

Dong-A

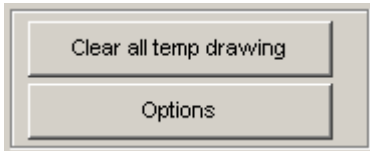
3D-Slope Manual



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 [www. Slope.co.kr](http://www.Slope.co.kr)

:



1. Clear all temp drawing : Joint , section guide temporary drawing .

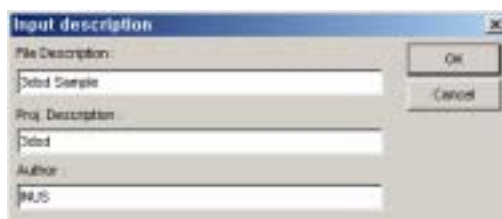
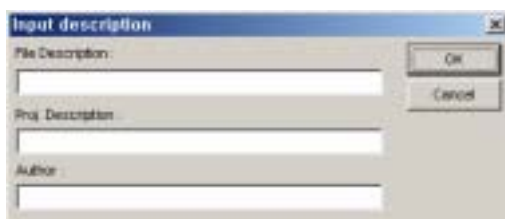
2. Options : , option .
Caption font , Image Grid

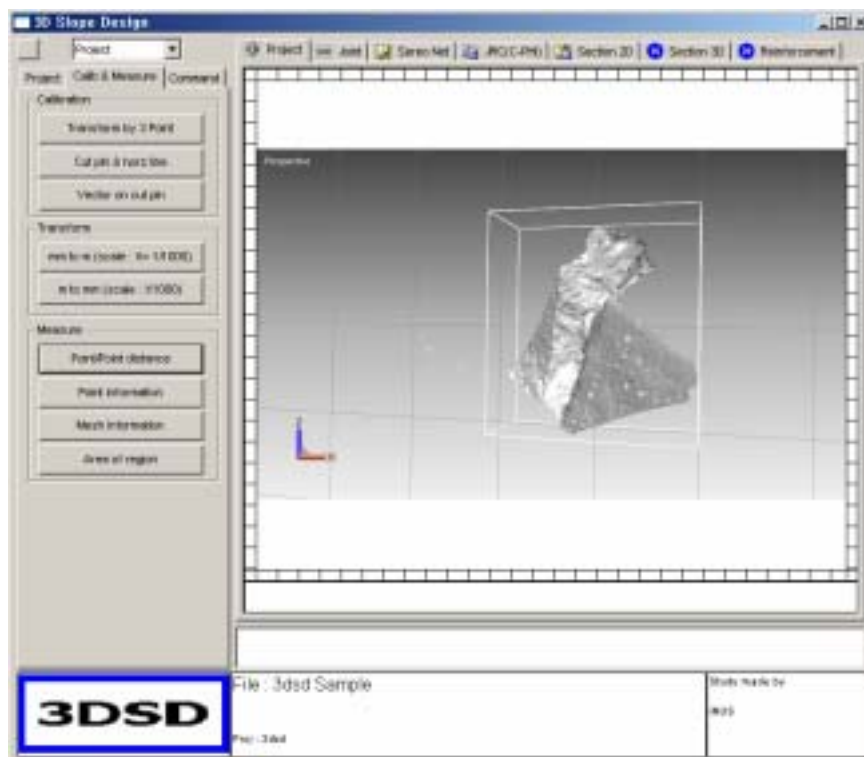


:

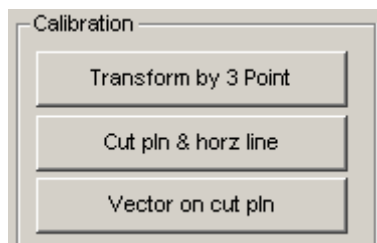
double click

가





Calibration :



Scan data . 3가

1. Transform by 3 point

3 scan data 3
, command tab

scan data
dialog

가

Project	Calib & Measure	Command
<div>Scan Point</div> <div> <div>P1</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div> <div> <div>P2</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div> <div> <div>P3</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div>		
<div>Measured Point</div> <div> <div>P1</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div> <div> <div>P2</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div> <div> <div>P3</div> <div> <div>...</div> <div>0</div> <div>0</div> <div>0</div> </div> </div>		
<div>Transform</div>		

Scan point scan data picking , Measure point



picking

Data , Transform , scan data

2. Cut pln & Horz line

Cutting plane Strike/Dip

Project

Calib & Measure

Command

Cutting plane Strike/Dip

Strike :

Dip :

☐ Negative plane

Select faces of cutting plane

Pick horizontal line

Transform

Rotate 180

Strike N45W , Dip 45NE
 , Negative plane check

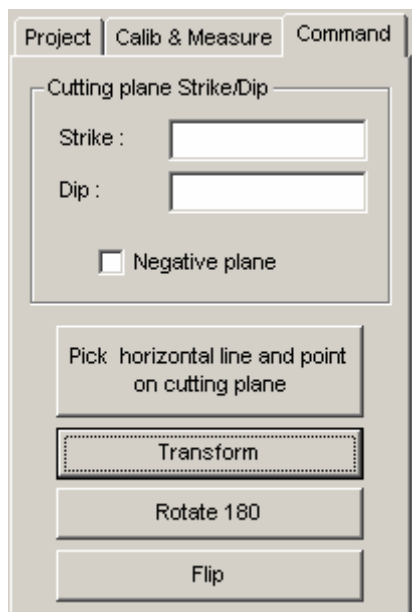
Select faces of cutting plane : strike / dip Cutting
 scan data . scan data

Pick horizontal line : .

Transform , Strike/Dip 가 .
 180 Rotate

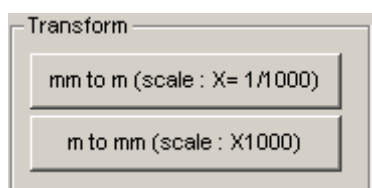
180 180 .

3. Vector on cut pln



Vector on cut pln 2 Cut pln & Horz line
 , cutting plane strike/dip , Pick horizontal line and point
 on cutting plane , cutting
 .
 Transform , 180 가
 Transform 가 , Flip/Rotate180
 . Flip .

Transformation :



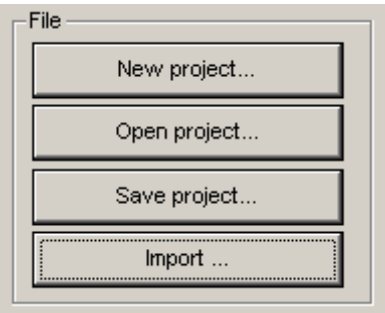
1. mm to m : mm m , 가 1/1000
 .
2. m to mm : m mm , 가 1000
 .

Measure :

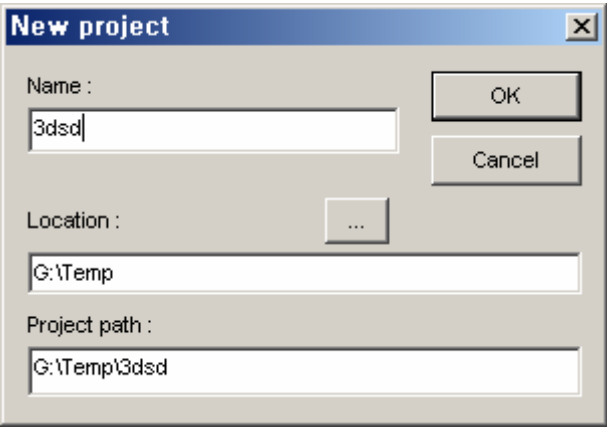
Reinforcement : Shotcrete , rockbolt layout

Project

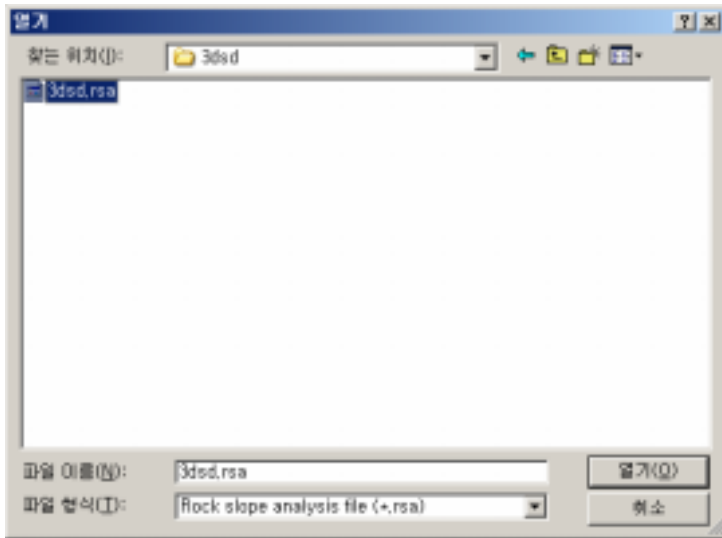
File :



1. New project
- Project Location project directory
, Name project가 Location Name
Directory가 , .rsa

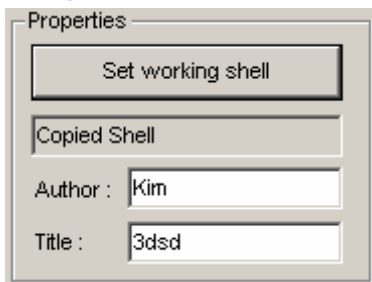


2. Save project
- 3DSD data .rsa
, Scan data file mdl working shell
, mdl
3. Open project
- Load . rsa project file open
scan data file Load



4. Import scan data file . Scan data file mensi
soi scan data가 .

Properties :



1. Set working shell : 3DSD scan data shell . 3DSD
shell . clear
shell . , shell

Report :

