“City Layout – Gas” Software

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C O N T E N T S

Keyword:

GIS Ready – Crisis management – Drawing gas elements – Managing blocks and layers – Customizing software

Background:

One of the city identifiers is map. There is some act for producing maps. One of these acts is map producing for using in GIS (Geographic Information System). Our purpose of this article is introducing a software that named “City Layout - Gas”. “City Layout - Gas” is outcome of seven years research and using of experts experiences of National Iranian Gas Company (NIGC) and hole of deficiency of National Iranian Gas Company (NIGC) about drawing process. “City Layout - Gas” manages and draws gas elements in a drawing file only with choosing proper icon or command and batch of process have done at a little time that in usual fact, users spend a lot of time for the same order. Today, with developing and increasing of information which industrial and office departments need, it has to use computer for saving and taking reports. For these purposes using simultaneity database’s information and related documents are necessary. The simultaneity exporting information with observation drawing (Maps) idea can help a lot. GIS software has some tools that perform relation between information and objects of drawing (Map). The first step of produce a GIS is producing a drawing. In a drawing all elements must be in specific layers. Draftsmen (Map drawer) after two or three hour drawing have a lot of mistake in maps. So “City Layout – Gas” was designed because of these drafted objects in wrong layer or situation. Base references of “City Layout – Gas” are taken from National Iranian Gas Company (NIGC).

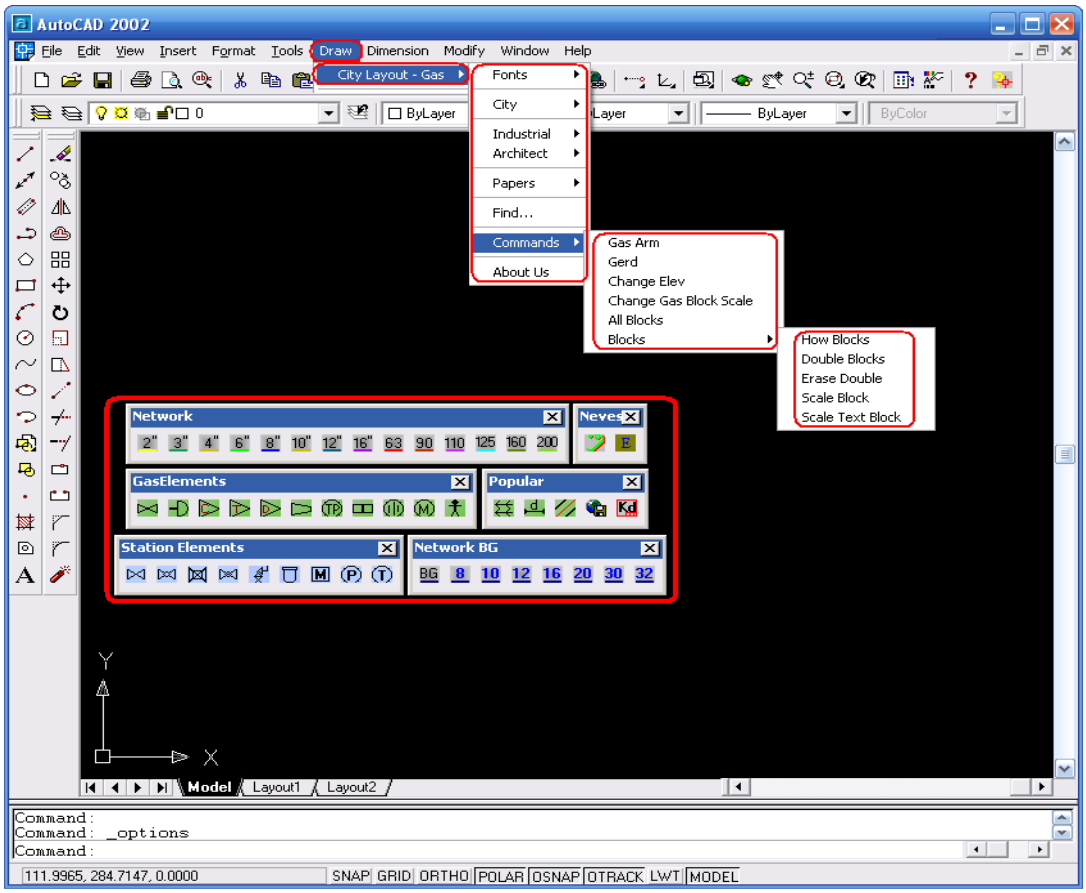


Figure 1

As you see, figure 1 shows “City Layout – Gas” environment. More companies use Autodesk softwares for designing or drawing maps such as AutoCAD, Mechanical desktop, Autodesk Map. Autodesk added some plug-ins to AutoCAD2002 and named this new product, Autodesk Map2002. Also “City Layout – Gas” is a plug-in for the AutoCAD as Autodesk Map2002 too. “City Layout – Gas” was written by Visual Studio.net 2010 and Auto Lisp. “City Layout – Gas” adds some commands to AutoCAD software tha t makes confirm of accuracy of producing Gas maps prefect. Fortunately “City Layout – Gas” approved by experts in National Iranian Gas Company (NIGC) and it is international designed software for digitizing gas maps and can take a well market in the world. And at last because “City Layout – Gas” produce drawing for GIS (a high level documentation for managing), produced drawing covers all gas company needs. The usage of “City Layout - Gas” is for gas elements drawings and in the future other elements can be added to software for other organisations such as post office, police office, power electric company or organisers.

Here in figure 2 you can see a drawing of one of city in Iran which drew with “City Layout – Gas”.

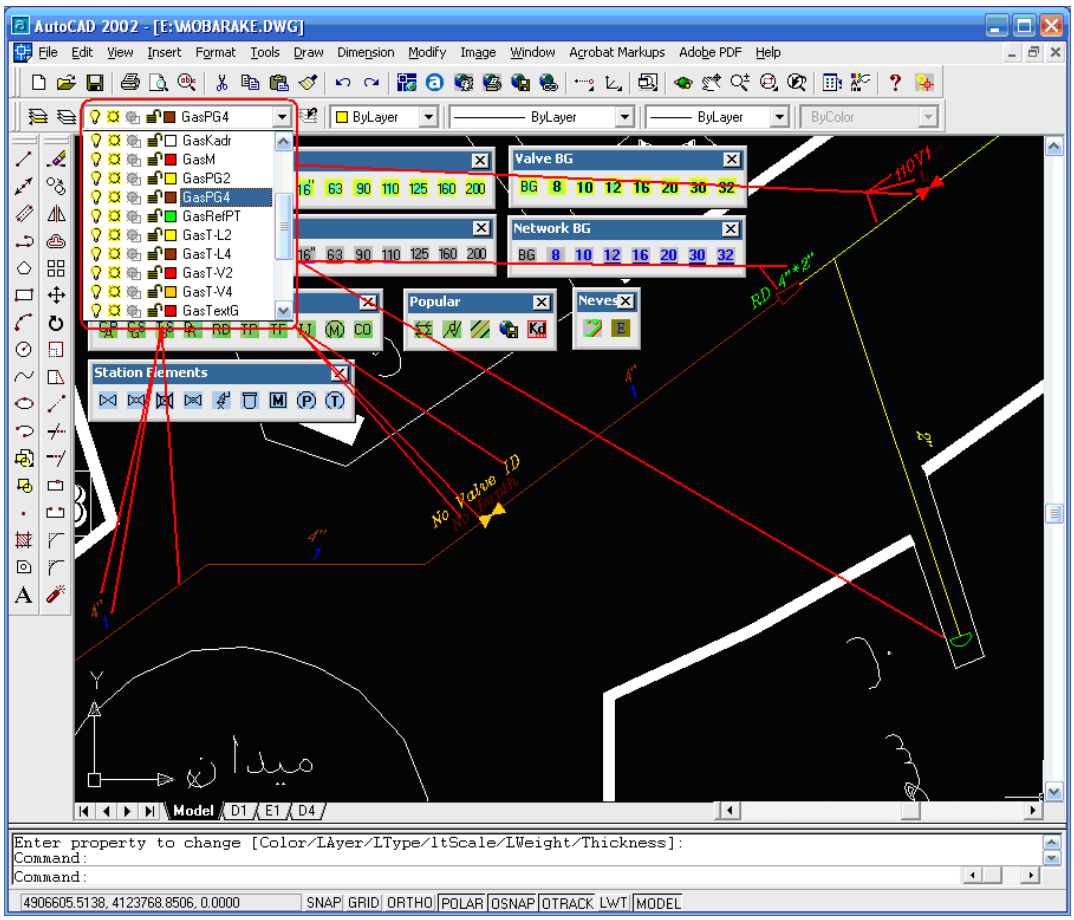


Figure 2

Aims

By the creation of mankind, presenting and explaining different subjects to each other was required. This includes animals, humans and ultra creatures. One way of presenting is using maps. In the past, maps were drawn on animal skins. But now it is drawn by computers. History of drawing maps and creation of general standards for drawing and reading maps are not considered in this article.

