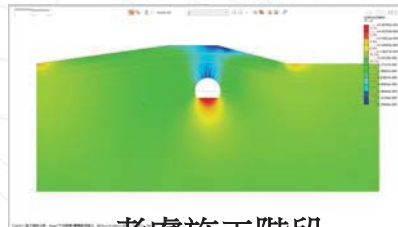
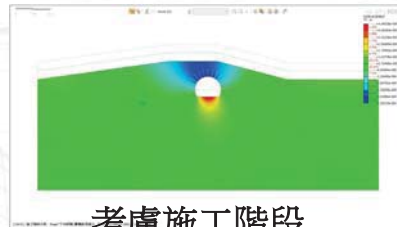


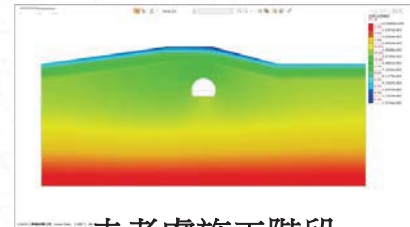
GTS_隧道開挖及推進教學1



考慮施工階段
($K_0=0.5$)



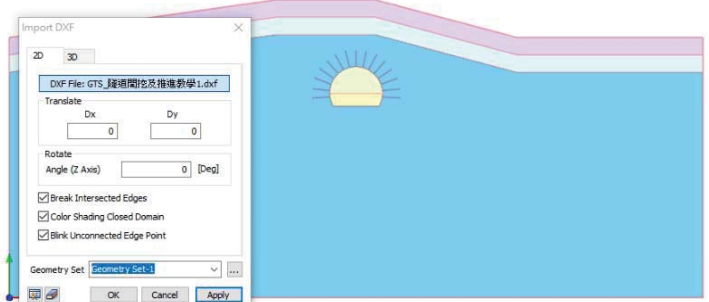
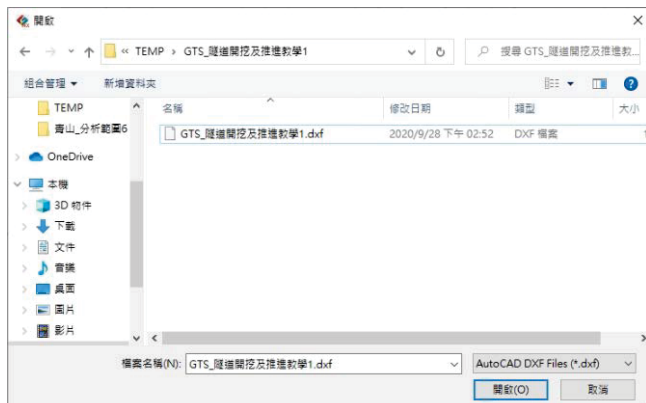
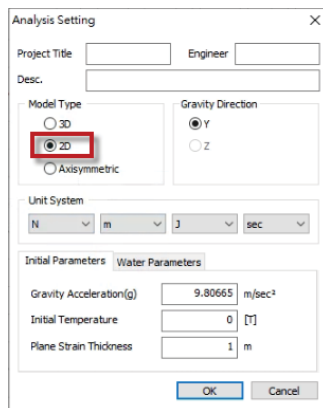
考慮施工階段
($K_0=2$)



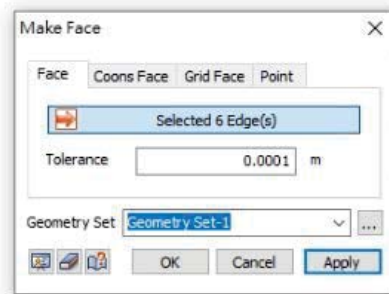
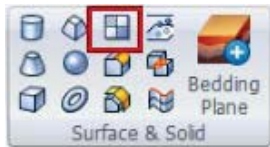
未考慮施工階段