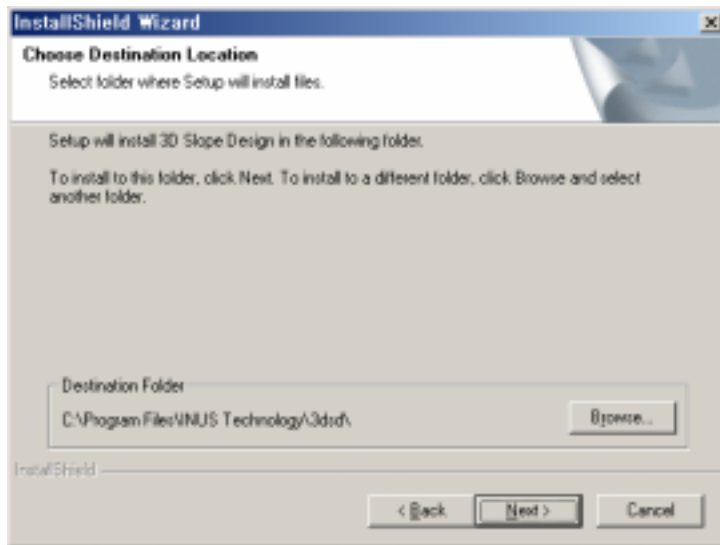
3DSD Install

3D Slope Design

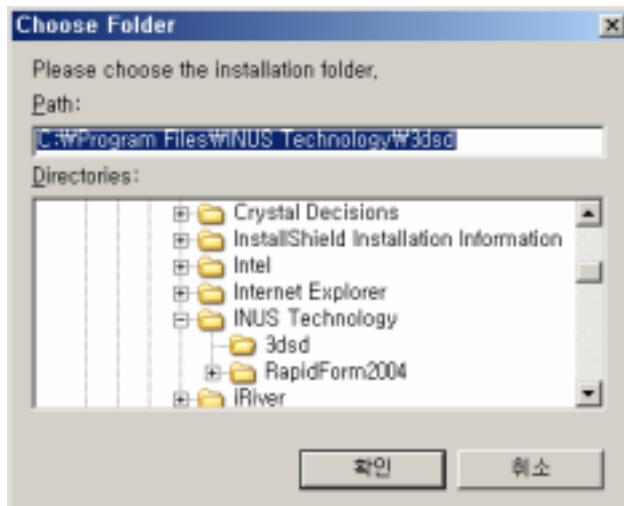
Setup.exe
가

, RapidForm2004 SP1.5

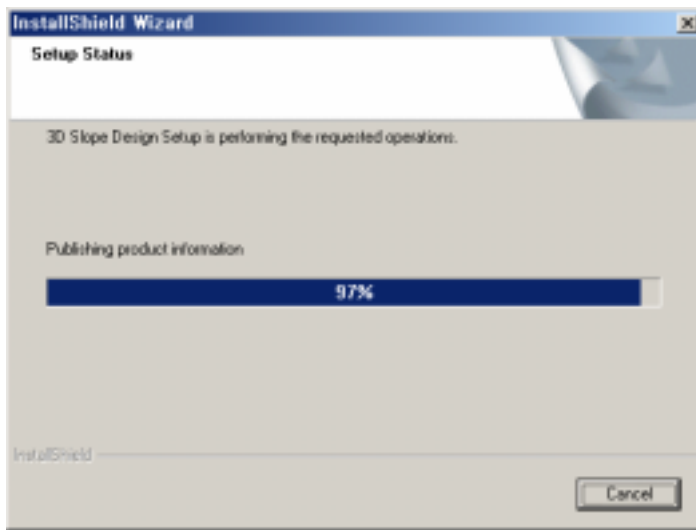
1. 3D Slope Design Setup.exe



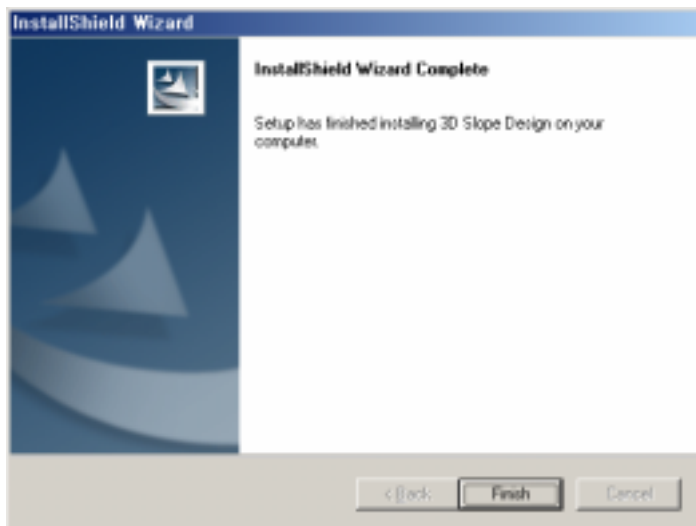
2. Browse



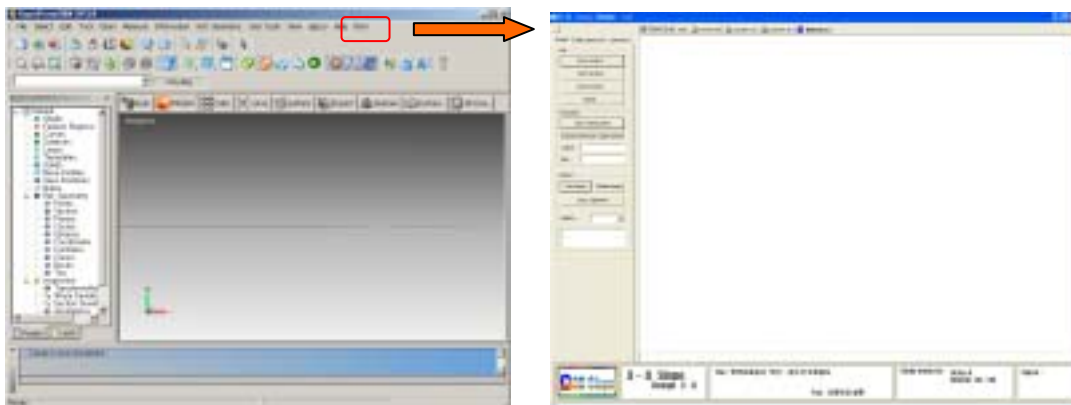
3. Next 가



4. Finish

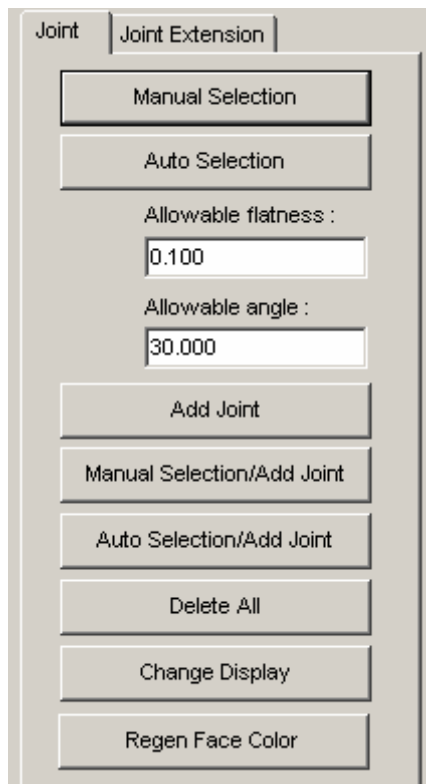


5. RapidForm , 3DSD
> Scan/Polygon workbench 3D Slope! menu가

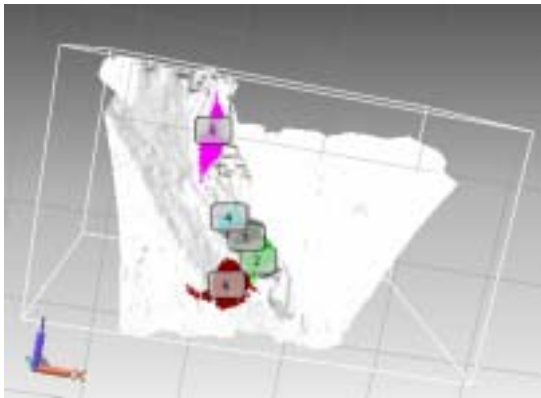


joint tab Joint Joint extension . joint
 , Joint extension

Joint :



1. Manual selection : Joint .
2. Auto selection : Joint . Allowable flatness
Allowable angle Normal vector .
click , .
3. Add joint : Plane fitting Joint 가 .
4. Manual selection/Add joint : 1 3 .
5. Auto selection/Add joint : 2 3 .
6. Delete all : Joint .
7. Change display : joint .
8. regen face color : Joint 가 .



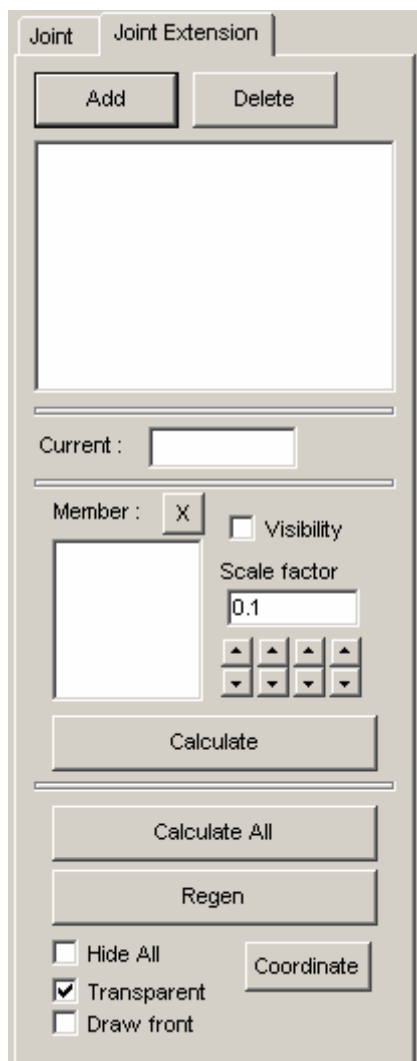
Joint 가

No.	Strike	Dip	Dip Direction	Dip	Area	Flatness	Color	Visible	Note	Great Circle
2	N35W	78SW	234	78	5,591	0,226	Red	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3	N36W	77SW	233	77	3,521	0,255	Black	<input checked="" type="checkbox"/>		<input type="checkbox"/>
4	N40W	68SW	229	68	3,169	0,205	Cyan	<input checked="" type="checkbox"/>		<input type="checkbox"/>
5	N19W	69SW	250	69	20,315	0,323	Magenta	<input checked="" type="checkbox"/>		<input type="checkbox"/>
6	N68E	23SE	158	23	14,484	0,281	Dark Red	<input checked="" type="checkbox"/>		<input type="checkbox"/>

Area Joint , Visible, Note, Great Circle Stereo net
, Visible Check StereoNet ,
Note , Stereo net Great circle check Great
circle .

Joint Ext:

Joint가 Data Joint extension Joint .

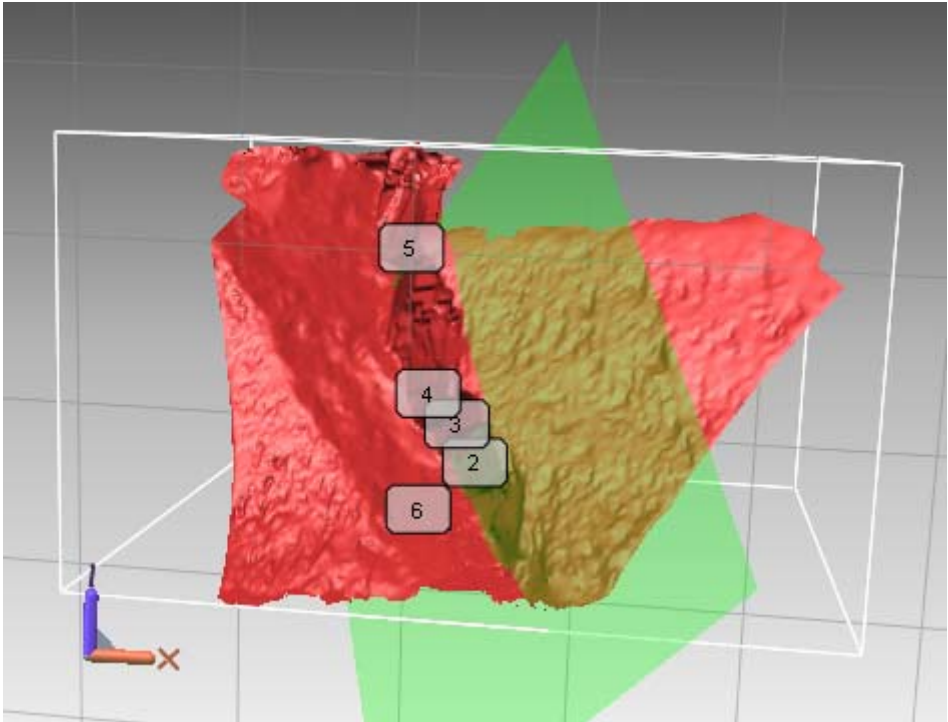


1. Add : Add joint extension member가 joint extension member가

2. Joint list Context menu Joint extension member

Project Joint Sereo Net JRC(C-PHI) Section 2D Section 3D Re									
No.	Strike	Dip	Dip Direction	Dip	Area	Flatness	Color	Visible	N
2	N35W	78SW	234	78	5,501	0.226	Green	✓	
3	N36W	77SW	233	77					
4	N40W	68SW	229	68					
5	N19W	69SW	250	69	20,315	0.323	Yellow	✓	
6	N68E	23SE	158	23	14,484	0.281	Red	✓	

Member




3. Regen : , Regen

4. Hide all : .

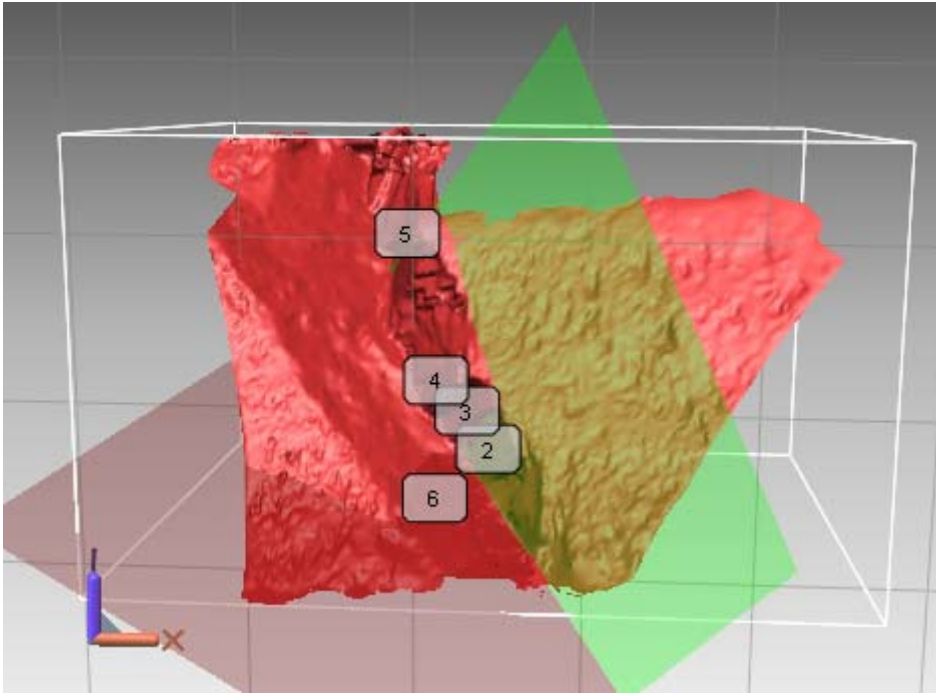
5. Transparent : .

6. Draw front : .

7. Visible Joint member Show/Hide .

8.  : Joint member .

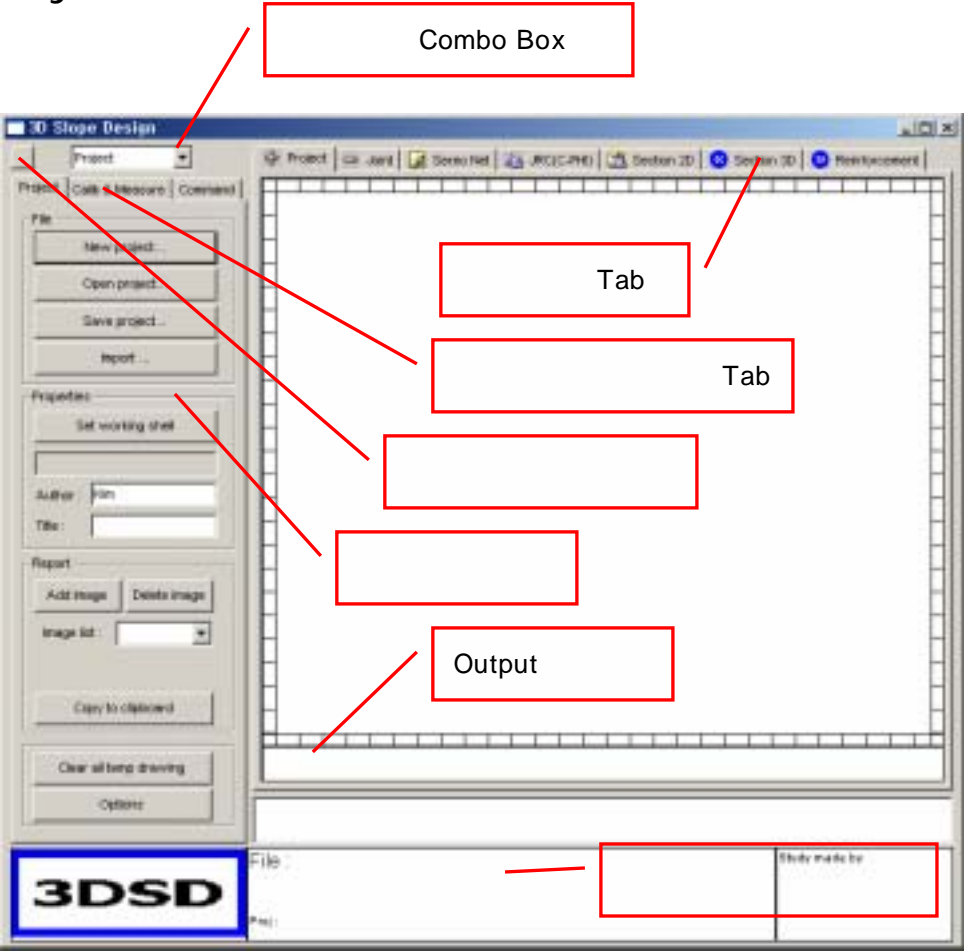
9.  Scale factor Joint .