This article is for presenting a new tool for drawing gas maps. This tool is by now designed for National Iranian Gas Company (NIGC) scope, but in case of necessaries it can extend for other organisations too. In this article “map” is not referred to all elements of a city but it including elements and standards of National Iranian Gas Company (NIGC) scope and can be installations for electrical, water and sewerage office, police and post office’s maps and etc.

“City Layout – Gas” scope:

“City Layout – Gas” is basic software for producing GIS.

“City Layout – Gas” is unique and there is no similar software as it till now.

“City Layout – Gas” is for any scale such as 1/200, 1/500 1/2000.

National Iranian Gas Company (NIGC) has a standard for digitizing gas maps. This standard is imperfect. In “City Layout – Gas” this defects was corrected.

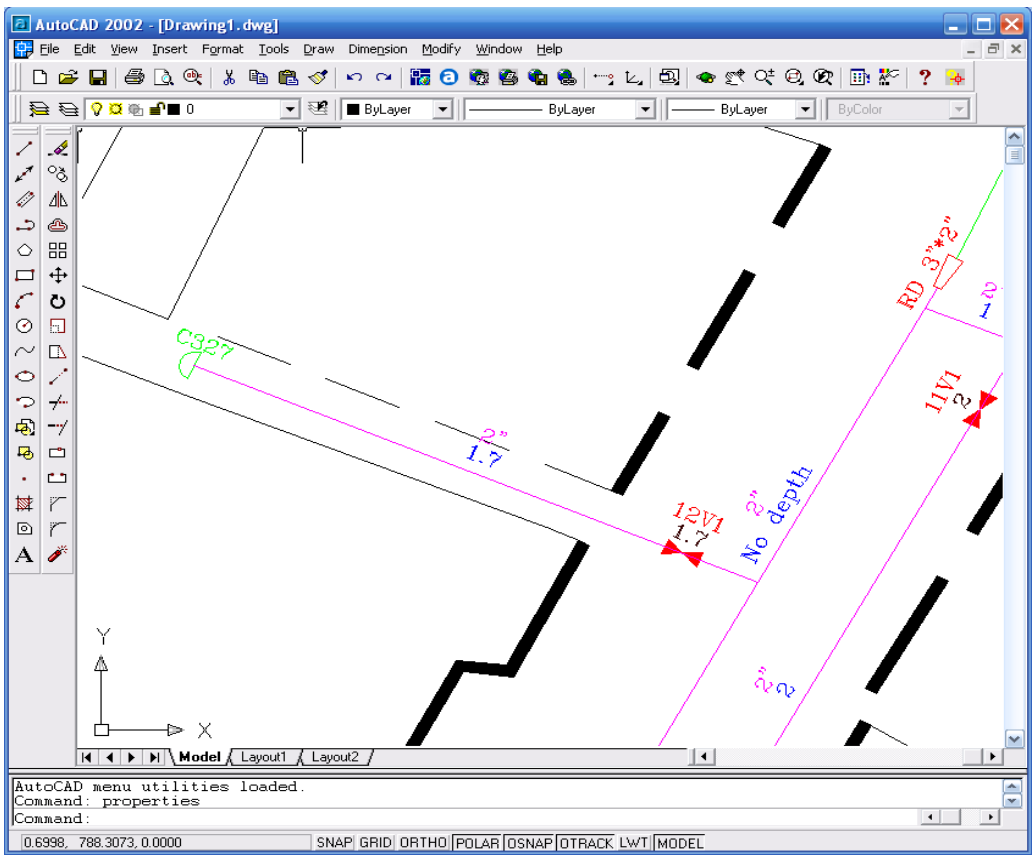


Figure 3

In gas companies and related, for producing maps, at first, texts, measurements, layers, colours are adjusted for AutoCAD. Then inner and outer blocks are provided. These blocks include of Valve, TBS, Reducer, TP, TF, Cap, CGS, TBS and etc. A template drawing template was distributed to all clients, then digitizing and drawing is started by supervisor. During drawing maps, the operators must pay attention to position of graphic layers and gas elements. Otherwise it may cause producing maps with wrong reports. For example valves may be placed in Cap layer or identifier text of a pipe may be placed in pipe depth layer, TF layer or Reducer layer. These imperfections are unavoidable in gas maps. Because the operator may become tired after some hours of drawing. And after that the operator will not draw maps correctly, and elements won't be in their right place.

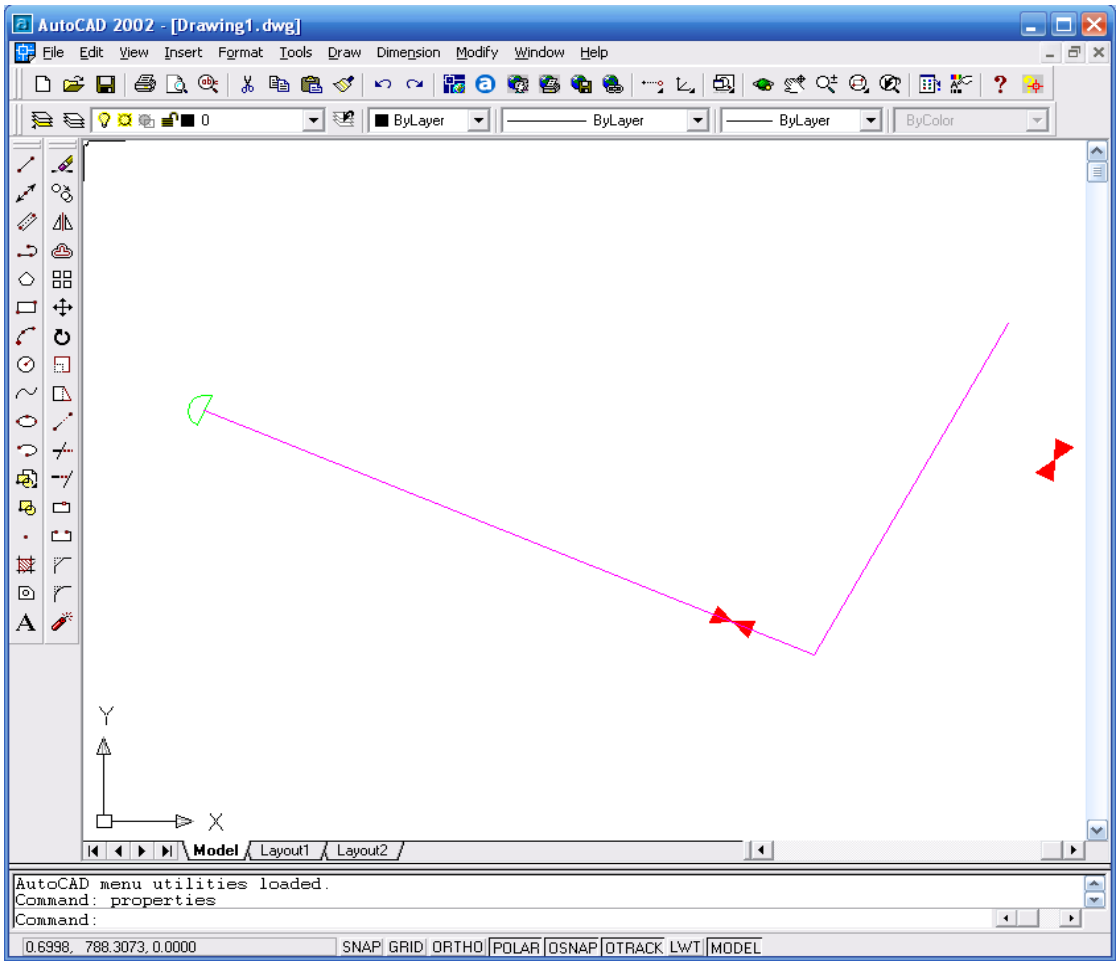


Figure 4

Now we consider this produced map from two aspects:

- If our goal of drawing is a map, only for observation or printing then the above map is enough.
- If we want to give this map to other organisations for analyzing, then it is not correct. Because elements are not in their right place. In according to above example steel pipe lines may be in polyethylene pipe layer and so on. (Figure 4)

While producing a map the final goal is considered. For example while producing the map it is mentioned that it will be given to municipality. And municipality will consider all maps of other organisations for crisis management.

