

3D MODELLING MULTIPLE FAUCETS BODIES

Asist. ing. Cătălin RĂDULESCU¹
Conf. Ec. Dr. Ing. Adrian-Mihai GOANȚĂ²
¹Universitatea "POLITEHNICA" din București
²Universitatea "DUNĂREA DE JOS" din Galati

ABSTRACT

In this work is doctored the way of tackles the and realization of a innards by the students in the program Autocad. The work has as objective a these accomodation with the commands 3D the and a crossing from 2D to 3D how much the maul for everyone. The utilization commands 3D constitute a priority but no forgeted a commands of draw from 2D which constitute base of go on this modelling innards.

I. Introduction

In this work is doctored the way of tackles the and realization of a innards by the students in the program Autocad. The work has as objective a these accomodation with the commands 3D the and a crossing from 2D to 3D how much the maul for everyone. The utilization commands 3D constitute a priority but no forgeted a commands of draw from 2D which constitute base of go on this modelling innards.

II. Modelling 3D

In order for pass from the drawing 2D to his model 3D is achieved gradually is begun drawing in plane, succeded of crossing to drawing in space. Attainment of the tridimensional models require discovery commands of draw in plane (2D)

In order to achieved the tridimensional model of a innards begone from the study part, which study point out us constitutive bodies multiple faucets, carry is compound from several zone distinctly:

- central zone bodies of faucets is compound from several tronsone of forms cylindrical which does jonction between diferent zone of the faucets;

- rhomboidal attachment flange zone is compound from effective attachment flange and the body of jonction among these and the central body of faucets;

- cylindrical attachment flange zone is compoud from effective attachment flange and the body of jonction among these and the central body of faucets;

- faucets with plug zone is compoud from the faucet with plug, the body of the jonction among these and the central body of faucets and the cylindrical body of out from the faucet with plug.

Form ultimate bodies which faucets must modelling and whereat must his is arrived in following all the steps of drawn is presented in figure 1.

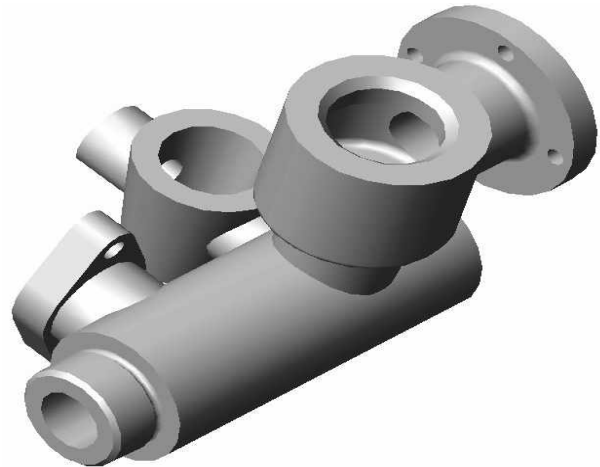


Figure 1: The model bodies multiple faucets

In order to arrive at formed the finish is opened with the projection exterior outlines in the plan xOy. Firstly we represent axles of the symmetry. In the case bodies of faucet is ascertained as in order to can draw the model 3D must begin drawing in 3 planes which xOy corresponding, each among they, natural plans of section of 3 zones:

- In first plane we found the central body of faucets;
- In the second plane we found out rhomboidal attachment flange zone;
- In the third plane we found faucets with plug zone.

In all these planes is drawn auxiliary forms subsequent wagon shall us be us useful in finalized models.

The commands of draw used-up are one used to plane drawing.

In order to achieved one 3 distinct planes is drawn first date auxiliary forms from central bodies zone after the wagon is can modified UCS so that the new UCS found out, by turns, in planes of draws of rhomboidal attachment flange and of faucets with plug.

Ascertained as for a good realization operation of extrude the faucets with plug needs as for this his is achieved in two moves successively of UCS, one coresponding faucets with effective plug, in the plan of section and the another coresponding cylinder, carry generates us the body of jonction, UCS be placing, in this case, uptown which circles generate the body, the precise maul in the plan xOy most out of use of the central body of faucets.

Because is known as the in follows operation of fount don't obtain the right angles, because facts as the don't s can flush out of form, all parts main are connected between they.