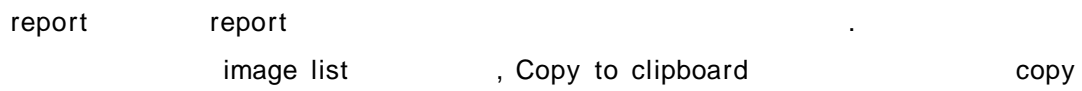
가

2

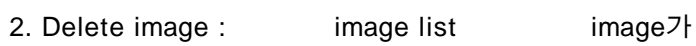
Layout

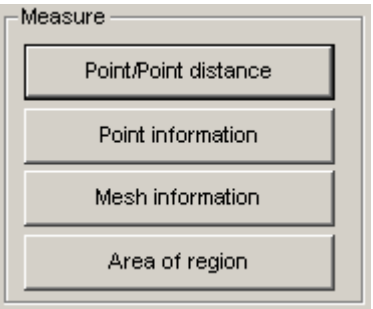


3DSD 7 .
Project : Project , .
Report Image .
Joint : , .
StereoNet : StereoNet , 가 ,
Friction cone .
JRC(C-Phi) : Roughness JRC , C-Phi .
Section 2D : , Autocad .



Enter





- 1. Point/Point distance : Shell Picking Output window .
- 2. Point information : Shell picking picking 가 .
- 3. Mesh information : Shell mesh picking , picking mesh 가 .
- 4. Area of region : .

Stereo Net

stereo net tab Joint tab Joint data Stereo net

Stero Net

Regen

Copy to clipboard

Major plane

Add

Del

Strike :

Dip :

ID	Strike	Dip	Color	Da

Friction cone :

Toppling zone

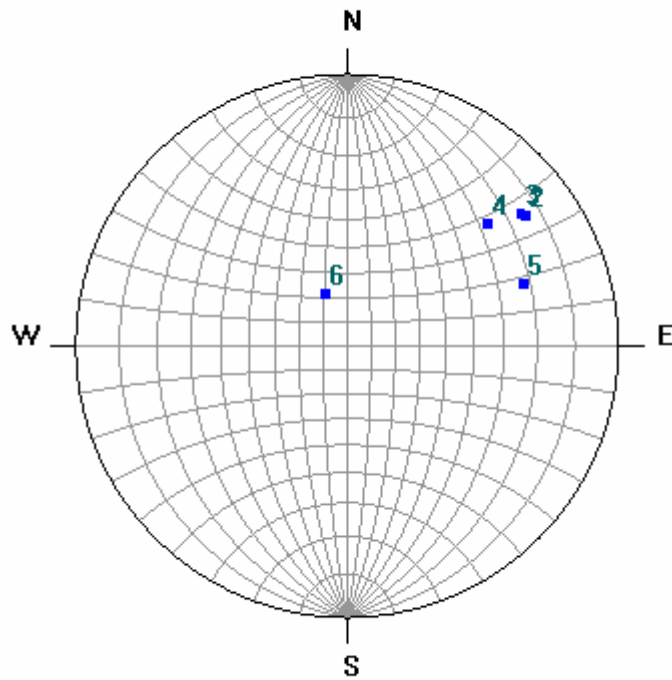
Del

ID	Color	Note

Map type

Pole plot

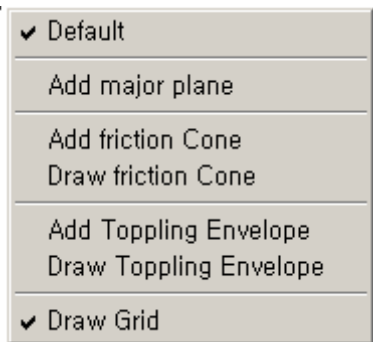
1. Regen : Joint data stereonet .



Stereo net

Context menu

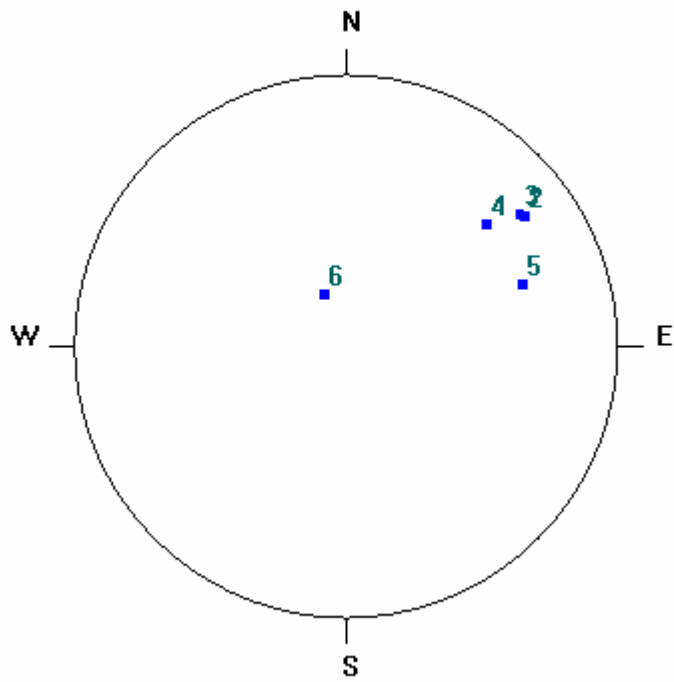
가



2. Draw grid

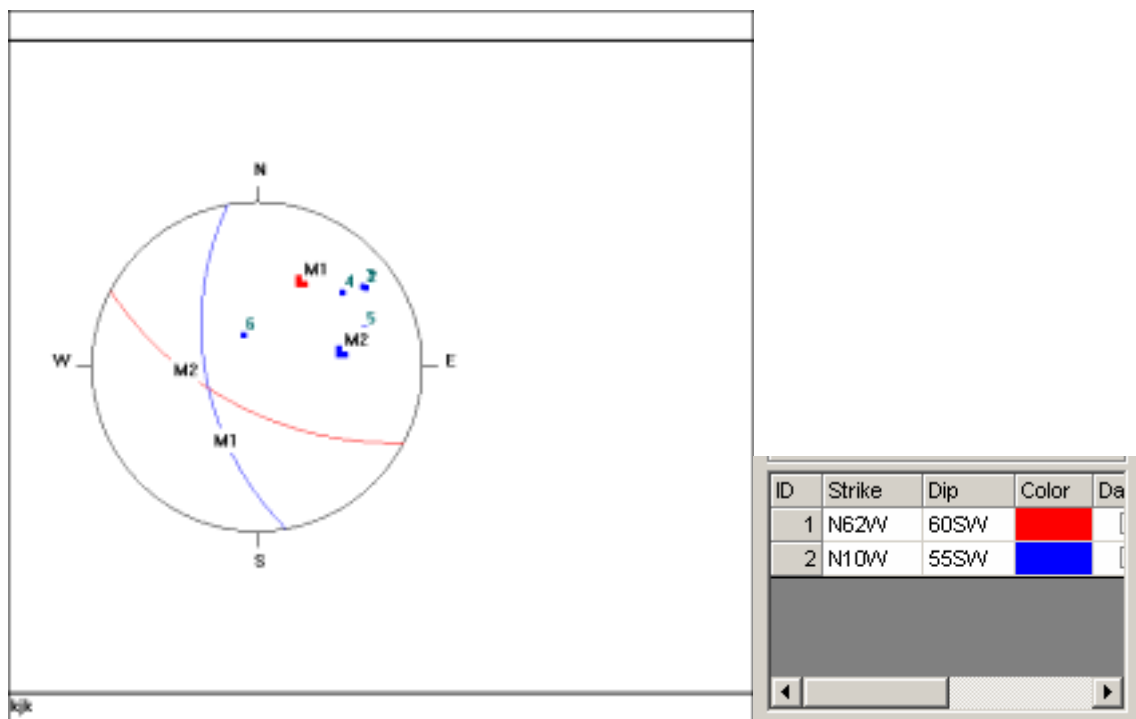
off

grid



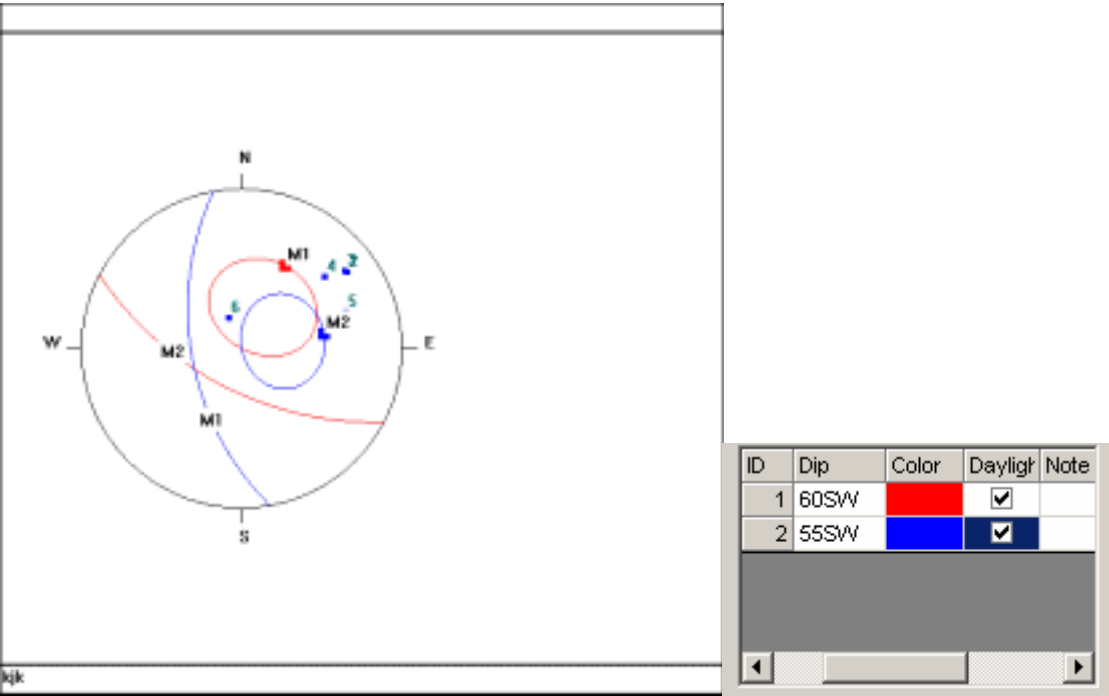
3. Add major plane : Cutting plane

Strike/Dip , Context menu 가

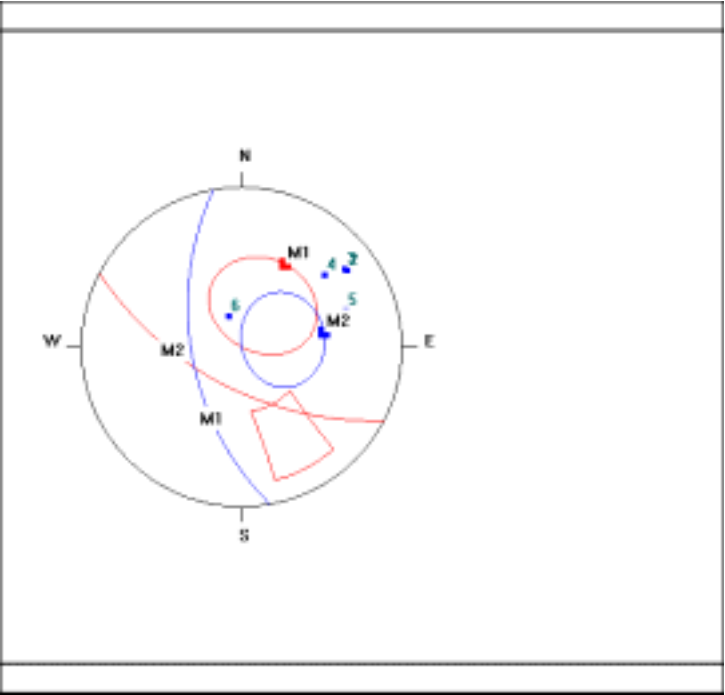


4. Daylight zone color

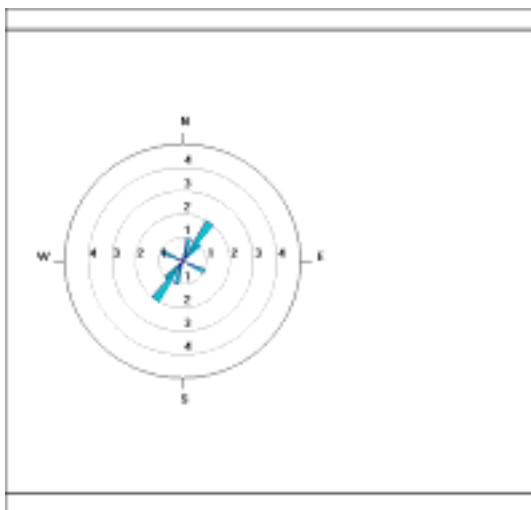
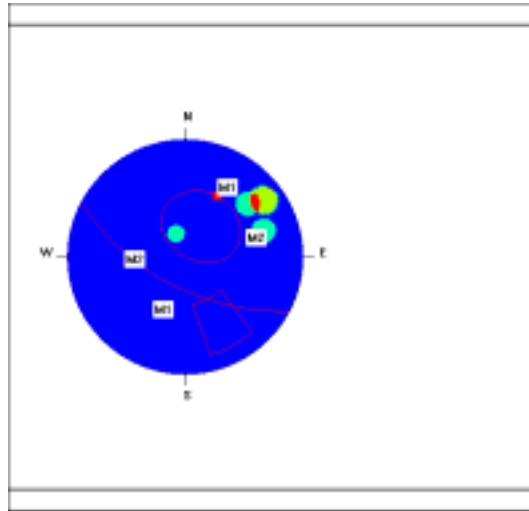
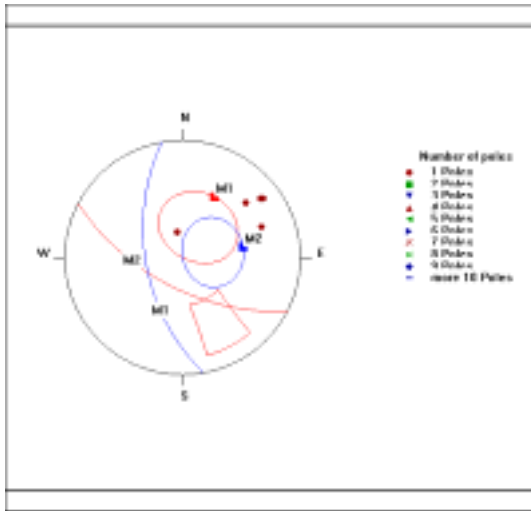
Major plane List color Color 가 , Daylight zone display option Daylight zone .