Maybe you say that the above plan is not appropriate for presenting to municipality and you know why. Because before presenting, it must be corrected. We call this GIS Ready: meaning every element must be in its right place with its right format. We now try to present the software and its extra capabilities and presenting the details of mapping to gas companies and executive contractors. Also we create idea of customize this software for other industries.

Here is layers data entering form (user interface) of “City Layout – Gas” (Figure 5). In this form user (Cad man) specify layers name and colors of gas elements for AutoCAD. Also user must create or manage gas element blocks for drawing or for distributing to other client in workstations.

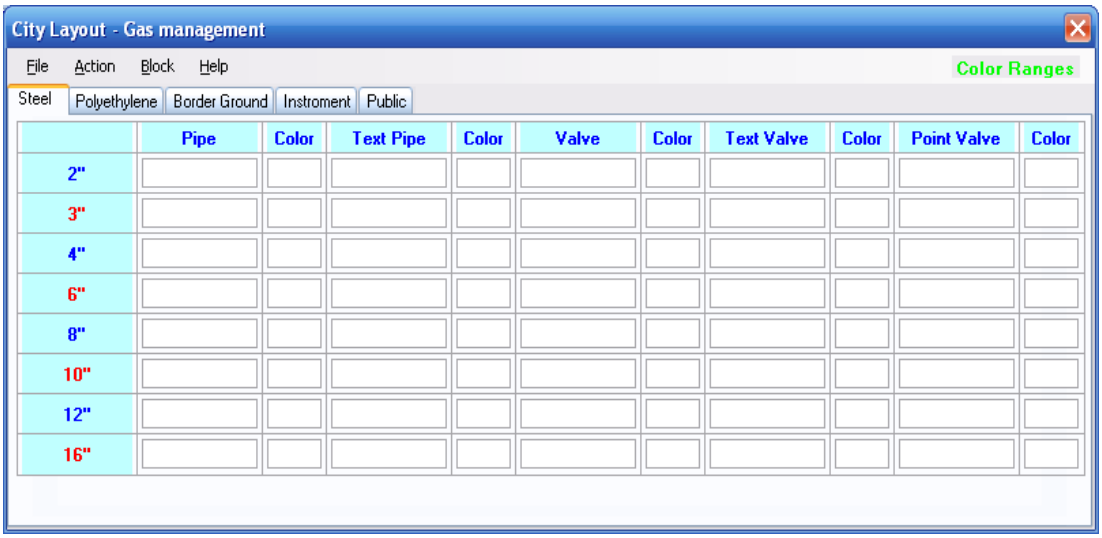


Figure 5

METHODS

Producing tools:

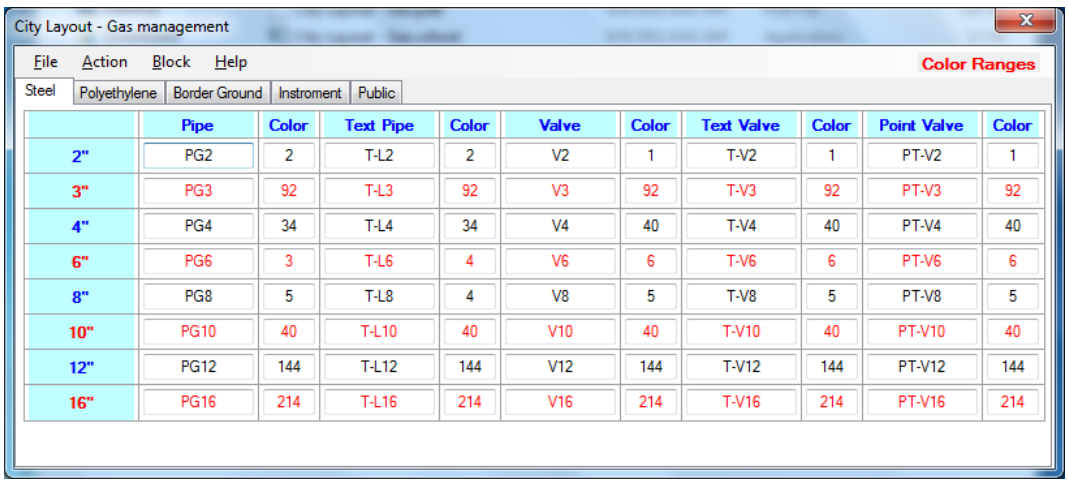
- Auto Lisp language.
- Visual studio 2010
- Install shield program.
- Optional- SQL express

For design and programming, I used “Visual Lisp” environment and lisp program syntax for defining commands, tools and dialog as a plug-in for attached to “AutoCAD” software. Before I must to seed this command by specifying layers name, layers colour, layer line width and all related blocks in “Visual Studio 2010” by a data entry form (Figure 6). I can store date in Sql Server Express, but all data are stored in a flat text file. For installing software, “Install Shield” software, finds AutoCAD directory and related sub directories and then copy all necessary files in corresponding folders. After “Setup.exe” copies “City Layout – Gas” at computer, now there are two steps for producing gas maps by “City Layout – Gas”

- Step one: Manipulate and managing gas and layers gas blocks.
- Step two: Using prepared menu and tools in drawing environment.

Step one: Manipulate and managing gas layers and gas blocks:

At first, all standard layers of gas map will put in it by “City Layout - Gas management” form. As you see in the figure 6 the entry of layer names and colors are placed in different classifications.



	Pipe	Color	Text Pipe	Color	Valve	Color	Text Valve	Color	Point Valve	Color
2"	PG2	2	T-L2	2	V2	1	T-V2	1	PT-V2	1
3"	PG3	92	T-L3	92	V3	92	T-V3	92	PT-V3	92
4"	PG4	34	T-L4	34	V4	40	T-V4	40	PT-V4	40
6"	PG6	3	T-L6	4	V6	6	T-V6	6	PT-V6	6
8"	PG8	5	T-L8	4	V8	5	T-V8	5	PT-V8	5
10"	PG10	40	T-L10	40	V10	40	T-V10	40	PT-V10	40
12"	PG12	144	T-L12	144	V12	144	T-V12	144	PT-V12	144
16"	PG16	214	T-L16	214	V16	214	T-V16	214	PT-V16	214

Figure 6

In these forms you cannot have identical layer names otherwise the operator may get an alarm and its textbox become yellow. And if you leave a textbox blank the textbox become green and the program will put the default value in it as figure7.

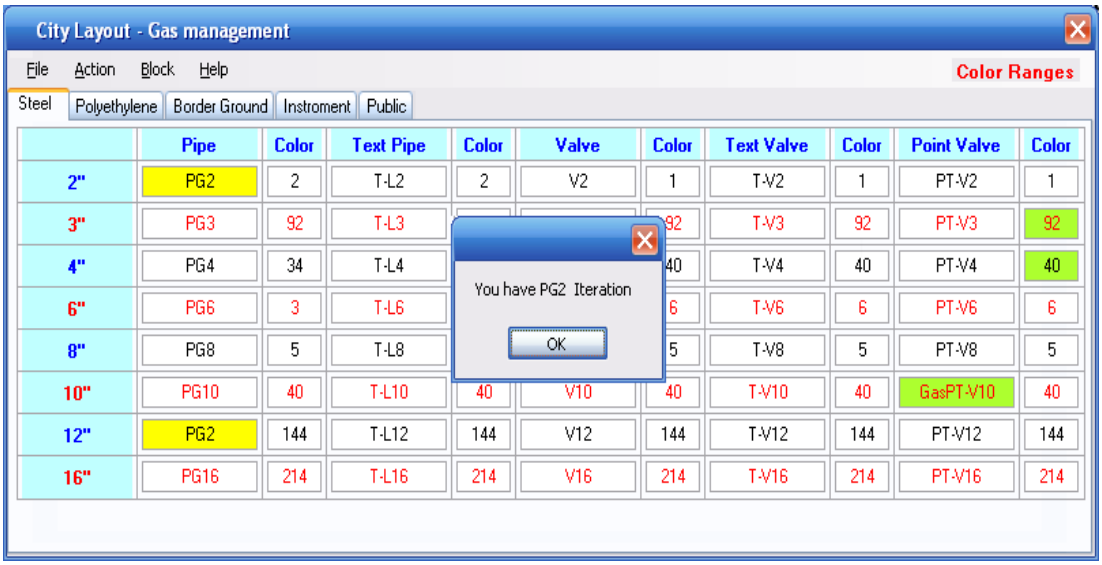


Figure 7

Having identical layer names in AutoCAD, Mechanical desktop and Autodesk Map softwares, cause error. But “Make City Layout - Gas management” form, besides providing an alarm won’t let you enter identical value as data validating.