Initial is drawn with an alone layer zones wagon shall us cause us zones of material of faucets. The commands of draw are one know to drawing in plane. Alone difference constitute a fact as the of this date don't is worked in a alone plan but is worked in the many maul plane.

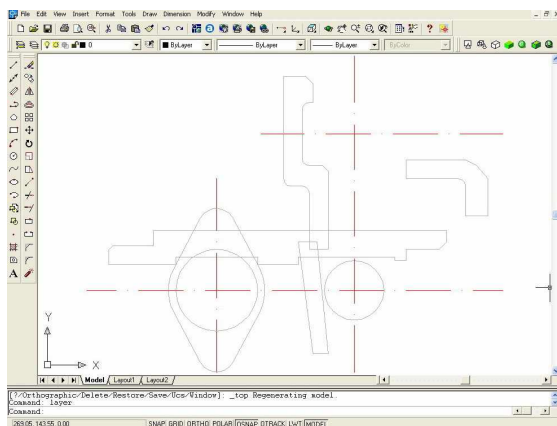


Figure 2: Auxiliary drawing forms in the plan xOy

Because most auxiliary lines found out in central zone faucets, considered this as the be even main and other planes obtained

departing from the main plan through the move UCS, be considerate secondary plane.

For draw utilized line and the circles, the way of generation of these is one known from drawing two-dimensional.

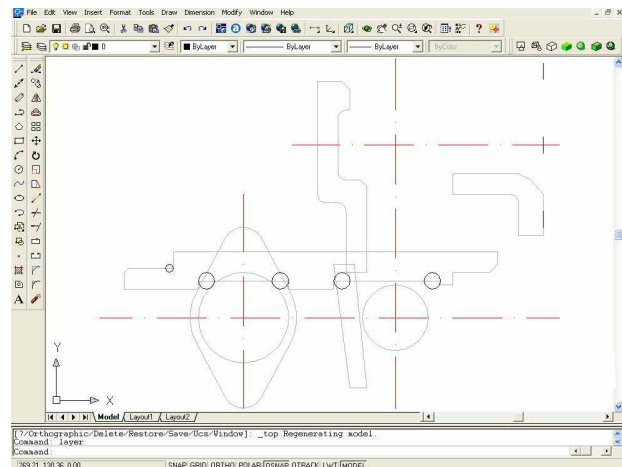


Figure 3: The move UCS in sight drawing of holes or cylindrical flange

The result of drawing in the 3 planes is discovery in figure 2, all planes be heteronymous across same main plan xOy.

In sight execution of holes cylindrical flange is achieved a change of UCS in the natural plan of this, so that the natural plan of flange becomes new plan xOy. In the middle of UCS drawn which circle help with us the generation holes cylindrical flange. Used command ARRAY, know from drawing in plane, we can generated four circles.

The result of these operations is found in figure 3

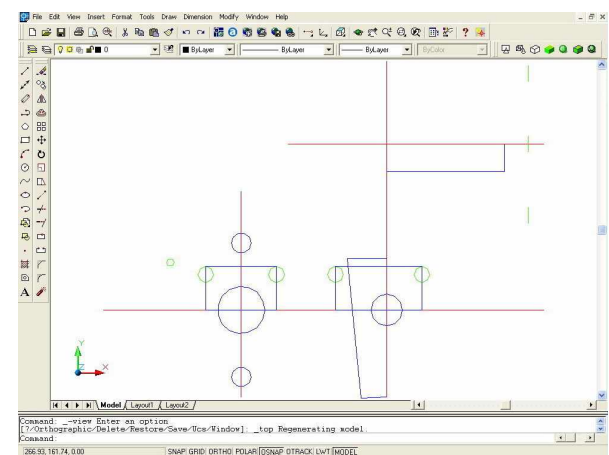


Figure 4: Auxiliary drawing forms of extraction in the plane xOy

In sight of finalize forms is drawn zones of extraction again there for is utilized layer differently of initial layer. In order to don't created the confusion temporally drawing freeze first layer utilized to draw the bodies faucets and

is utilized the different colors for layer thus shall obtained just zones of material which are shall extract subsequently.