- 5. Add Friction cone : Cone angle .
- 6. Add toppling zone : Context menu , Toppling zone . Draw option .



7. Map type : Map type Pole plot, Scatter plot, Contour plot, Rosette diagram

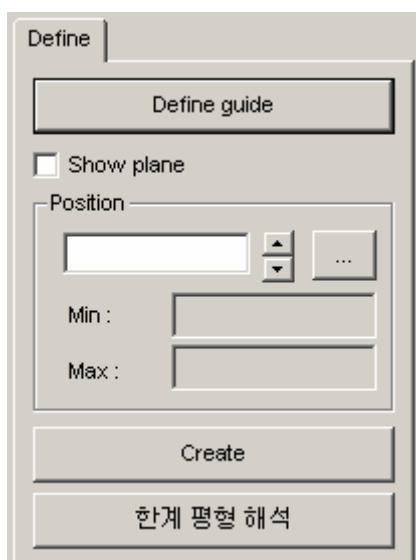
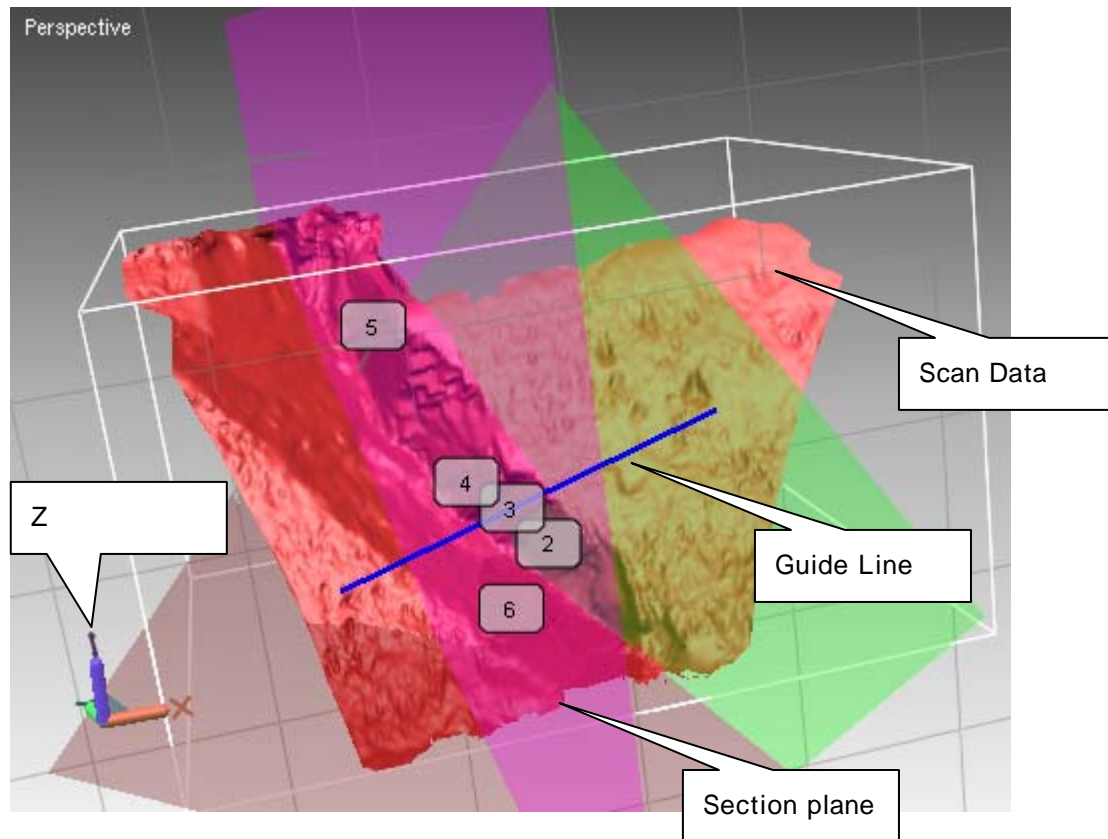


Section 2D

scan data

Section plane guide

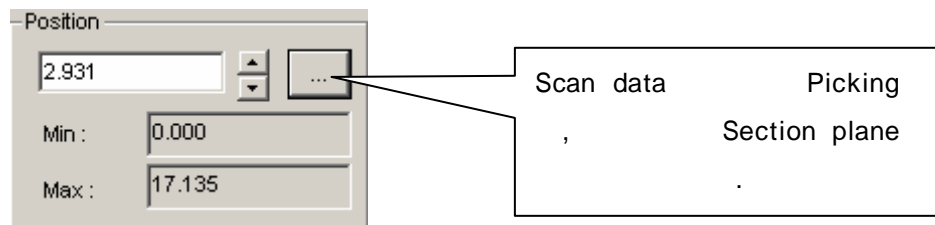
Z



1. Define guide

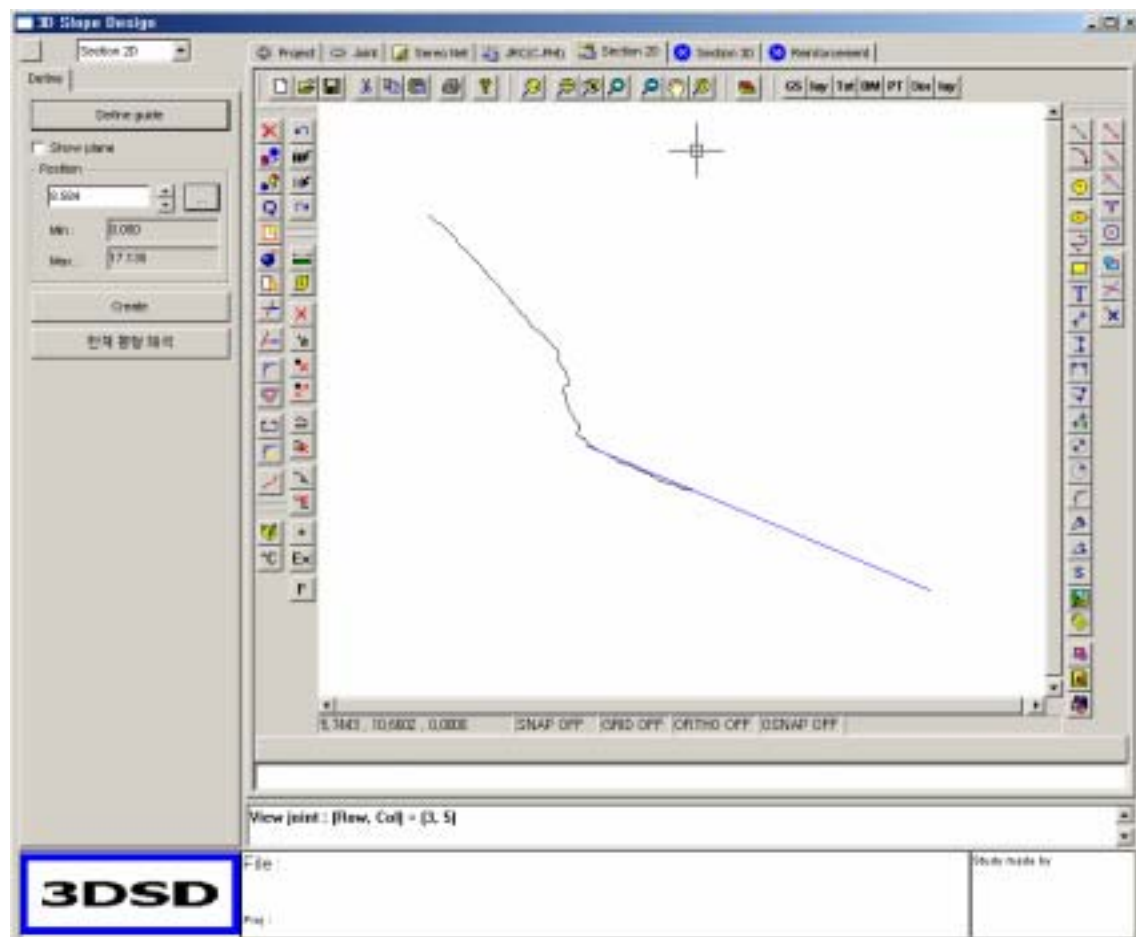
Section plane 가 guide . ESC
 guide line

guide line section plane , section plane
 picking



2. Create

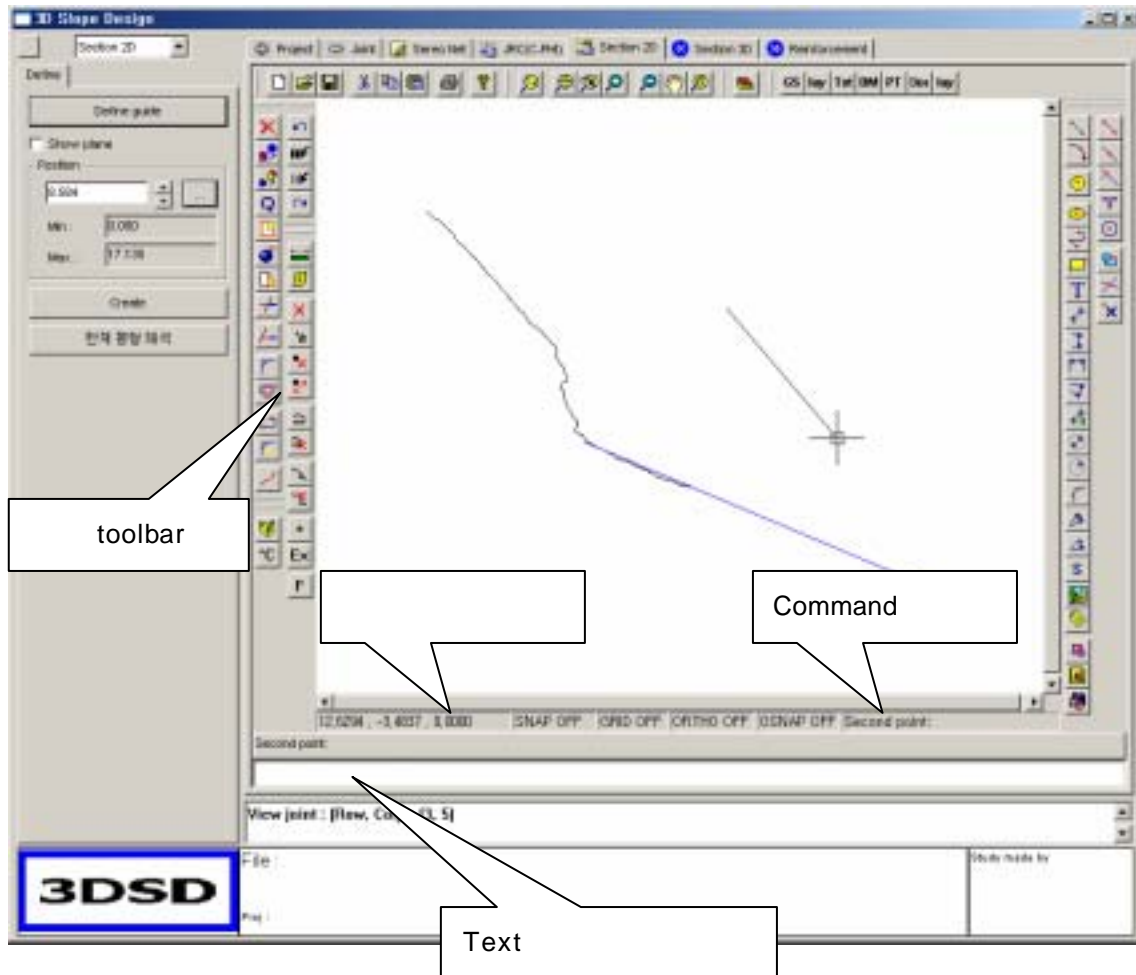
Section , Create Section



3. Section edit

Section Toolbar , Autocad

Next → , → Select Picking → Enter ... , ESC
가 .



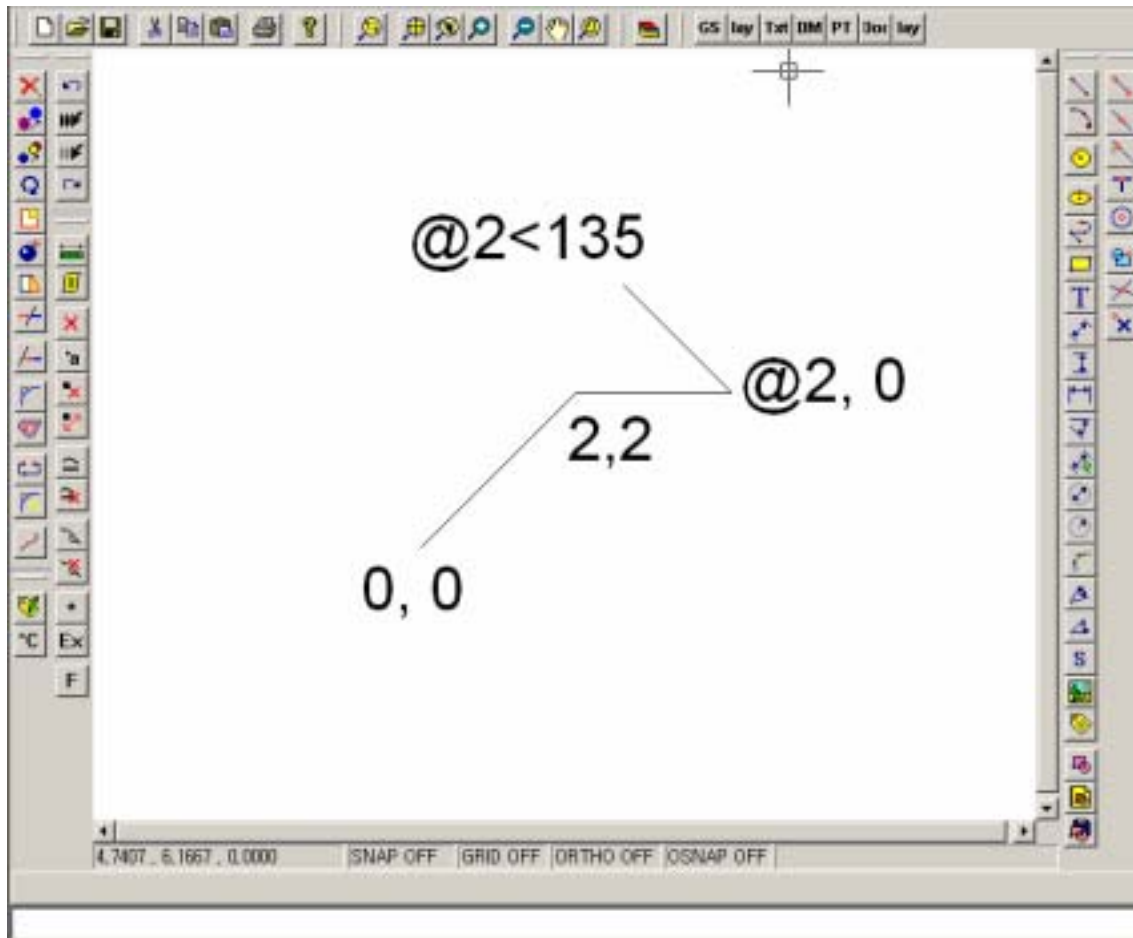
Autocad


Text

가 .