Steel pipe names and colors are classified in “steel tab”, and also Polyethylene pipes in “Polyethylene tab”, ring pipes in “Border Ground tab”, CGS, TBS, TP, RD, IJ blocks in “instrument tab”.

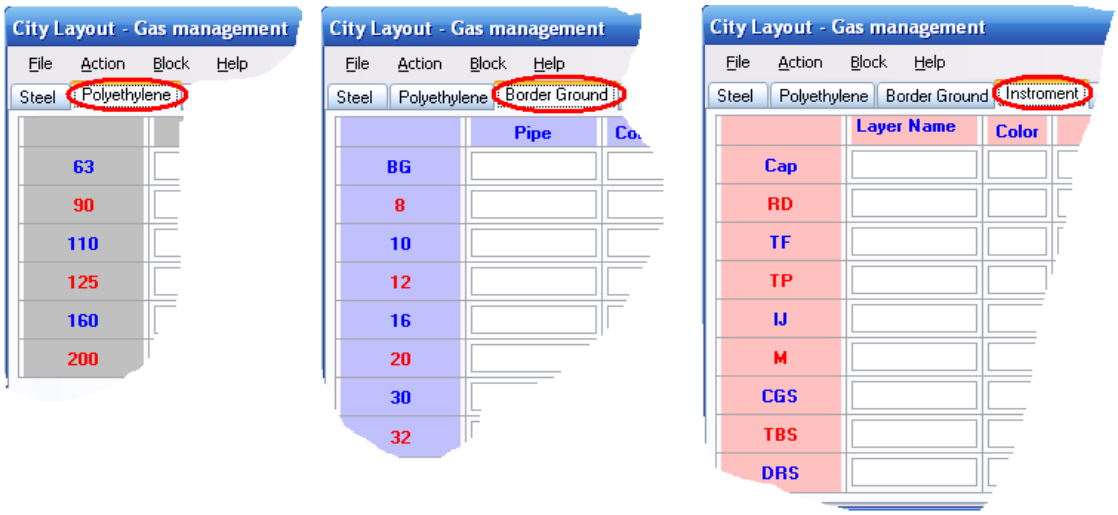


Figure 8

General layers like Z, Base, M, UTM and Gas in “public tab”. With “file” menu you can watch current used AutoCAD layers and by “export” and “import” menu, final created layers can be give and take to other client. (Figure 9)

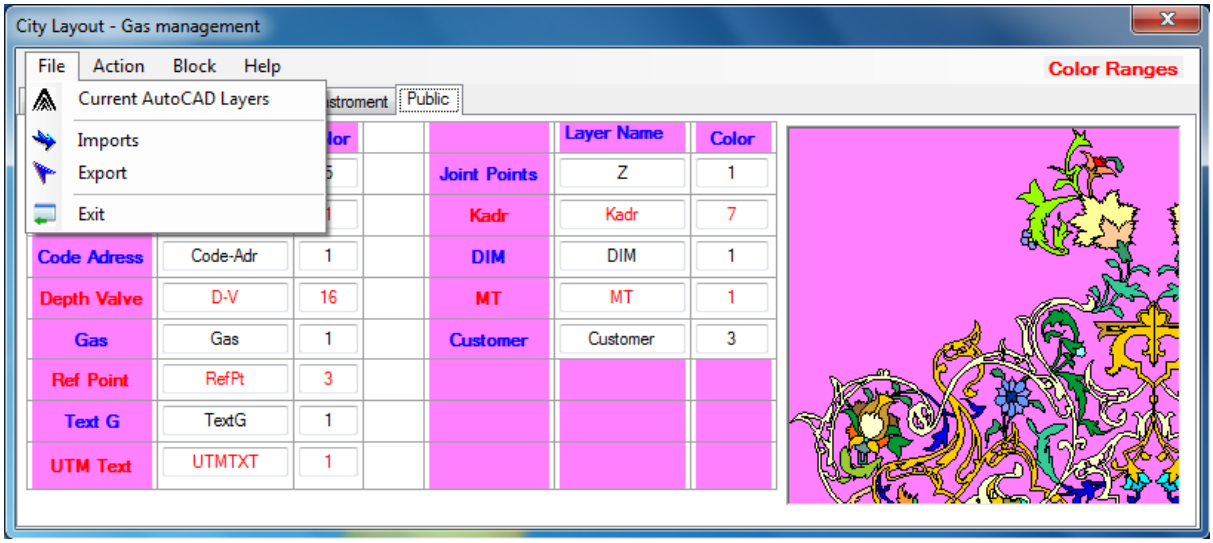


Figure 9

As you see Figure 10 “Color ranges” link, appears a color dialog for finding correct color number. This form is look like Autodesk color dialogs.If you pay attention, you can find lot of tools, menu and user interface(UI) is similar to common environment such as office software and AutoCAD environment. This factor causes operator works better because all forms are user friendly.

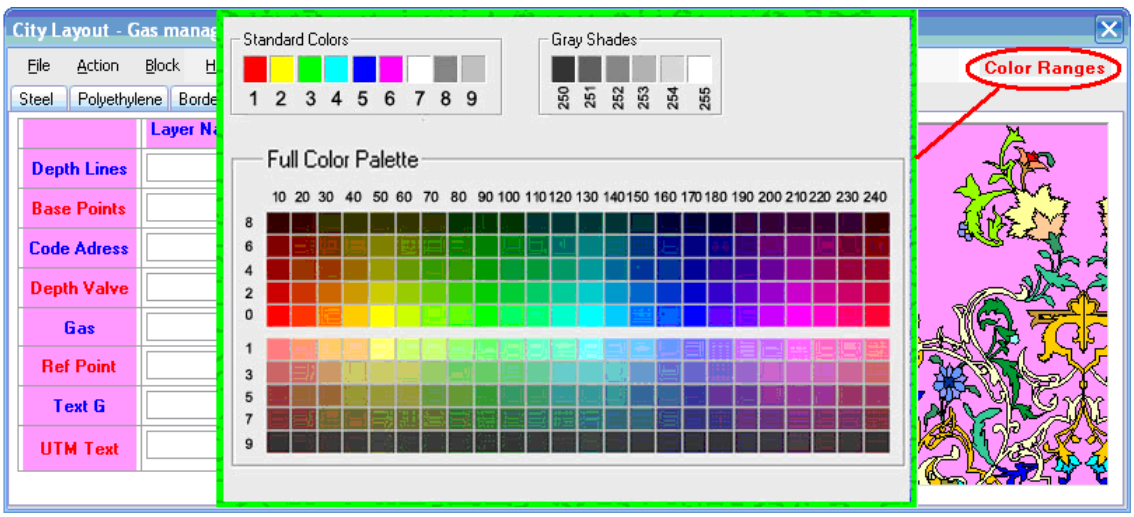


Figure 10

"Action" menu makes final layer name for Autodesk software. GIS and National Iranian Gas Company (NIGC) layers menu put default layer name in text box of "City Layout - Gas management" form. "Block management" shows a new form with same name that manage element blocks for Autodesk softwares. (Figure 11)

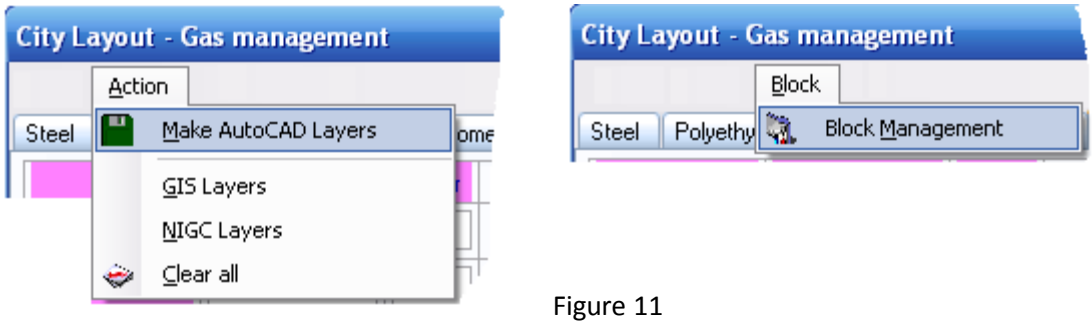
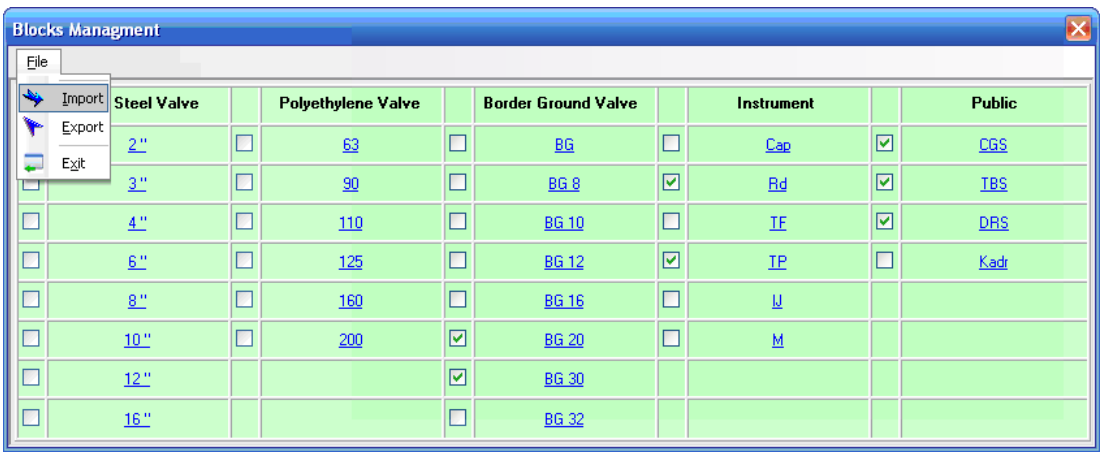