The result of these operations is found in figure 4: In order to applied command REVOLVE, must we have closed spaced, which thing achieved with help command PLINE. For each zone which were orbit or extrude used an alone poliline. Freeze of every layer fractionally confer us the safety and the high rapidity in the realization of each poliline. The result of common transformation lines operation in polilines we found in figure 5:

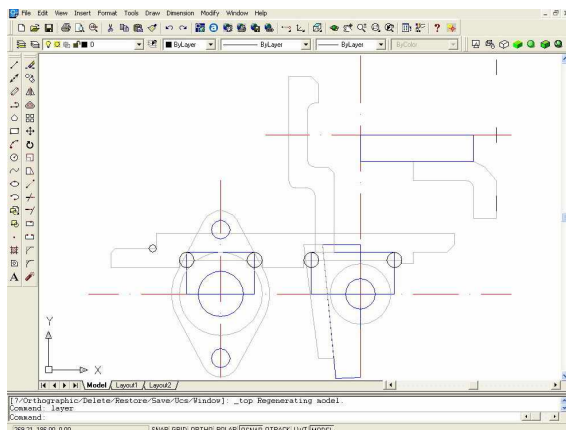


Figure 5: The utilization of command PLINE, see in the plane xOy

Because must exists a good maul coordination of drawing in diferente plane, utilized the command 3D ORBIT, from bar made to order with same name, when is necessity is verified the correct location of auxiliary forms.

In follow used commands of the feather now obtained a tridimensional image of all auxiliary forms which can be us useful, subsequently in bodies faucets modelling.

The study, merely of drawings in the plane xOy, don't permits us a very good visualization of planes from behind main plans because many line overlaped between they, what ploughes can generate the confusion. Image obtained in space is present in figure 6.

With the utilization command PLINE is finished the made to order which set were used-up to drawing in plane and is achieved the crossing to the commands of draw tridimensional.

Former command from the set of new commands 3D where continued drawing represented commanded REVOLVE.

In sight used command REVOLVE we proced to freeze layer unnecessary to the respective moment, axles used-up there for the command be axes of symmetry drawing previously.

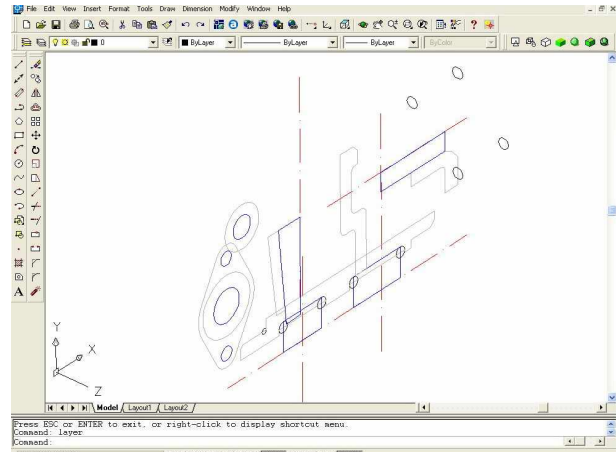


Figure 6: The utilization of command PLINE, see in space

The 3 polilines which we applied this initial command are:

- Poliline which generate the horizontal cylinder has as the axis of symmetry the horizontal axis;
- Poliline which generate the vertical cylinder has as the axis of symmetry the vertical axis;
- Poliline which generate the cylindrical flange body has as the axis of symmetry the horizontal, parallel axis with the horizontal axis main bodies of faucets.

In follow this operation we obtained designed forms on the main plane xOy, the result of the operation found in figure 7.

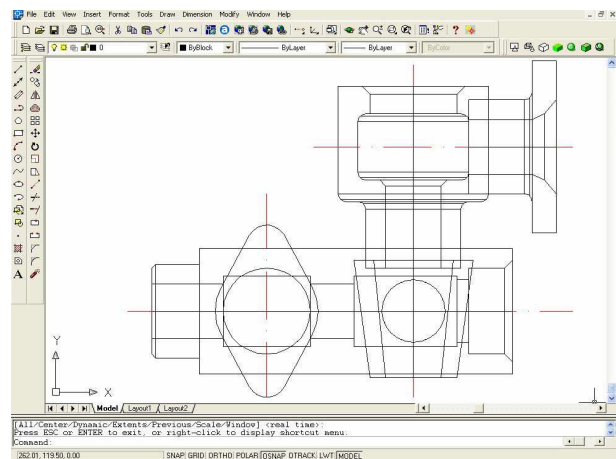


Figure 7: The utilization of command REVOLVE

Utilizing the command 3D Orbit is can achieved a turning a bodies a faucets in order to permits us a good visualization in what looks the utilization command REVOLVE and for the body faucets with plug, place behind main plans of designed.