@ 100, 100 : 100, 100
100, 100 : 100, 100
@100<45 : , 100, 45

Line



 (Draw line) → 0, 0 → 2, 2 → @2, 0 → @2<135

Toolbar



File new/ File open/ File save/ Copy/ Paste/ Print (Not available)/ Help (Not available)/
Zoom window/ Zoom fit / Zoom previous/ Zoom up/Zoom down/Pan/Zoom All/
Layer/General settings/Layer/Text settings/Dimension settings/Point settings/Document
settings/Layer settings

Draw :



Draw line / Draw arc / Draw circle / Draw ellipse / Draw Polyline / Draw rectangle /
Draw text / Draw aligned dimension / Draw vertical dimension / Draw horizontal
dimension / Draw angle dimension / Draw quick dimension / Draw diameter dimension /
Draw radial dimension / Draw 3pt arc and dimension/ Draw angle of between line /

Draw angle of line / Draw area of polygon / Draw bitmap / Draw attribute / Make block /
Insert block / Write block

Snap mode



End point/ Middle point/ Near point/perpendicular point/Center point/ Insert/Intersection
point/Cancel Osnap



Delete / Move / Copy / Scale / Explode / Stretch / Trim / Extend/ Fillet/
Offset/Break/Fillet polyline/Connect polyline / Modify attribute/ Cancel / Undo / Undo
begin/ Undo end/ Redo

Measure , Tarlen

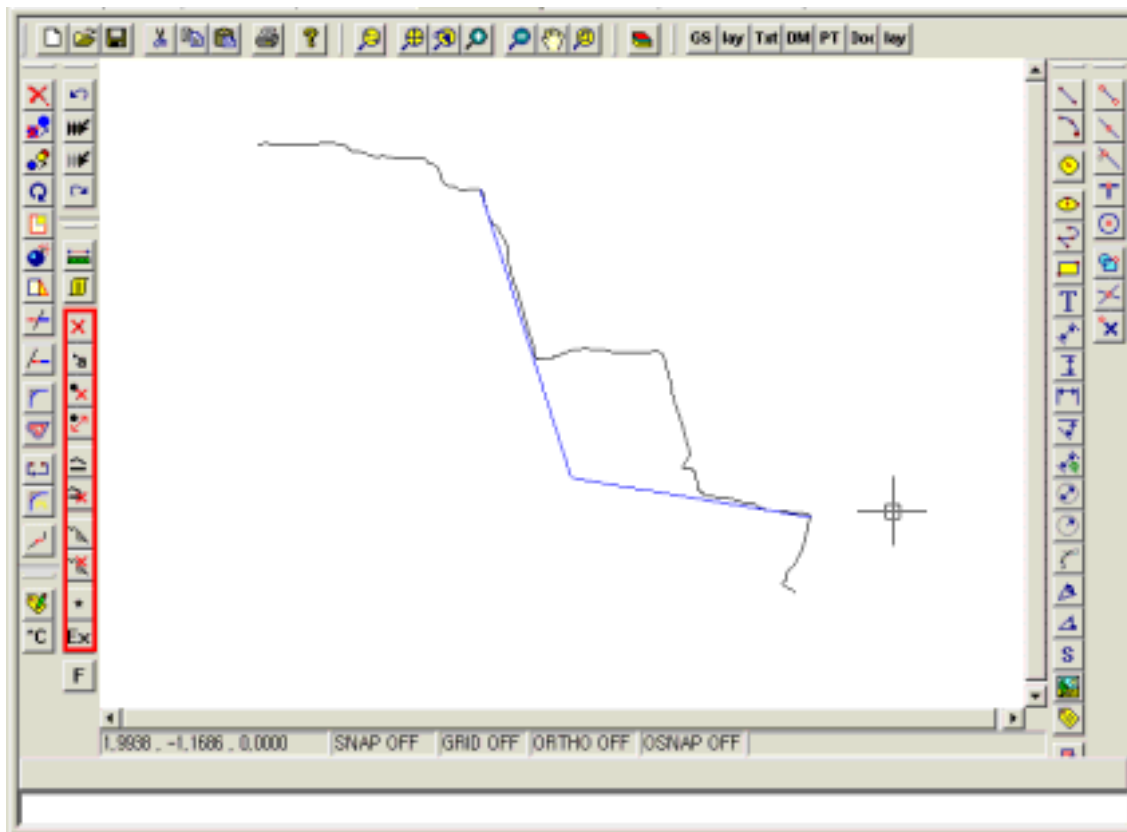


Distance/ Get, Set properties / Delete all tarlen point/ Add tarlen point/ Delete tarlen
point/ Move tarlen point/ Add layer/ Delete layer/ Add segment/ Delete segment/
Modify tarlen properties/ Export tarlen data/

Tarlen input file

Geometry data

Section 2D



segment



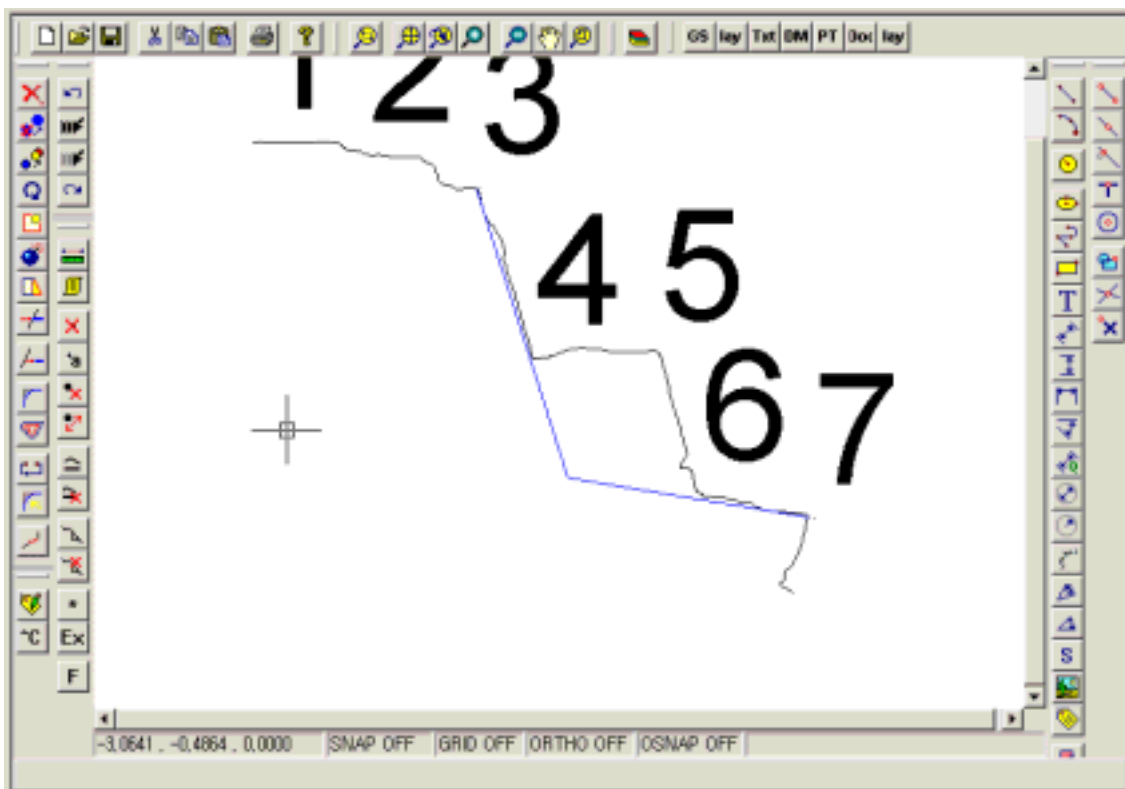
segment

* text

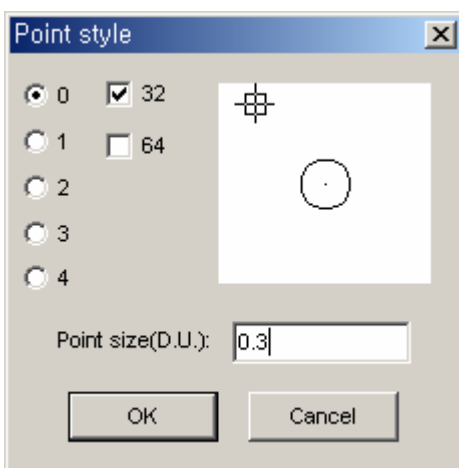
Ex

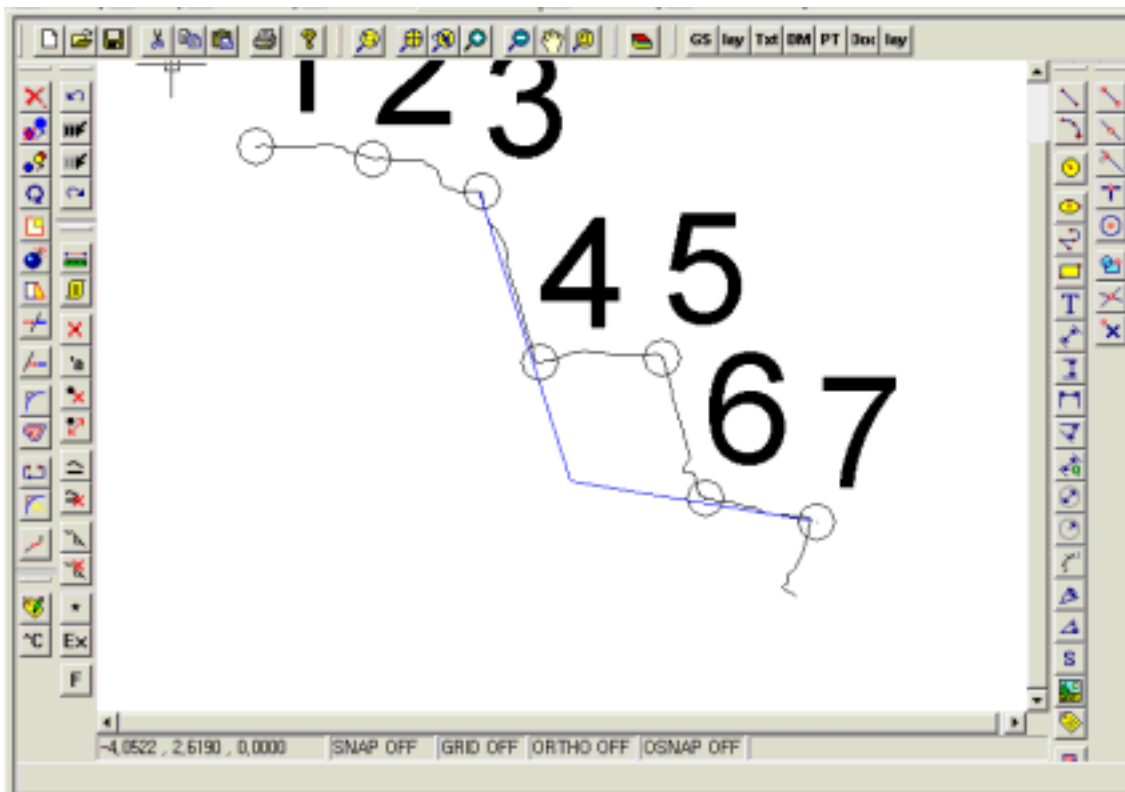
1.