Figure 11

In these forms you can edit current blocks or create new blocks and by "export" and "import" menu, final created blocks or selected blocks can be give and take to other client. (Figure12)



Steel Valve		Polyethylene Valve		Border Ground Valve		Instrument		Public
2"	☐	63	☐	BG	☐	Cap	☑	CGS
3"	☐	90	☐	BG 8	☑	Rd	☑	TBS
4"	☐	110	☐	BG 10	☐	TF	☑	DRS
6"	☐	125	☐	BG 12	☑	TP	☐	Kadr
8"	☐	160	☐	BG 16	☐	IJ		
10"	☐	200	☑	BG 20	☐	M		
12"			☑	BG 30				
16"			☐	BG 32				

Figure 12

Step two: Using tools in drawing environment:

"City Layout – Gas" software puts all gas elements and commands in different toolboxes and menus by classifications.

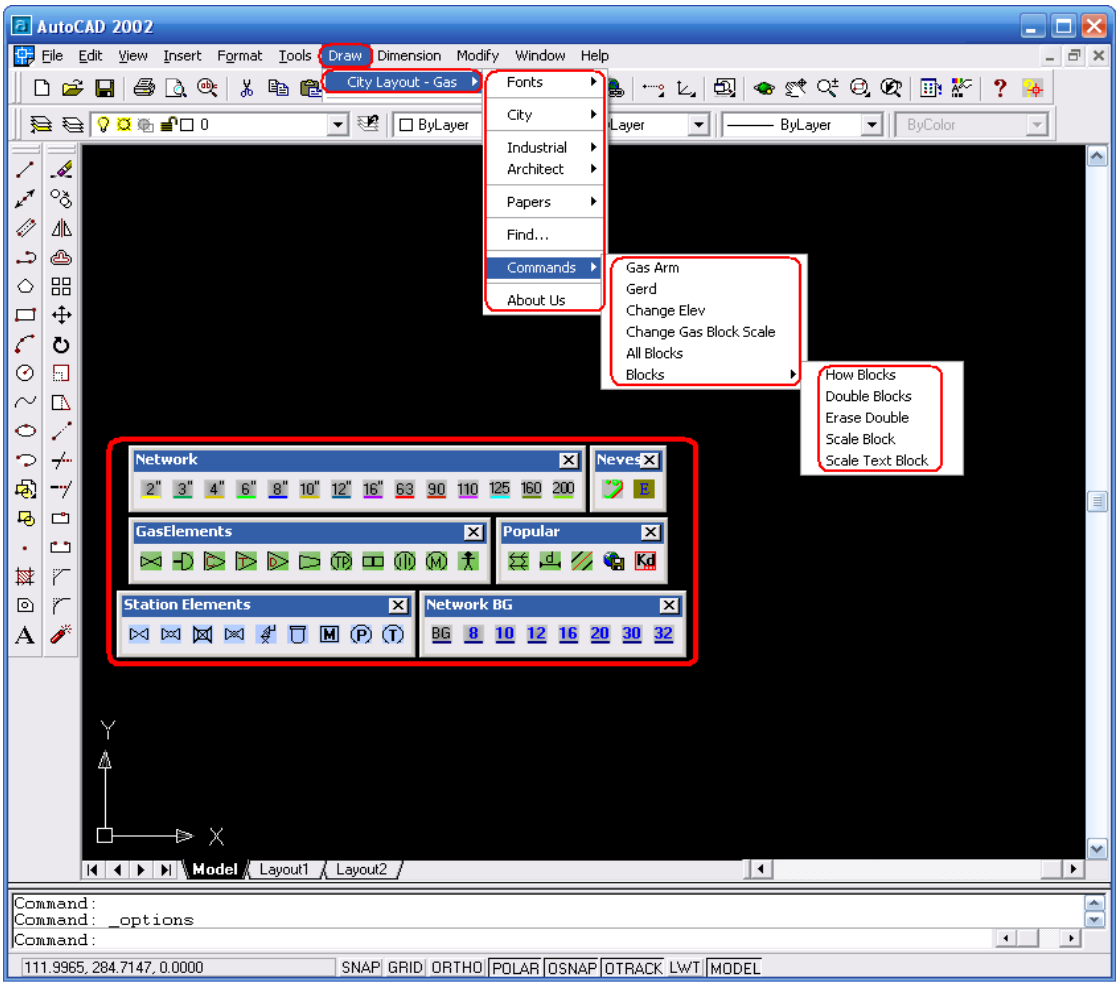


Figure 13

Drawing of gas lines is done by **Network icons**. With clicking each icon's respective, **layers are create if they don't exist** and then gets the beginning and end point of line's coordinates from the operator. Then pipe depths are taken and at last the gas network is drawn as poly lines. Pipe depths and sizes are written above each pipe in defined layers, without any need to go to another layer or changing current layers. If it is not done, blocks and lines are drawn in wrong layers in drawing environment.

By **valve icons**, steel valve, polyethylene valve or ring valve is inserted on gas line. One of the advantages of "City Layout – Gas" software is that the inserted point is asked from the operator when choosing the **Valve icon**. And if the inserted point is on gas line, block of valve is drawn otherwise if inserted point was on gas line such as street line, lane line or other parcel line, an alert noticed to user that he(she) choose

an incorrect gas line. For inserting Valve first, a valve that adjusts with gas line is

placed with the right angle and the pipe line will break(if necessary) in the inserted point. Then depth and identifier of valve is asked from the operator and the software writes these texts on the middle top of valve. If the operator doesn't enter the depth and number of valve, the software will put "NODepth" and "No ValveID" values, in order to correct them in future in the correct layer.

