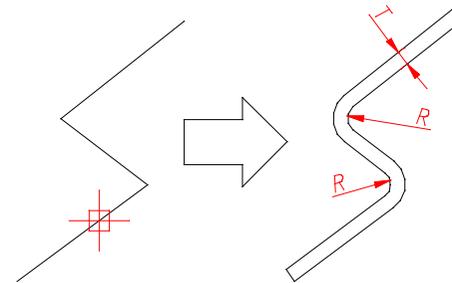
2D profiles – J



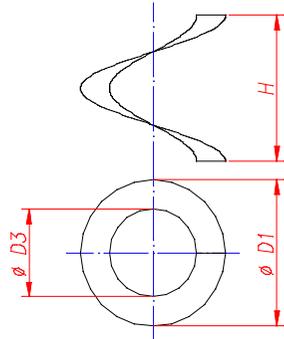
2D profiles – S



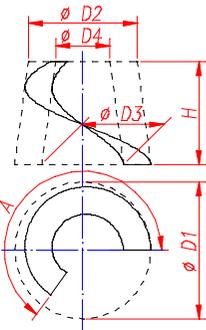
2D profiles - Free profile from 2D curve



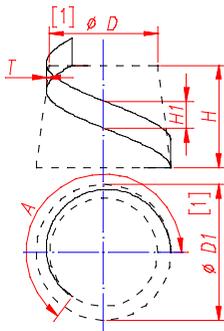
Helix - 360°



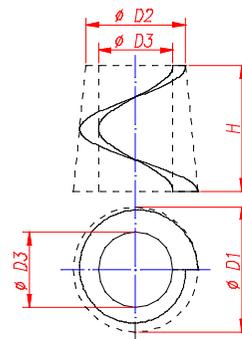
Helix - BiConical – Angle



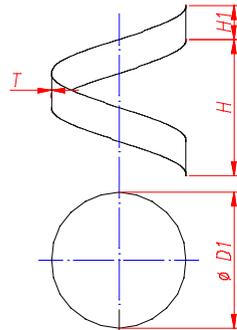
Helix Lateral - Conical – Angle



Helix - Conical - 360°

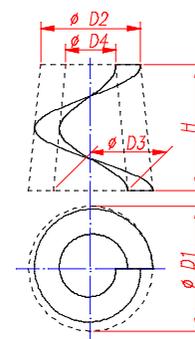


Helix Lateral - Cylinder - 360°

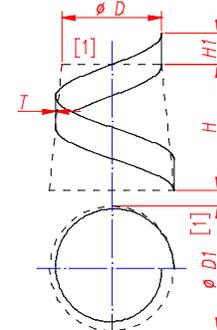


[reserved]

Helix - BiConical - 360°



Helix Lateral - Conical - 360°



[reserved]

Warning: Helixes are **NOT** developable surfaces. Please contact us for an enhanced version of these developments.

Entities drawn for each pattern

After all parameter are input, the program draws the 3D entity, the 2D unfolded mesh, a 2D contour of the unfolded mesh, and/or a 2D contour with groove seam allowance, and/or text insertions for angles and approximate radius of the unfolded mesh according to configuration settings.



Note: Not all settings are due to all of the patterns. You may be asked for an insertion point and, if the option is unticked, it may not be drawn. Also, although an option is unticked, it may be drawn anyway.

Exceptions:

Rectangle to Rectangle - Offset [Hopper]: **No thickness.**

Helix - 360°: **No thickness.**

Helix - Conical - 360°: **No thickness.**

Helix - Biconical - 360°: **No thickness.**

Helix - Biconical – Angle: **No thickness.**

Rectangular duct – Bend: **No 3D.**

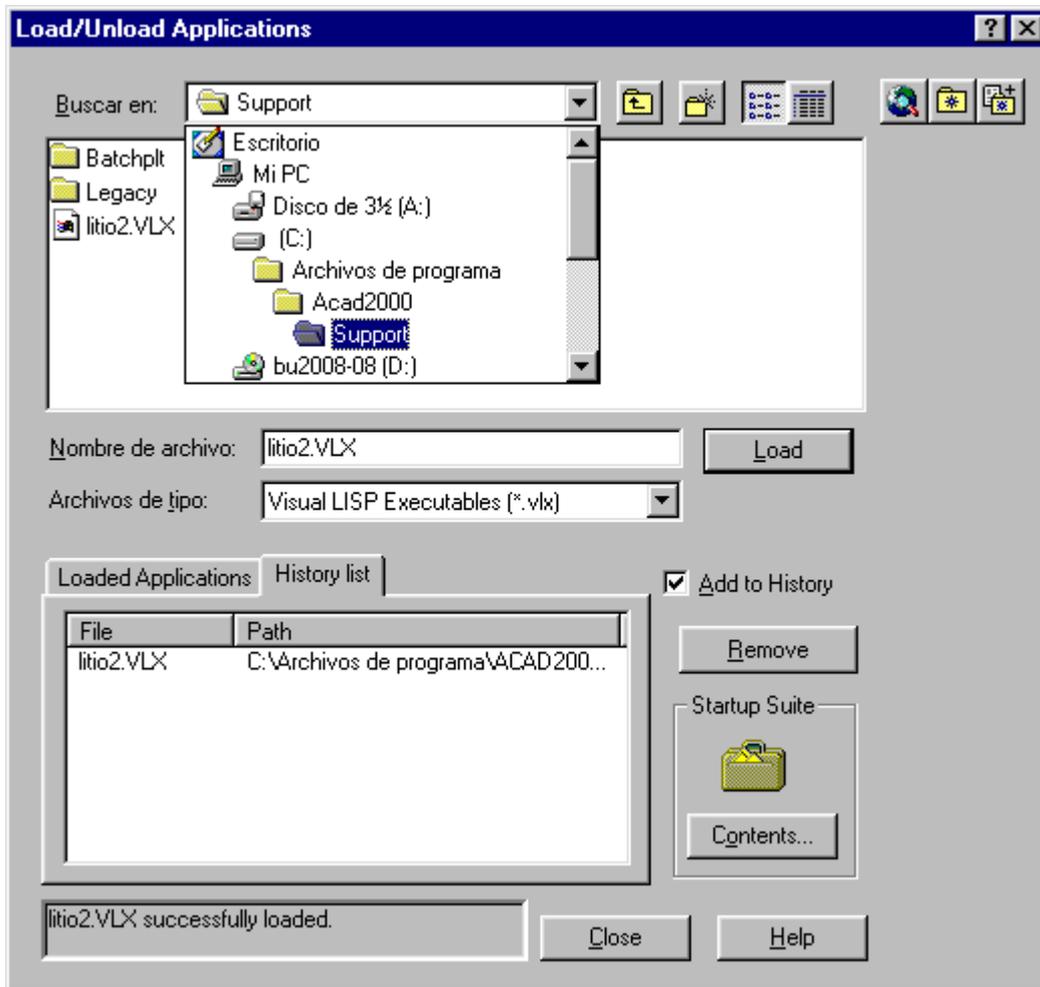
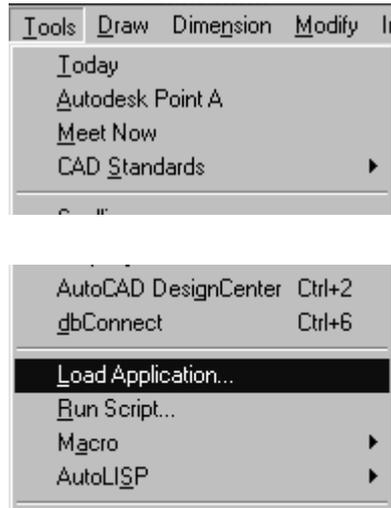
Spheres and sectors of spheres: **No 3D.**

Apload

Apart from the loading method explained on page 6, the program can also be loaded by using the APPLOAD command. Just select the **Tools, Load Application** menu.

 **Note:** This menu may vary, depending on your CAD version.

A dialog box appears (Load/Unload Applications). Browse to find the directory where the **litio2.vlx** file is (this directory shall have been included in your CAD's search paths). Select the **litio2.vlx** file, and press the **load** button. A message saying "**litio2.vlx file successfully loaded**" should appear in the appropriate message box. Press the **close** button. You are ready to use the program in the current drawing session.