'a

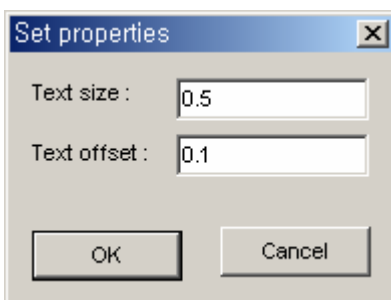


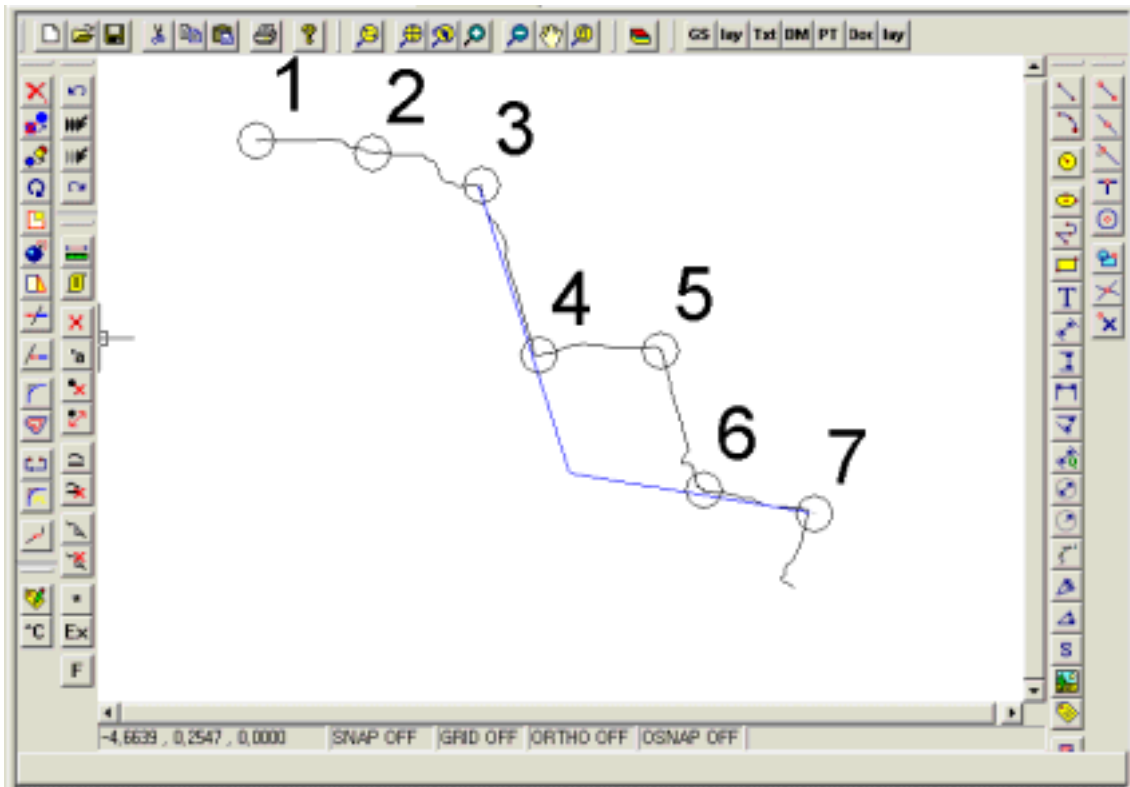
PT





text

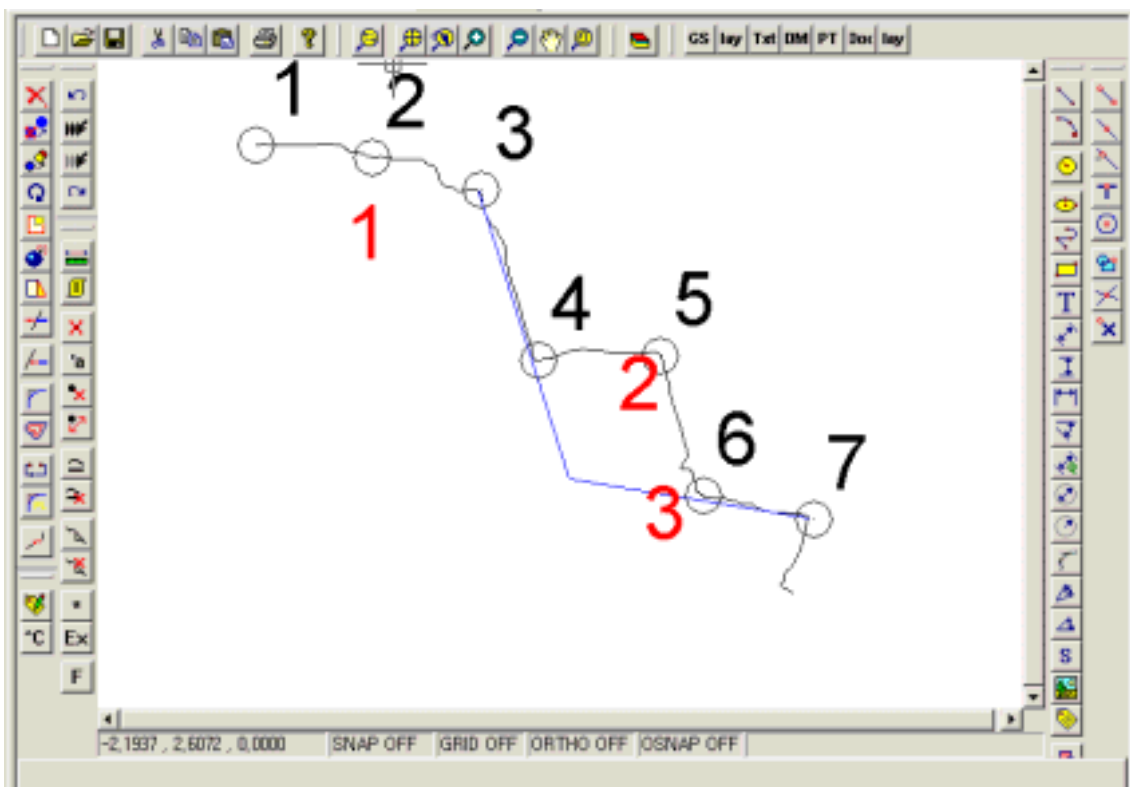




2.



Text가



3. Segment

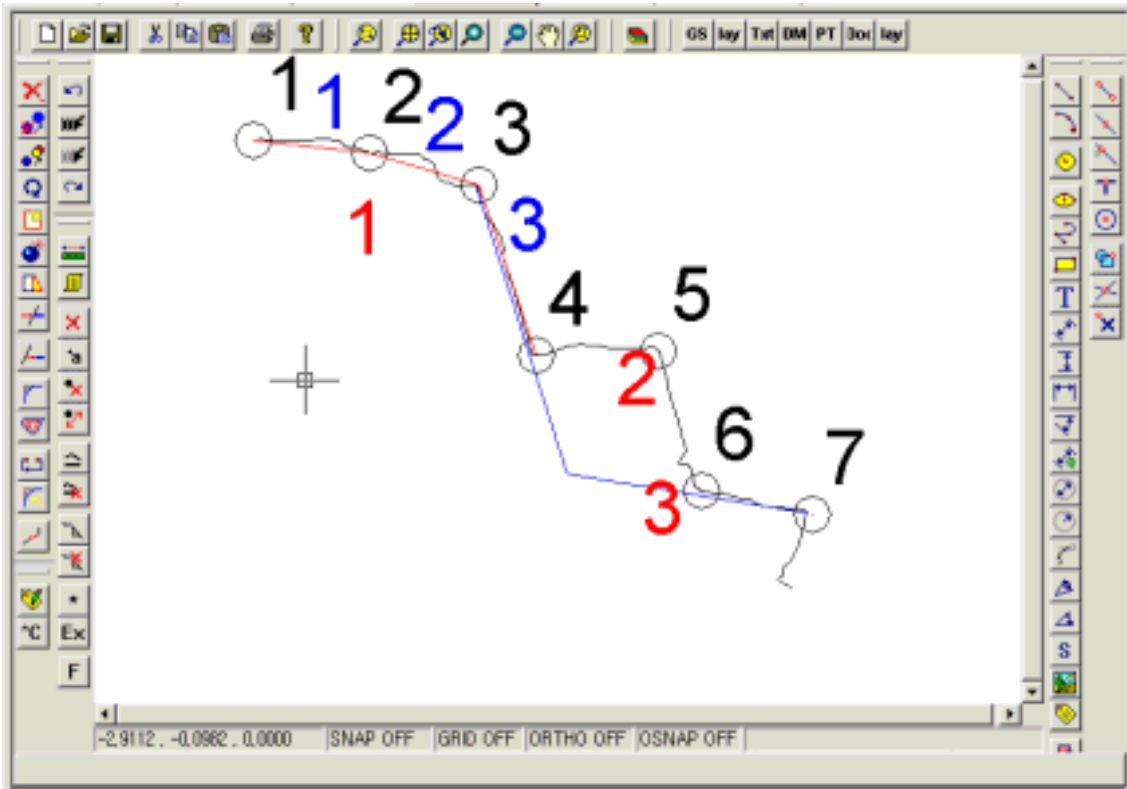


segment

picking

picking

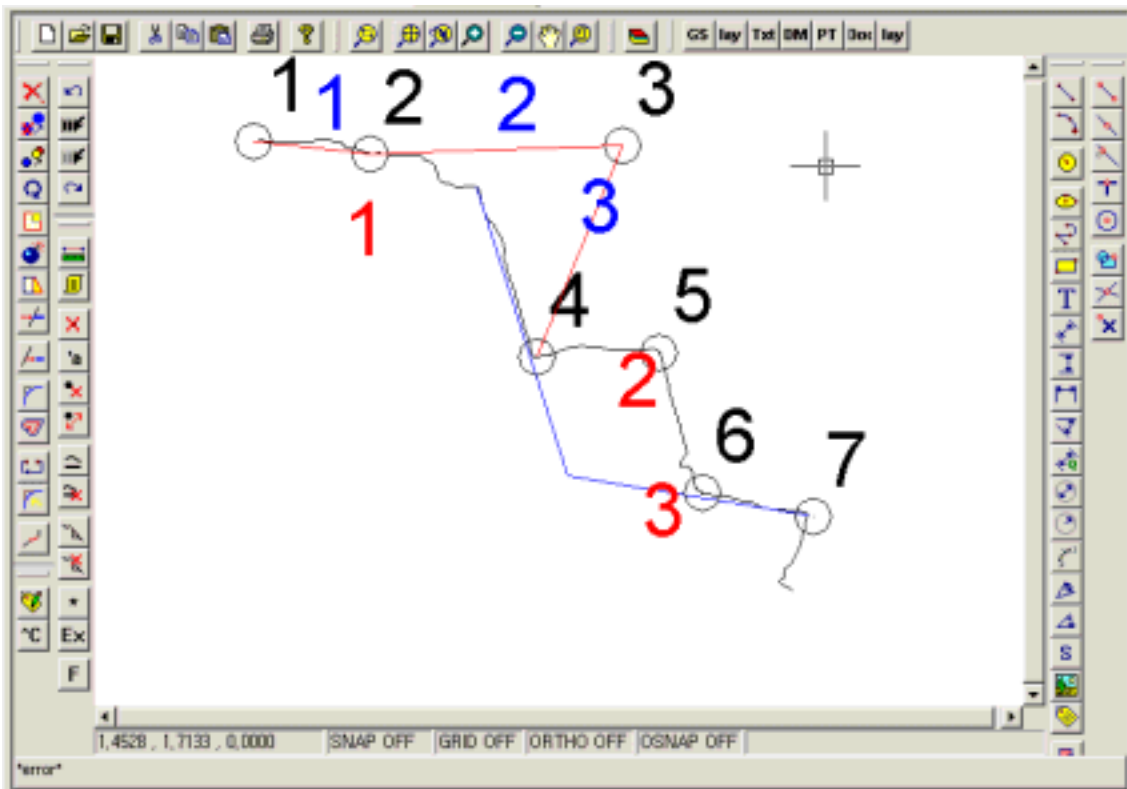
picking , segment line



4. point

point

segment



point 3 , segment 2, 3 .

5. export

Ex

가 , update 가

Export points and segments

Update

Point list

1	-3.346	1.925
2	-2.370	1.819
3	-0.253	1.890
4	-0.970	0.114
5	0.053	0.149
6	0.418	-1.027
7	1.347	-1.227

Segment list

1	1	2	1
2	2	3	1
3	3	4	1

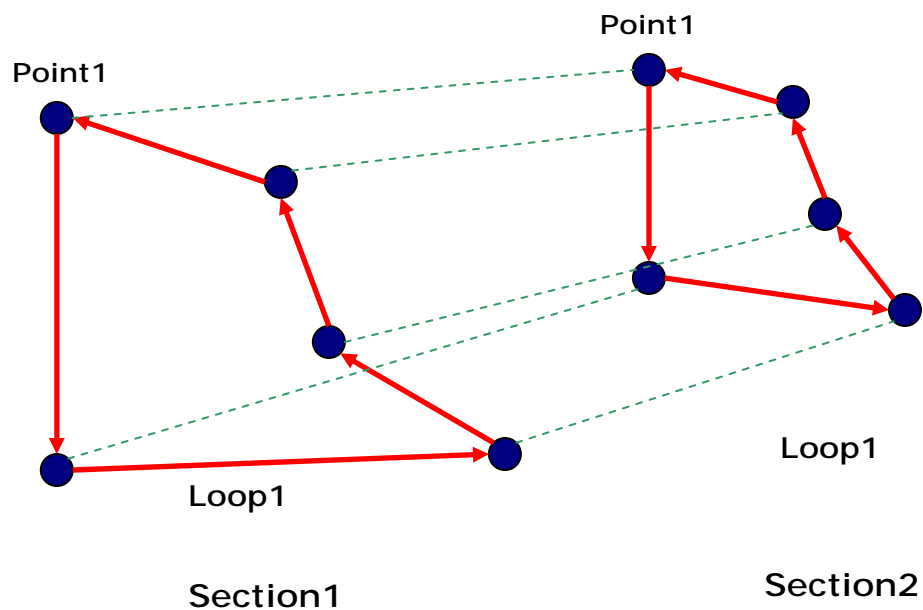
Section 3D

이 기능은 두 개의 단면으로 간략화 된 3차원 모델을 만드는 기능입니다. 두 개의 단면을 연결하기 위해선, 연결 지점이 짝이 정의 되어야 하므로, 동일한 점 수를 가지는 단면으로 간략화 시켜야 합니다.

Point / Loop

Point란 단면이 3D 모델로 전환 될 시 사용되는 점을 의미합니다.

Loop란 Point가 연결되어서 고리를 형성한 단위 입니다. 3D 모델은 양 쪽의 동일 한 이름 의 Loop를 연결시켜서 만들어 지게 됩니다.



따라서, 3D Model을 만들기 위해선, 우선 양 단면에 동일한 이름을 가지는 두개의 Loop를 미리 만들어 주어야 합니다.

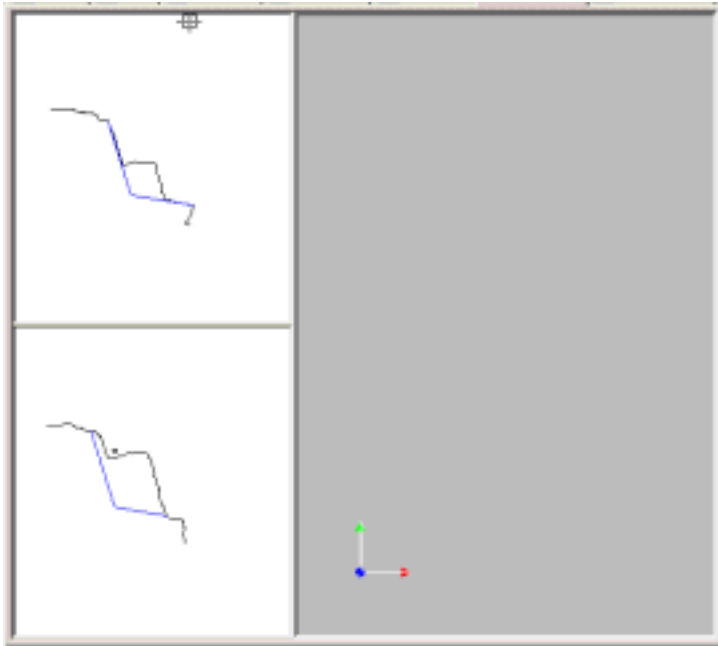
다음은 작업 순서 입니다.