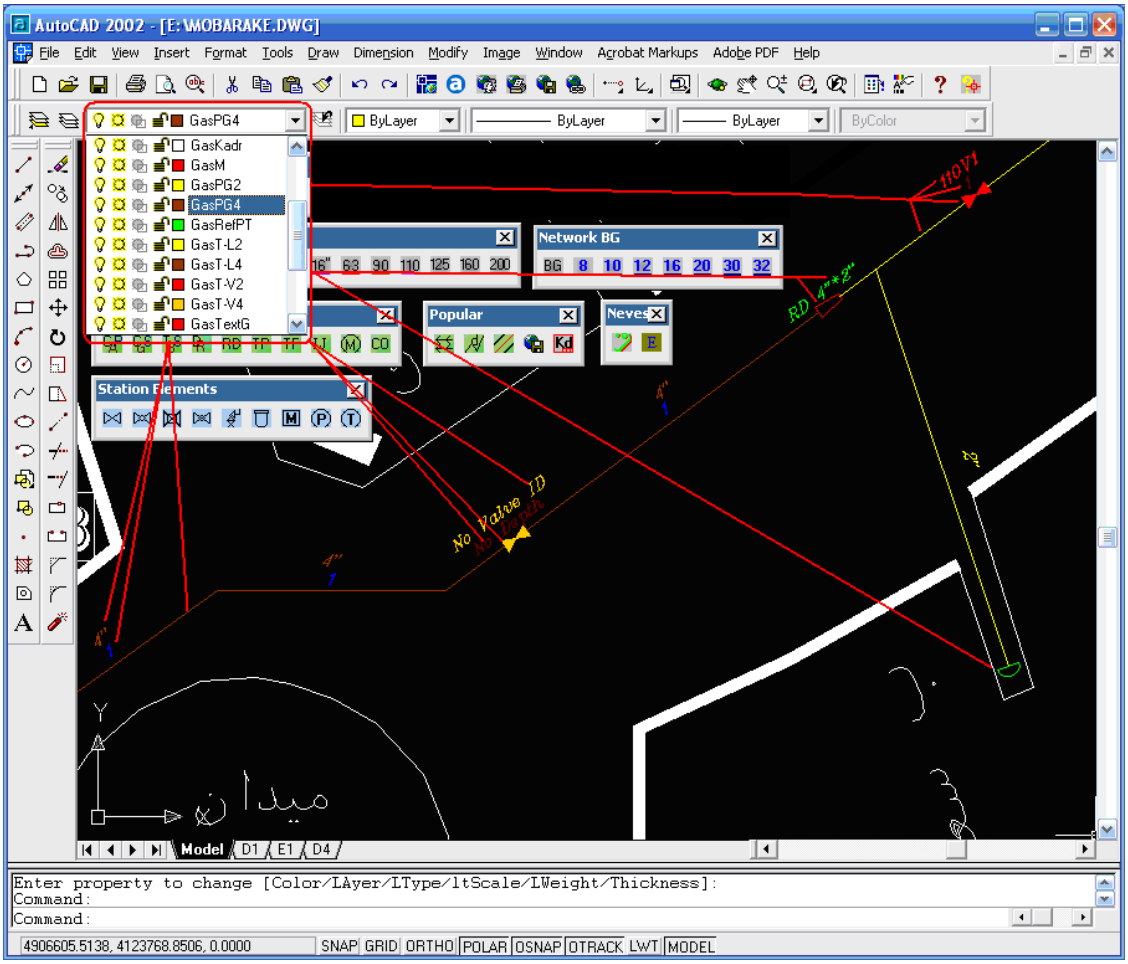


Figure 14

All gas elements will be placed in their own standard layers, without changing of current layer. As you see in the Figure 14, with drawing gas line, inserting valves or other gas elements, layers are created automatically. Then blocks can placed in correct layers.

By using **"TF", "TP", "RD", "DRS", "TBS", "CGS" icons**, respective blocks are placed in the requested point. Then block's information is written in it. For example after inserting a CGS gas station, number and capacity or any other characteristics of the station are asked from the operator and are written in CGS block as figure 15. **Customer icon**, writes the customer ID in the map. This is good for tracking gas line and find related valve (or valves) and with closing valve (or looped valves),the customer have not gas and repairing is done. (Figure15)

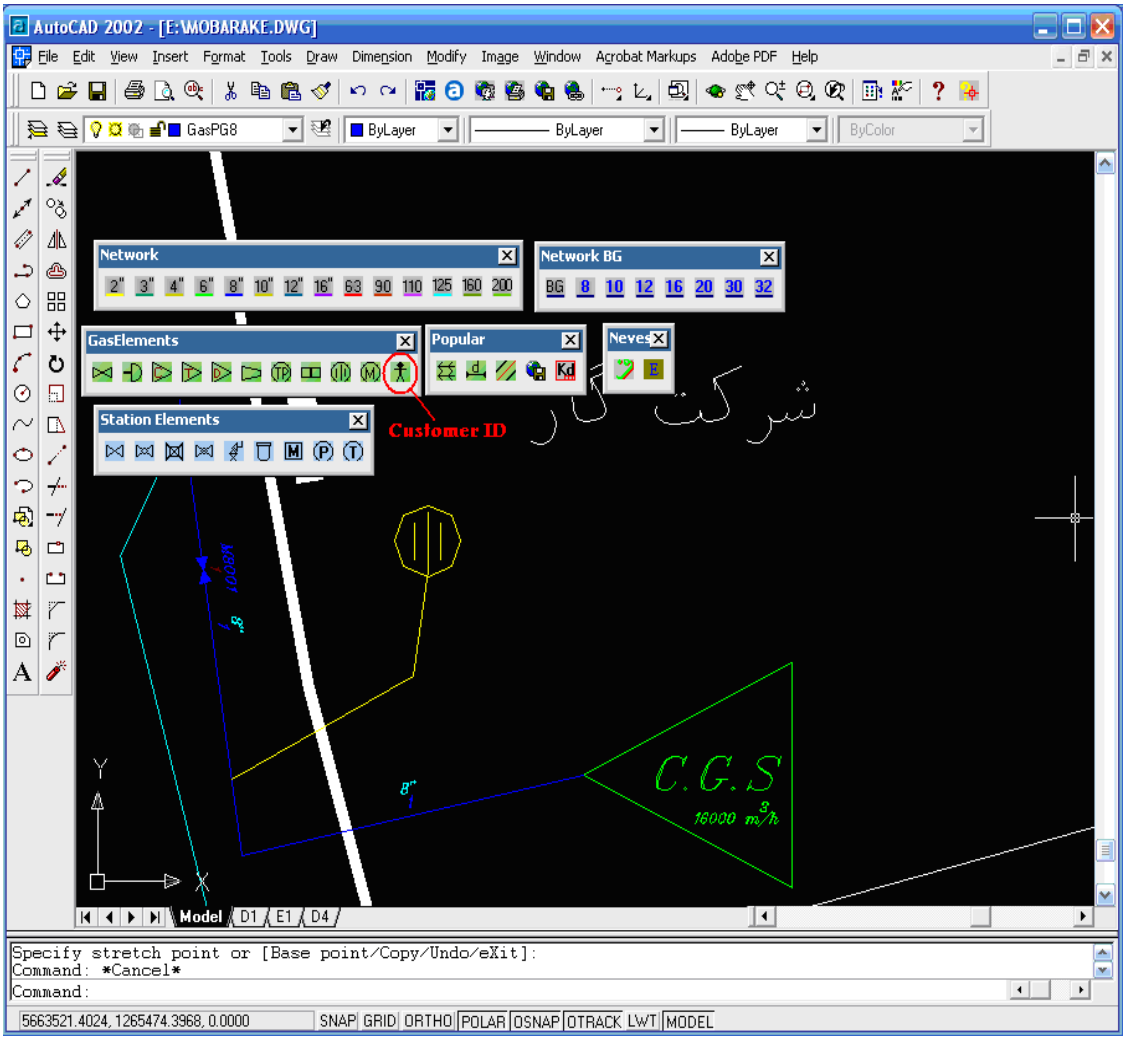


Figure 15

"Cutting line" icon breaks the lines which are perpendicular and draw an arc to show that these lines are not conjunct. Software breaks the vertical or horizontal lines by taking arc length and intersection points from the operator then it draws the arc.

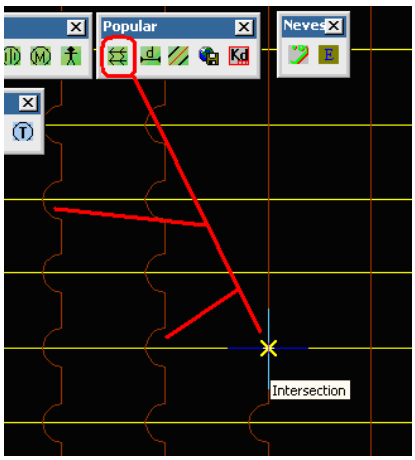


Figure 16

"Calculate Length" icon, reports the line lengths by choosing a pipe line or a region. This command is for referring for controls gas line to contractors or repair man of Gas Company. With this command operator take two kind of report. A length report is appear in a dialog by selecting a gas line or some gas line as figure 17.