In order to know anytime the model achieves is utilized from bared Shade the commands: 2D WIREFRAME, what has as result obtained

models faucets in figure 8, and the GOURAUD SHADED, which has as result obtained models faucets in figure 9.

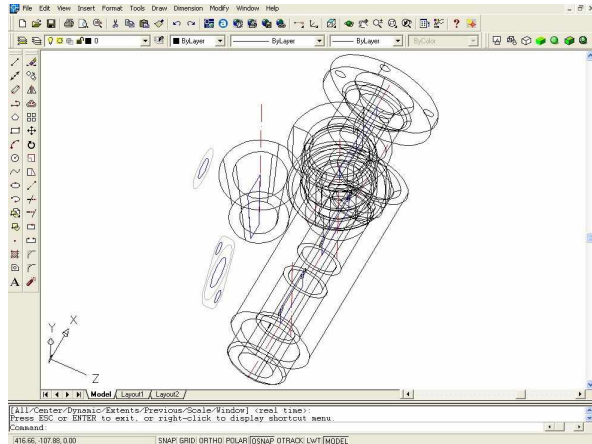


Figure 8: The utilization of command 2D WIREFRAME

The representation 2D WIREFRAME has the advantage visibility every hidden lines. The advantage of representation GOURAUD SHADED is the similitude with the part from reality, what is us purposive to know anytime how presented in space the part which is modelling.

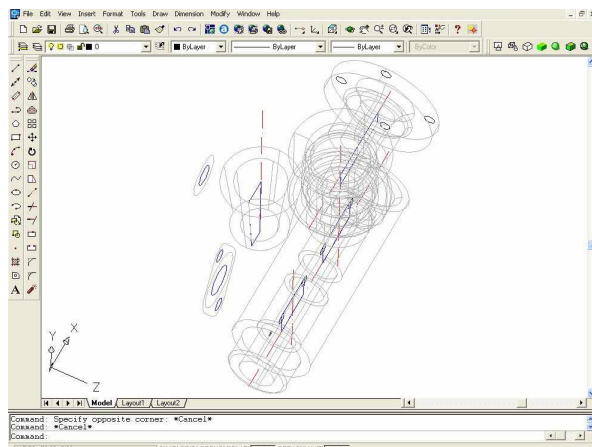


Figure 9: The utilization command GOURAUD SHADED

In order to determinated bodies faucets forms we needs utilized command EXTRUDE for the cylinder perpendicular to the faucet with plug and for rhomboidal flange and this bodies. In the case cylinder perpendicular to the faucet with plug needs as thickness extrude is choose so that don't exists spaced freely between cylinder and the main body not yet his is too big.

The result obtained in follows the commands EXTRUDE and the GOURAUD SHADED is presented in figure10:

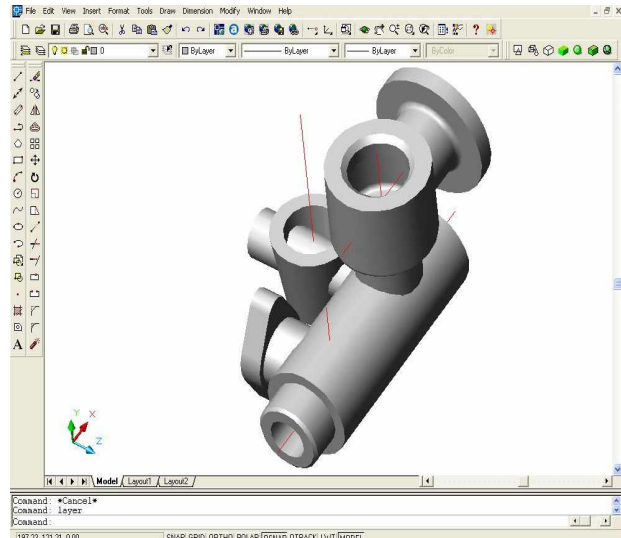


Figure 10: The utilization of command EXTRUDE

Ascertained as formed incipient, which corespond with forms the bodies was obtained. For determinated the form is necessary to extract some part of material. Directing to this thing is utilized the commands REVOLVE and EXTRUDE and for the parts which were eliminate from model.