1. 단면 불러 들이기

2D Section에서 구한 단면 파일을 불러 들입니다.

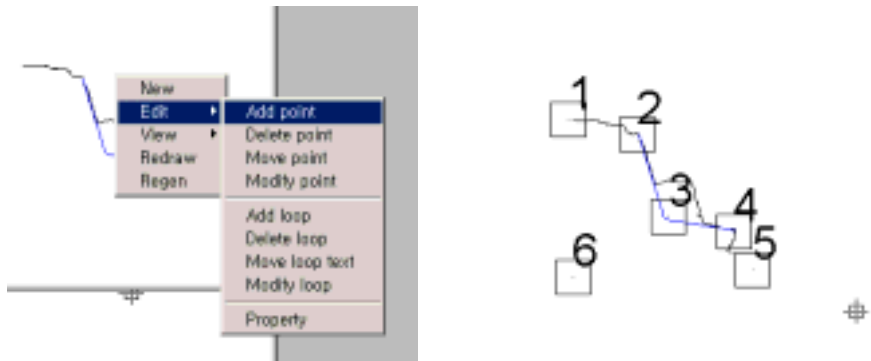


각각 1, 2에 해당하는 단면을 읽어 들입니다.



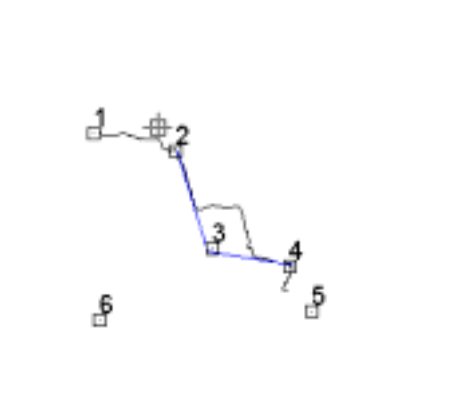
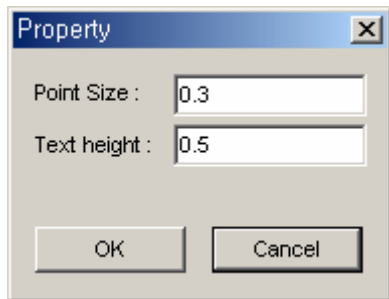
2. Loop를 정의하기 위한 Point 생성

단면 화면에서, Context menu를 이용해서 점을 생성한 후, 생성된 점을 가지고 Loop를 만듭니다.



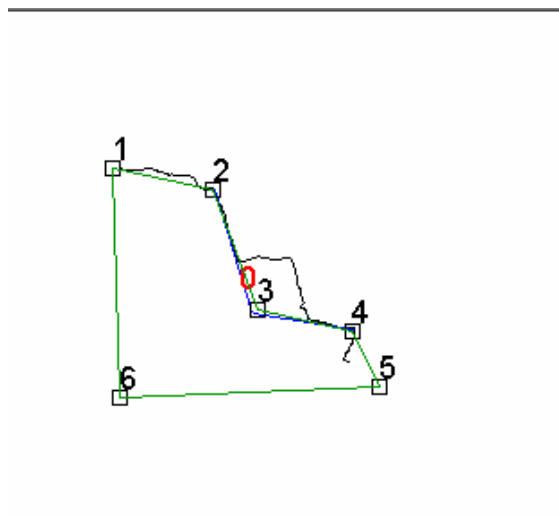
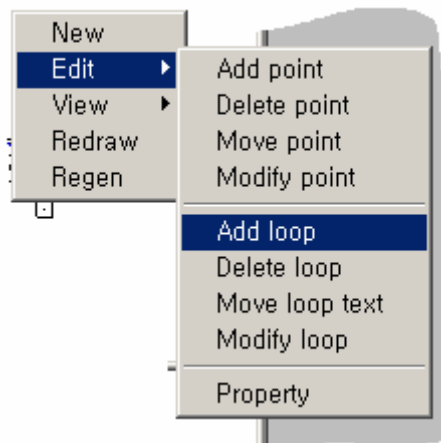
Point의 크기가 너무 클 경우, Property로 Point크기와 Text 크기를 재 설정합니다.

0.일 경우 기본 값으로 설정됩니다.



3. Loop 생성

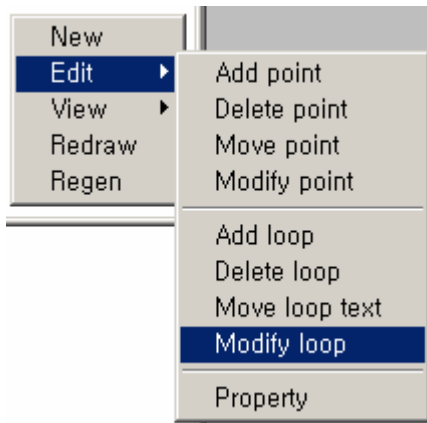
단면 화면에서 Context menu에서 Add Loop 명령으로 Loop를 생성합니다. 이 때 방향은 반드시 반시계 방향으로 Point를 입력해야 하며, 연결 시킬 Loop는 동일한 숫자의 점과 동일한 순서로 입력해야 합니다. 입력 끝 조건은 점이 아닌 곳을 Picking하거나 오른쪽 마우스 버튼 또는 ESC Key를 누르면 됩니다.



위의 예의 Loop는 1-6-5-4-3-2 의 순서로 6개의 점을 사용하여 정의 되었습니다.

4. Loop의 수정

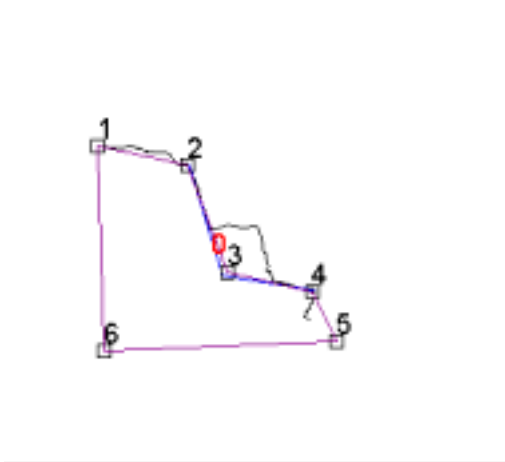
Loop의 Color는 3D Model이 만들어 질 때의 색깔이 되고, 번호는 동일한 번호들 끼리 연결 되기 때문에 필요할 경우 수정할 필요가 있습니다. 이 경우, Modify loop 명령을 이용해서 다음과 같이 수정할 수 있습니다.



변경을 원하는 Loop text를 click합니다. 이 예의 경우, 붉은 색 0을 click해야 합니다.

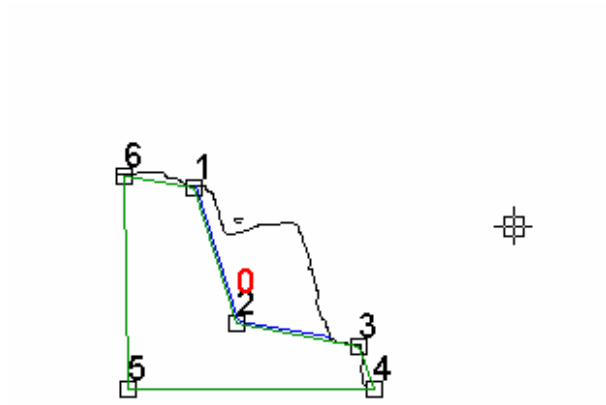


색을 녹색에서 보라색으로 변경하였습니다.



5. 단면 2에서의 Point와 Loop의 생성

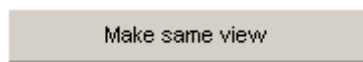
단면 2에서 동일한 방법으로 Point와 Loop을 생성합니다.



위에 그림에서와 같이 Point생성 순서는 3D Model생성과 관계가 없으나 , Loop생성시 시작점과, 끝점은 반드시 일치 시켜야 합니다. 그리고, Loop를 생성하는 점의 개수도 동일 해야 합니다. 이 단면의 Loop순서는 6-5-4-3-2-1 로 정의 되었습니다.

6. 동일한 크기의 View 설정으로 단면 비교

단면 작업 시 Point와 Loop를 만들면서 view의 크기를 변경하게 됩니다. 이 때 양 단면의 실제 크기를 비교하기 위해 동일한 view설정을 하고자 할 때,



명령을 사용합니다.

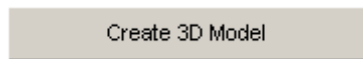
이 명령은 두 단면을 동일한 view설정으로 보이게 합니다

7. 3D 모델 생성

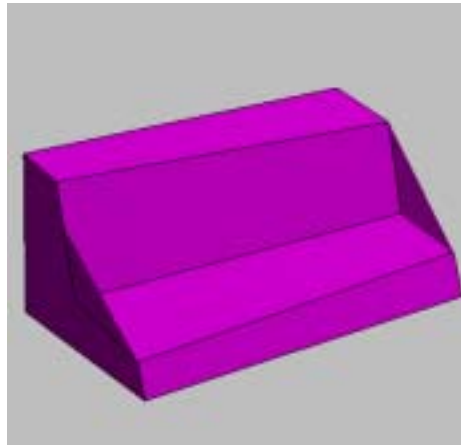
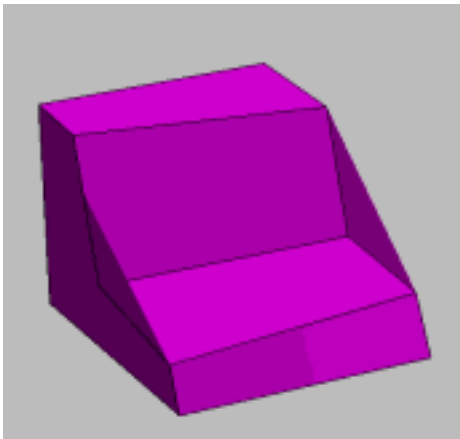
3D 모델 생성은  명령으로 실행됩니다.

입력된 양 단면간의 폭을 이용해서 3D 모델을 만들게 됩니다.

아래 그림은 단면의 폭이 각각 5, 10일 경우의 형상입니다. 폭을 입력한 후



을 다시 실행하면 모델이 재 생성됩니다.

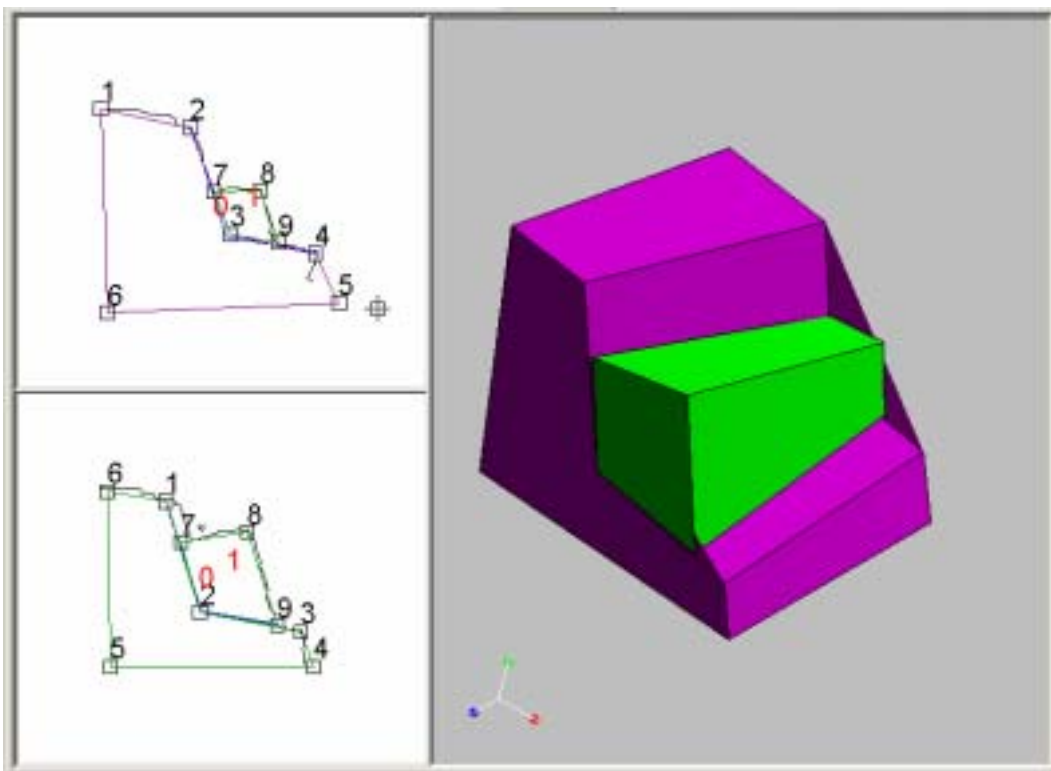


8 새로운 3D Model추가

3D Model을 더 추가하고 자 할 경우, Loop를 추가 생성한 후

Create 3D Model

을 실행하여 3D Model을 update하면 됩니다.