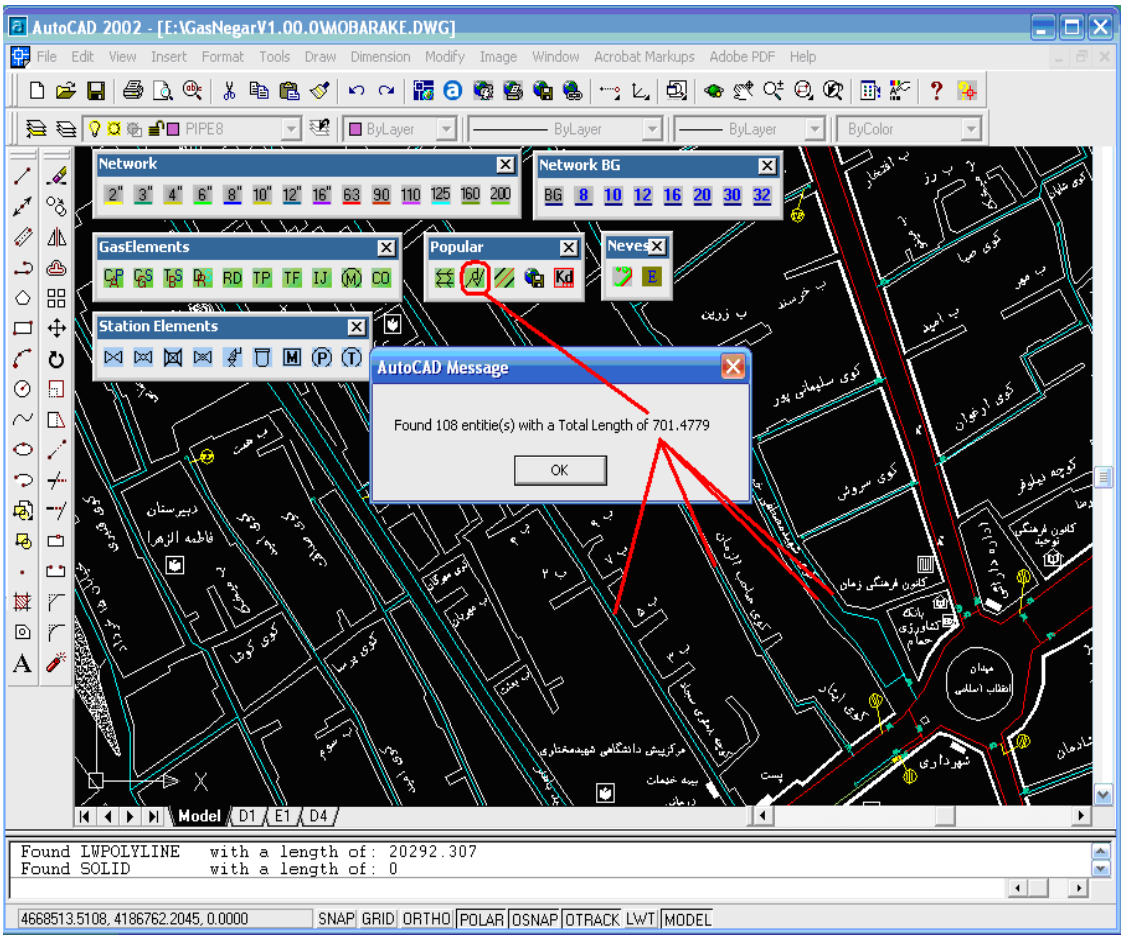


Figure 17

Other report is made of selecting a region and software filter unnecessary objects such as dimensions, street lines, lane lines, river regions and so on. Now, only gas elements and gas line remain in collection. Then "City Layout – Gas" loops between objects and in command window writs sum of all elements by categories. Figure 18 shows a real report of a region of a gas map city.

We can mention usage of this reports for repairing line or gas elements or managing a gas station or in a refinery.

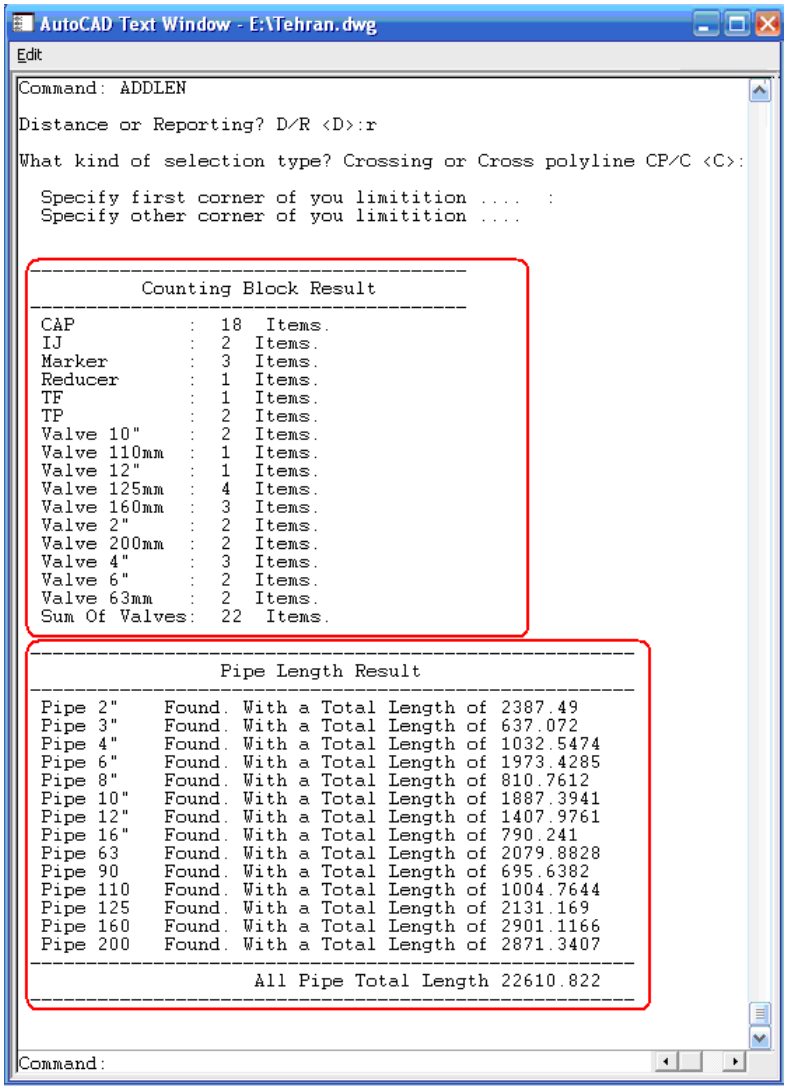


Figure 18

"Center Line" icon, draws the middle line of lanes or streets. These lines in GIS environments are used differently. For example after drawing middle line of streets with considering the land usage you can realize if widening is needed which side of the street must be destroy and how much.(It named buffer in GIS environment.)

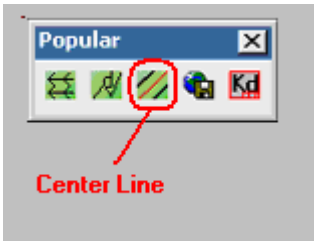


Figure 19

In “Draw” menu and “City Layout – Gas” submenu different practical commands are placed.

With Fonts Submenus Persian and English writing styles are defined. With and  **icons** you can write in AutoCAD.(Optionally it can added any font of languages)