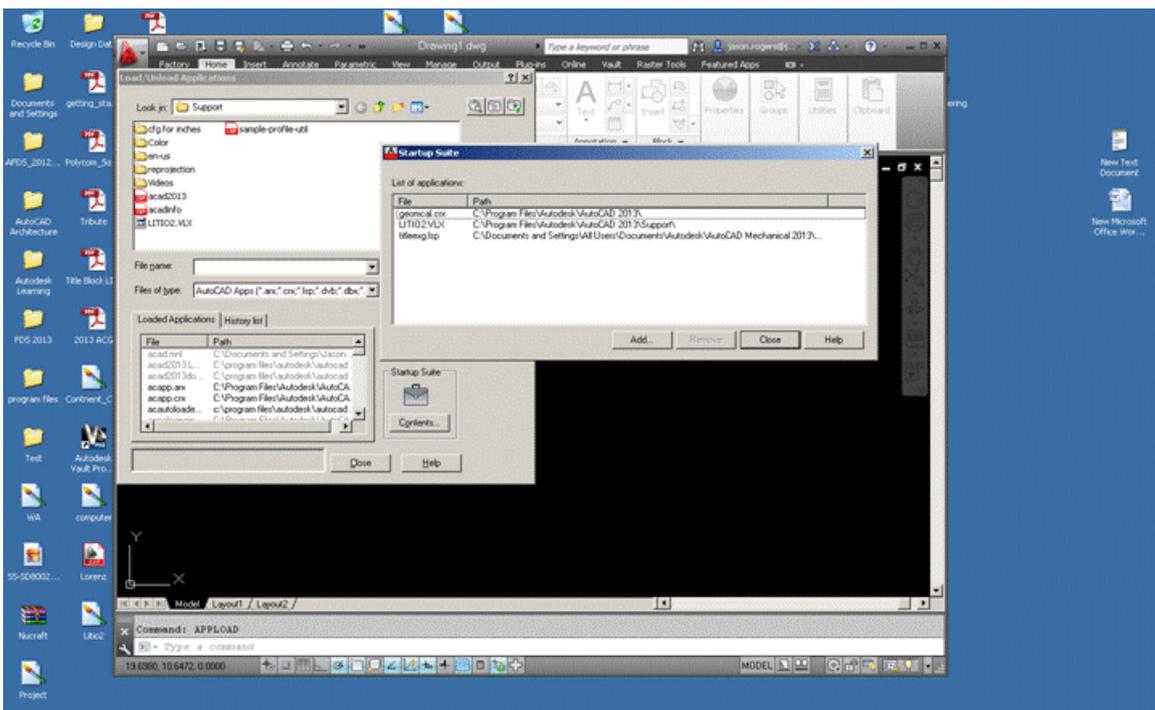
Loading method for AutoCAD 2013 or later

The following is the fix to run LITIO 2.0 within AutoCAD 2013 or later. To run Litio2, install the program per the normal instructions.

If the following message shows when trying to run LITIO 2.0:



... then you will have to load **GEOMCAL.crx**. This file is located in the installed directory of AutoCAD. To load this open AutoCAD; in the command line type "**appload**". From the **start up suite**, add **geomcal.crx** and **litio2.vlx** to this suite. [You do not need to load LITIO2.vlx with the appload command; but (from the APPLOAD command window) you need to add both geomcal.crx and litio2.vlx to the startup suite (right bottom of the LOAD APPLICATION window). A new window should open...]. See next figure:



You need to exit and restart AutoCAD. From then on, Litio 2.0 should run without problems.



Note: There is no need to load LITIO2 in the current session to run Litio2. This method is an **autoload**. Just type **LITIO2** in the command line.

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Terms for download, evaluation, registration, use, etc. of LITIO.

Very important - Read carefully:

LITIO v 2.x End User License Agreement

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1. Evaluation [DEMO] Version Only. The use of the evaluation version is limited to a period of 60 (sixty) days. During evaluation, you are encouraged to add a link in your website to our web site [www.litio.si], including (at least) the following text: LITIO - 3D sheet metal program for AutoCAD/GStarCAD. After the 60-day evaluation, you shall not use the evaluation version of the program. If you choose not to use the program, you shall erase it and destroy all its files and any additional information either supplied or downloaded. If you choose to use of the program, you shall register the program. You are also encouraged to add a link in your website to our web site [www.litio.si], including (at least) the following text: LITIO - 3D sheet metal program for AutoCAD/GStarCAD.

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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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