2D Section

Stability Analysis

☒ 단일 안전률

☐ 인장균열이 없는 사면의 경우($Z=0$)

☐ 인장균열 안에만 물이 있을 경우($U=0$)

☒ 인장균열과 미끄러짐에 물이 있을 경우

☐ 물이 계속 공급되는 포화사면($Z=Z_w$)

Unit weight (Rt) :

2.20

(ton/m³)

Friction angle(Phi):

25

(deg)

Cohesion (C):

2

(ton/m³)

Height (H):

15

(m)

Tension joint (Z):

5

(m)

Tension water (Zw):

2

(m)

Failure angle (Phi-p):

45

(deg)

Length (A):

14.14

(m²)

Block area (Sv):

35

(m³)

Block weight (W):

77.00

(ton)

U:

14.14

(ton/m)

V:

2.00

(ton/m)

F : 무기시

0.83

건기시

0.99

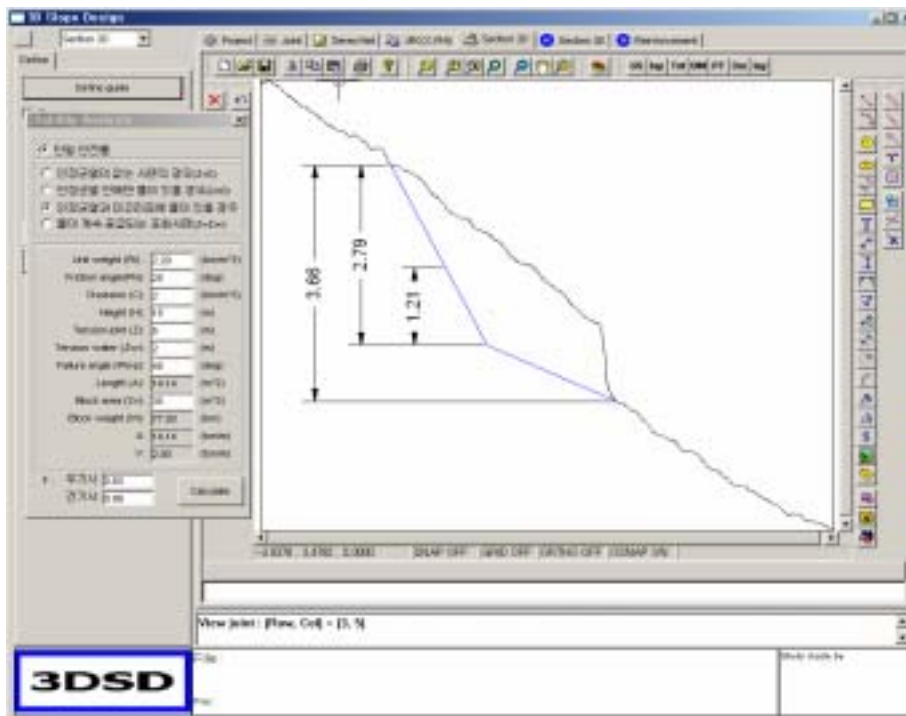
Calculate

C, Phi 가
Section

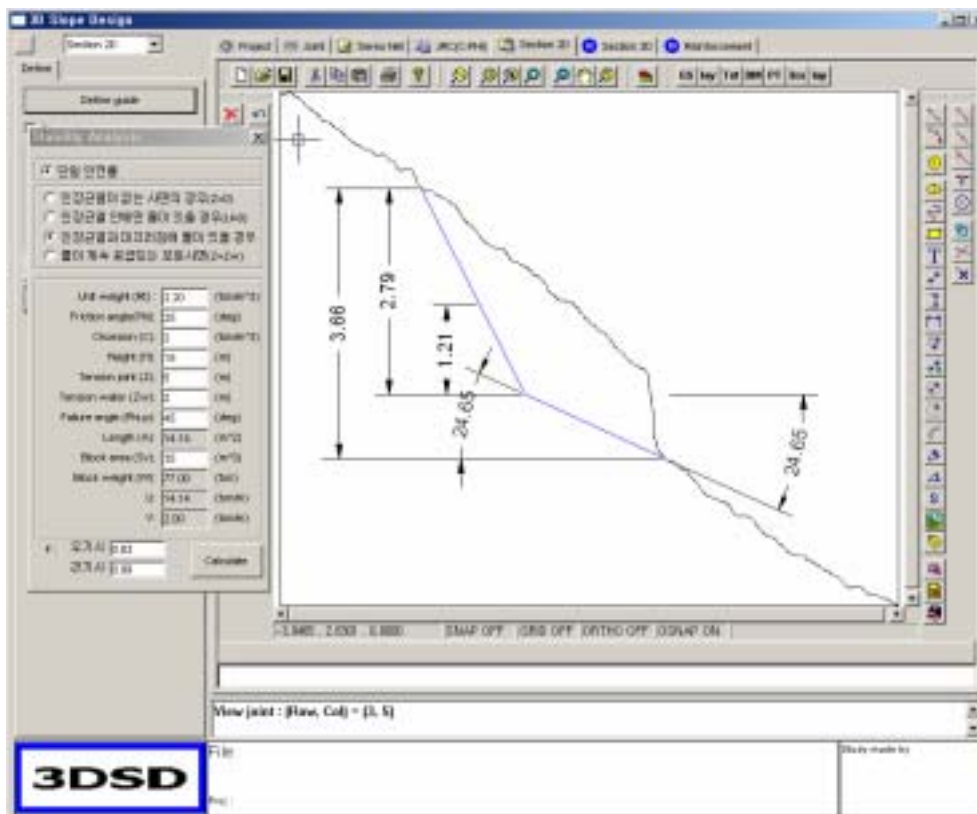
1. Height, Tension joint(Z), Tension water(Zw)



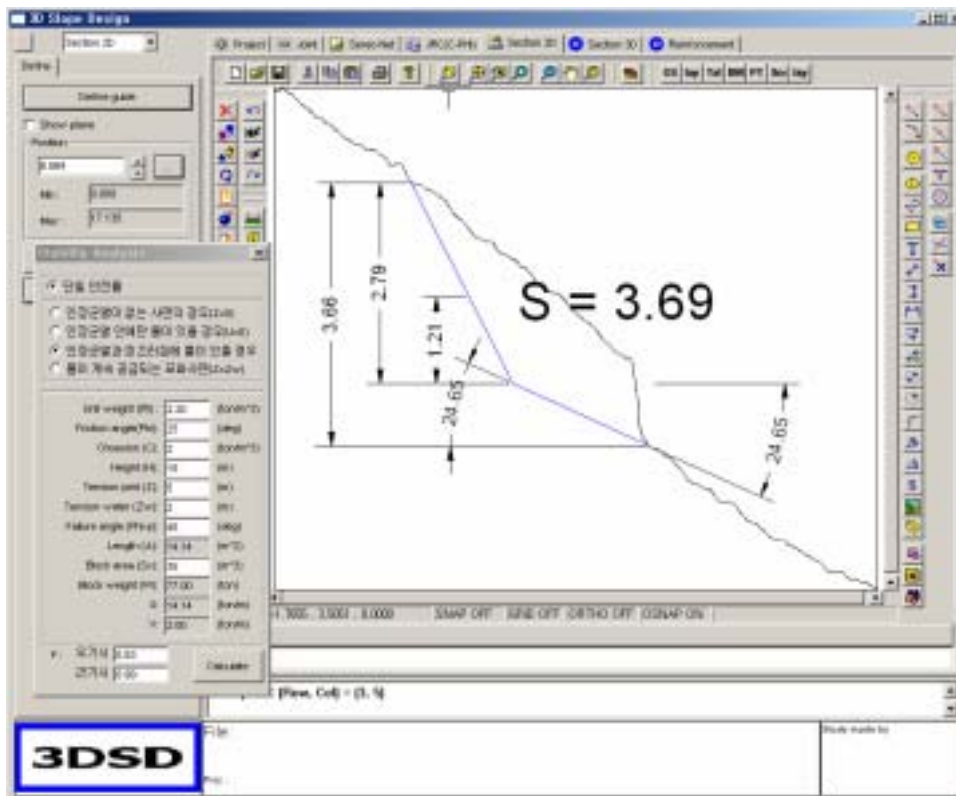
Dimension



Angle :   

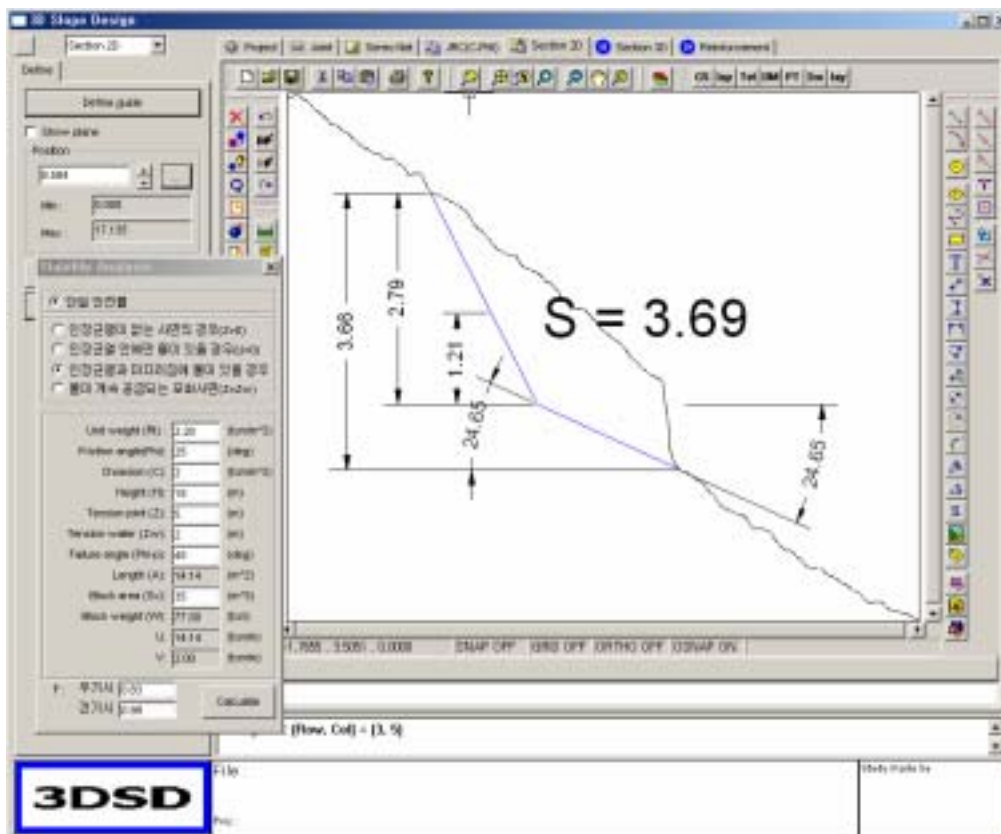


: S



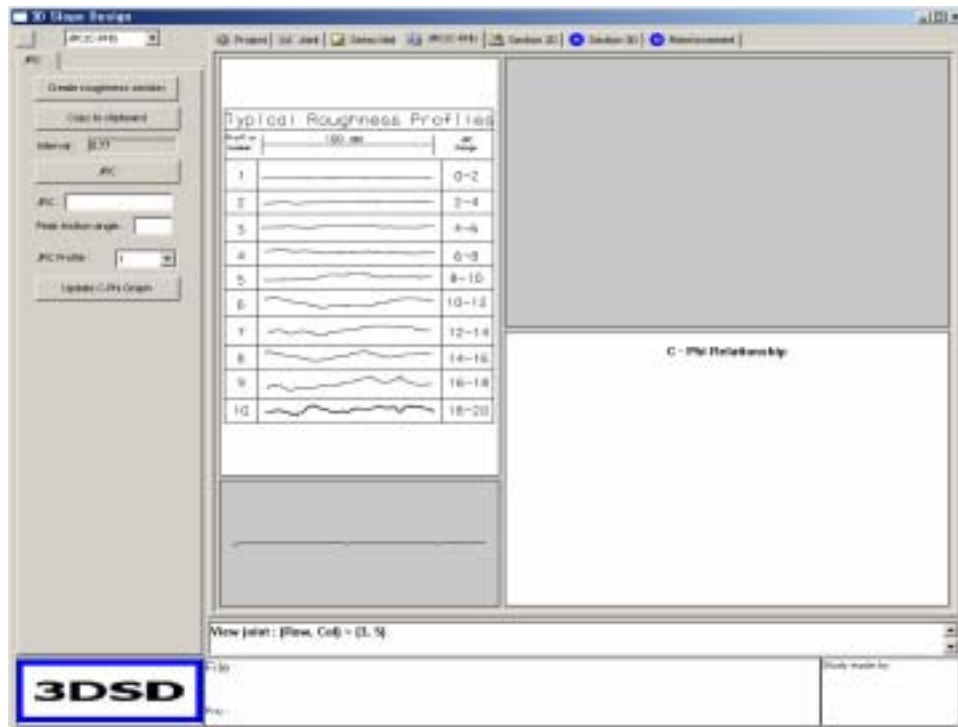
Parameter

F가



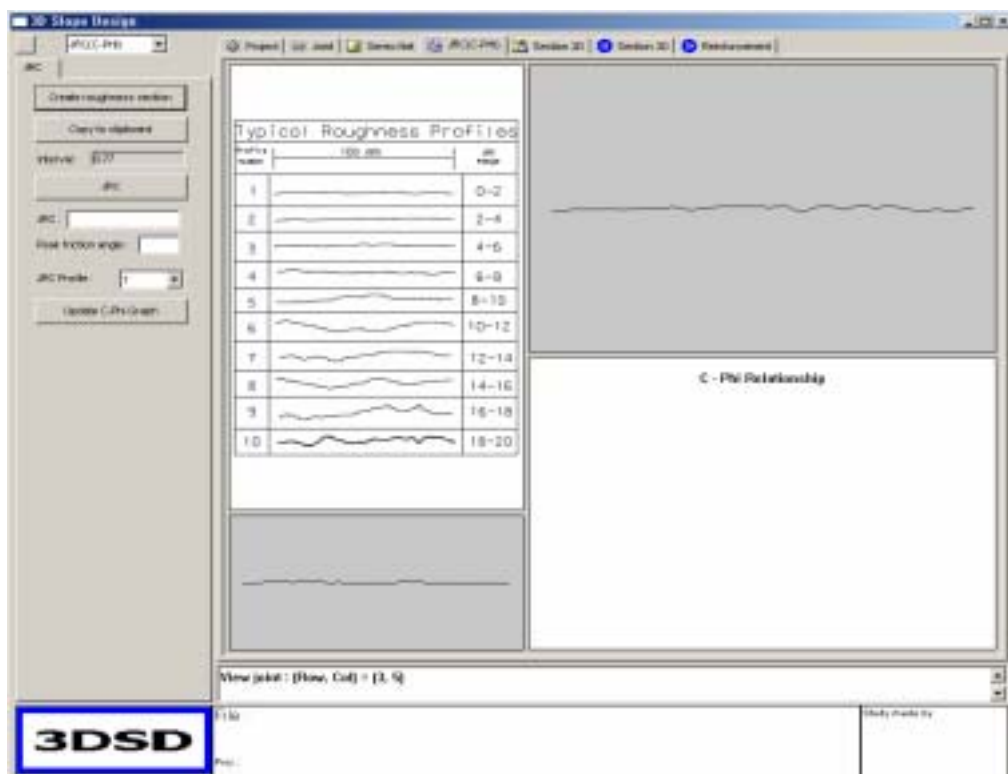
JRC (C-PHI)

JRC Tab 가 Section data , Roughness ,
JRC , C-PHI Chart



1. Create roughness section

Scan data 2 Line



JRC , Section data , JRC Parameter

가, C-Phi