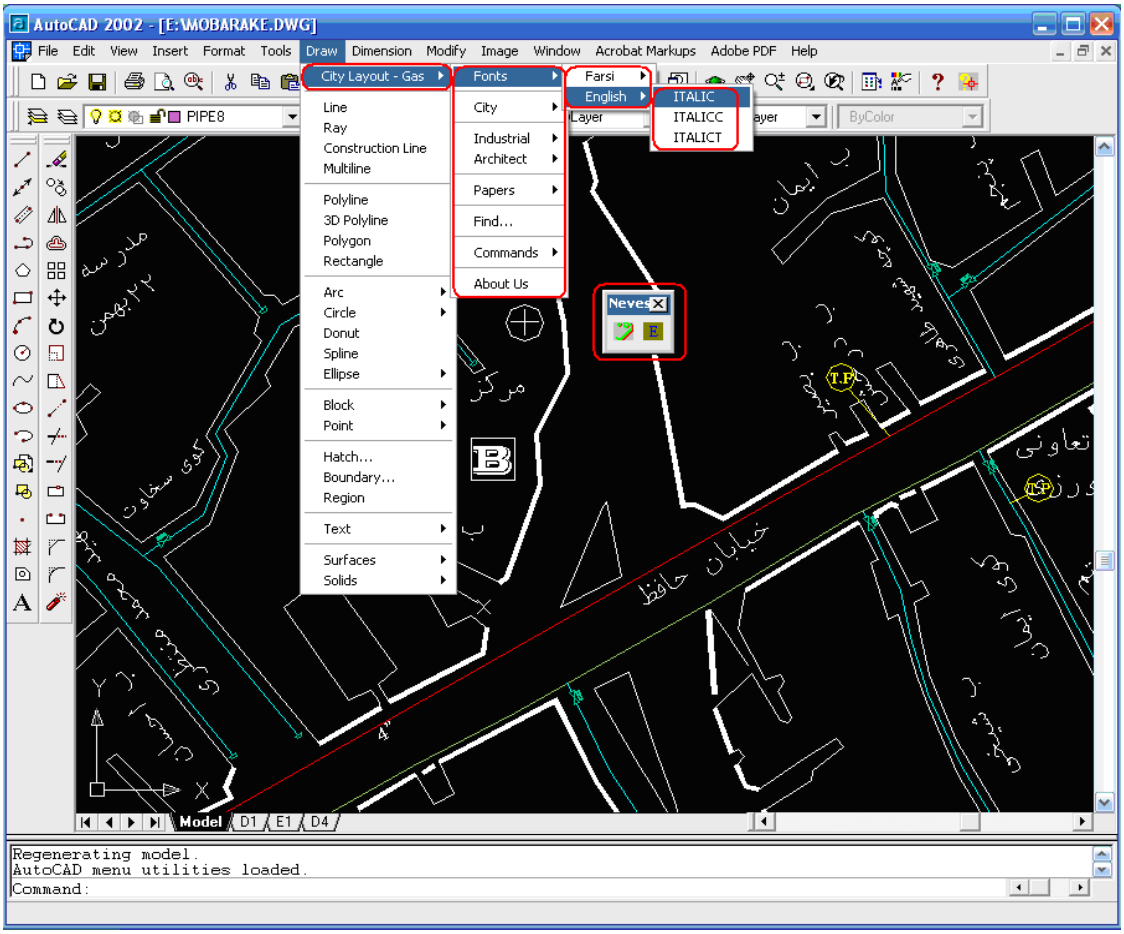


Figure 20

In “City Layout – Gas” submenu there are submenus for inserting civil furniture, industrial and electrical elements and all building and industrial standard I beam. In **Command** submenu there are commands for modifying size of inserted blocks or texts of those blocks.

It is also possible to find and delete double blocks which are drawn at same inserted point. This act may take hours or even days for the operator. (One of the GIS Ready acts)

“Station Elements” icons, inserts gas station elements in the map. After insertion station, element ID is asked. This number is used for tracking elements.

In two last figure show attribute of station elements (block) by double click on it and a template page for printing some area.

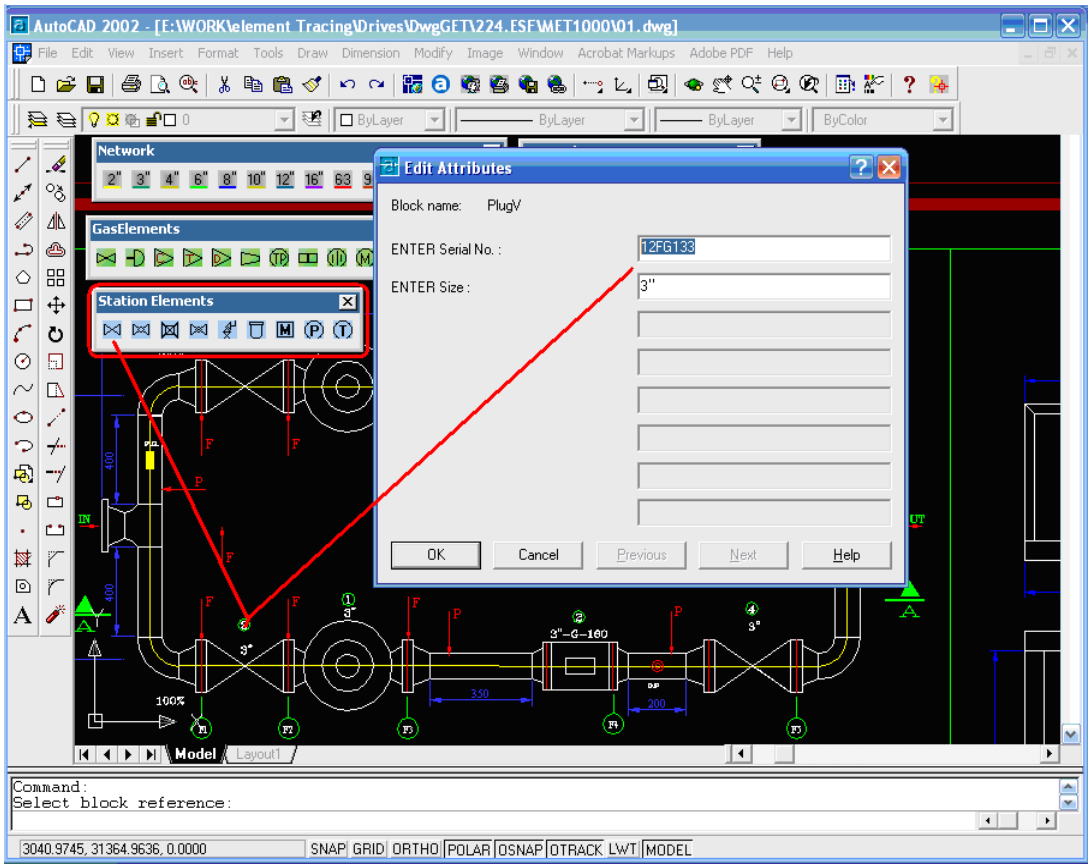


Figure 21

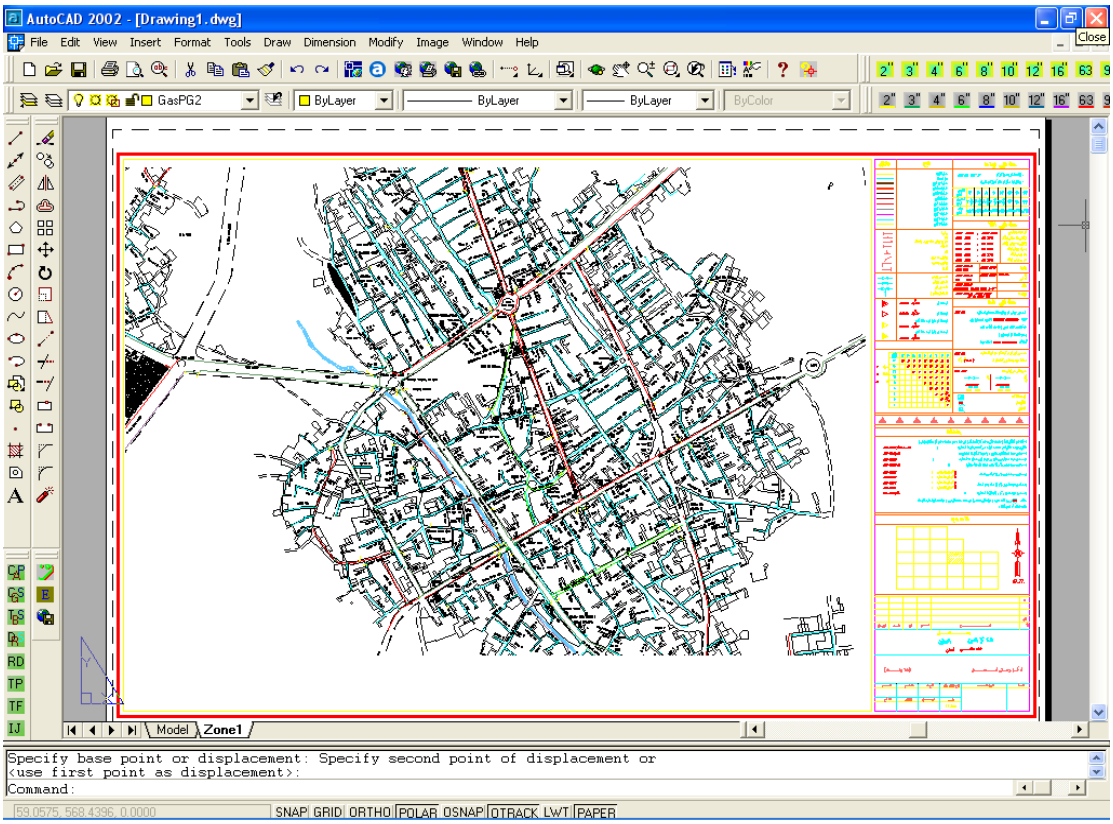


Figure 22

Conclusion:

"City Layout – Gas" software is for digitizing gas companies drawings, in which the operator only chooses the icons and inserts the blocks. And the software manages layers and blocks. Accuracy is guaranteed in "City Layout – Gas" software. It must be mentioned that all icons and blocks of software are editable. And changing standards can be applied in the software easily. This is idealistic if we can design a software called CCL (Common City Layout) with the help of other organisations.

Now we claim a lot of produced maps in gas companies have mistake and with city all of mistake was taken. **Our motto is *one correct way better than shortcuts***

Thanksgiving:

With a lot thanks of National Iranian Gas Company (NIGC) and my expert friends that help me to produce "City Layout – Gas"

REFERENCES

National Iranian Gas Company (NIGC) documents

National Iranian Gas Company (NIGC) web site: www.NIGC.ir

LIST OF FIGURES