In figure 11 is presented the result obtained in follows these commands and after the layers, who are unnecessarily for the moment, they were freeze.

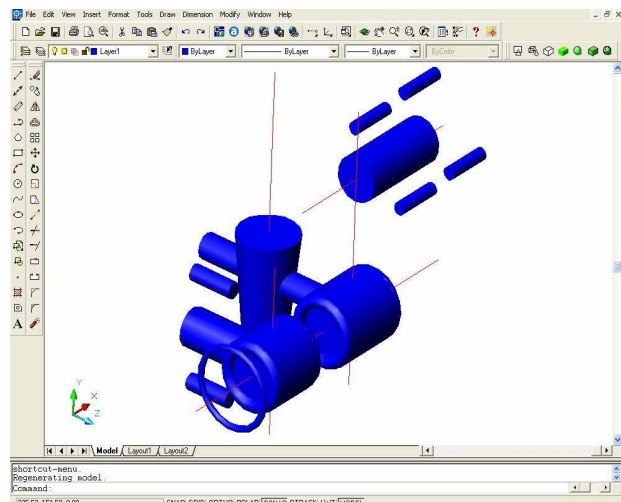


Figure 11: The utilization of commands REVOLVE and EXTRUDE

In order to obtained interior forms identically with one bodies what faucets must represented proceeded to freeze layer coresponding zones of extraction and is applied command UNION all

which bodies generate us the exterior outline of faucets. The advantage of application, for the moment of command UNION, is to maintain certainly all forms of part, of the case when is applies this command after the moving excedentar material, when exist the danger remove of a part from piece. The result obtained in follows this commands and defrost freezing layer is presented in figure 12.

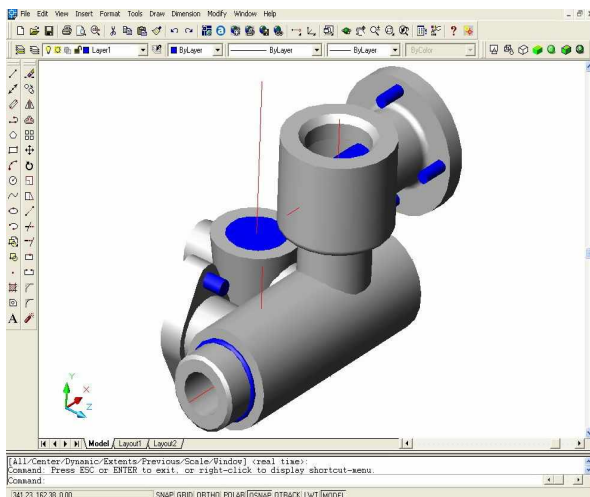


Figure 12: The utilization command UNION

In sight remove risk of confusion among the body faucets and the part of material who will be eliminated utilized just two layers:

- One for the body faucets - is applied a color the maul geted closer to the ultimate part;
- One for the part of material which were eliminated - is applied a color in contrast with a ultimate part.

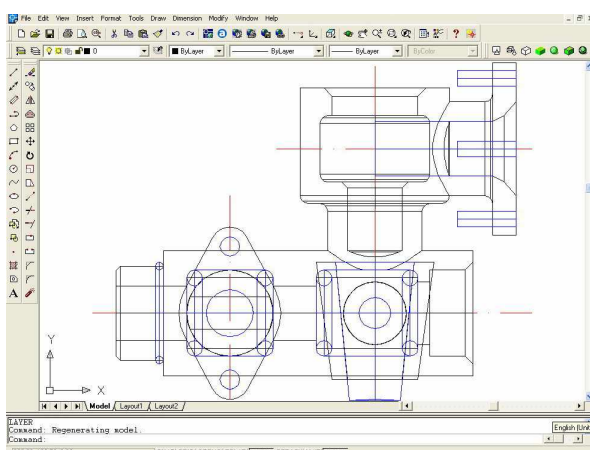


Figure 13: The utilization of command SUBTRACT

Obtained ultimate models of bodies multiple faucets are achieved in followed the command SUBTRACT is applied every zones who must be finalized. This command applied

very easy if utilized, from bar Shade, the command 2D WIREFRAME and is worked in plane, layer be of different colors, what permits us his achieves selection quotient a good mau zones of extraction. The ultimate model obtained in follows the commands SUBTRACT, whereat applied command GOURAUD SHADED, from bar Shade, and eliminated axis of symmetry is presented in figure 14:

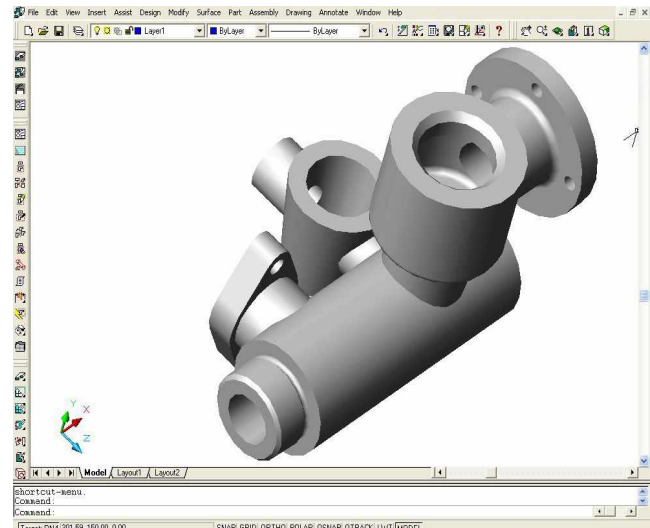


Figure 14: The ultimate model obtained in Autocad

In order to achieved a last verification tridimensional models are turned the part so that his are noticed all what details are hidden eye, because overlap the bodies faucets across certain orifices. A particular position of the pieces is presented in figure 15, in which we can notice another and which details were visible the feather now.

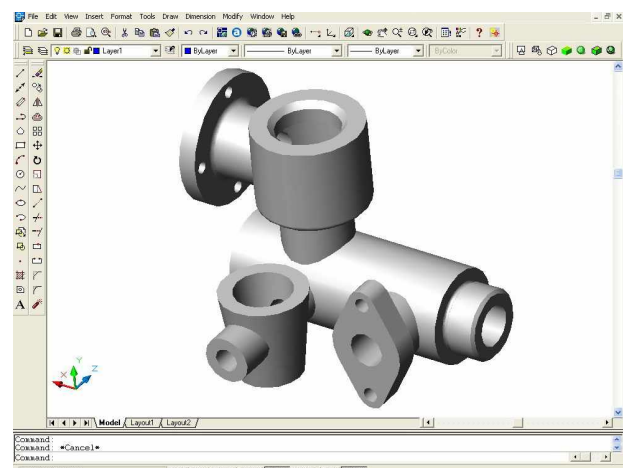


Figure 15: Turning ultimate models obtained in Autocad

III. Conclusion

Came in the support students, they utilized differently layers, for each zone in part, what has as effect a very good visualization the good maul zones.

Gradually renounced to certain layer, because is be achieve a big loading piece and ploughes be dim certain details the important maul of the model.

Methods of obtained form of this body of faucet are multiple. Method exposed in this work present the advantage learning students in modelling 3D, after what, in preliminarily, they were familiarized with drawing in 2D on computer.

Unfortunately the program Autocad don't permits and obtained a tridimensional thread. In order to can represented zones threading is can utilized an another program the advanced

hight maul Mechanical Desktop (which comprises the program Autocad) who don't constitute discipline, for students, as part as university.

This work has as aim well training students, in order for this can manages, all the same of the program of he models tridimensional which they can tackle it at one time.

References

- [1] **Marin Dumitru; Raicu Lucian; Ad r Victor; Dobre Daniel** - *Desen tehnic industrial- teorieş i aplicq ii* - Editura Bren, Bucureş ti, 2002.
- [2] **Petrescu Ligia; Marin Gheorghe; Petrescu Relly** - *Elemente de grafiq q computerizq q* - Editura Bren, Bucureş ti, 1998.
- [3] **Simion Ionel** - *AutoCAD 2000 – Aplicq ii* - Editura Teora, Bucureş ti, 2000.