台灣邁達斯

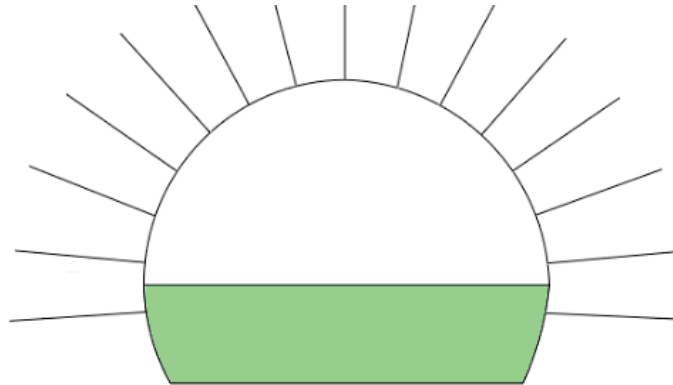
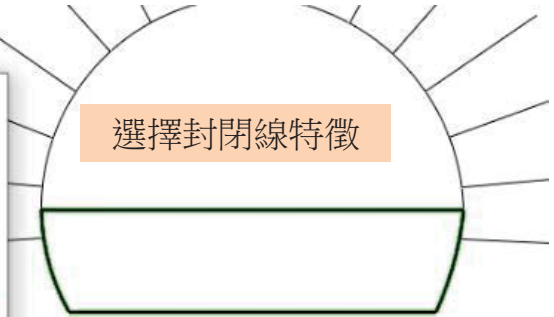
隧道系統-草圖匯入



面特徵模型建立-1



選擇封閉線特徵

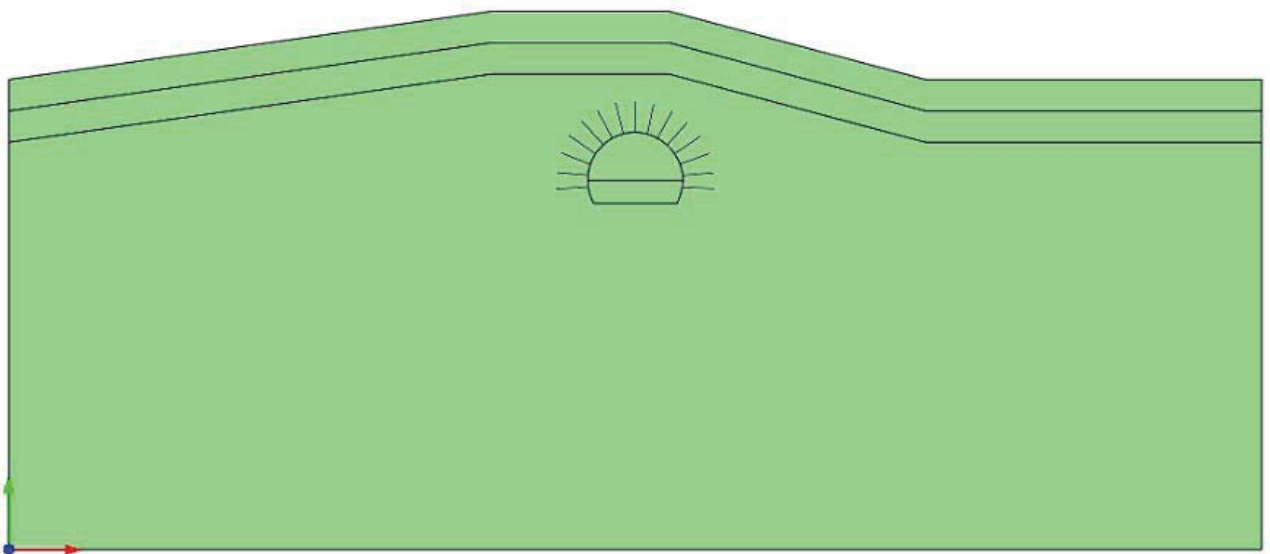


註:非封閉特徵無法產生面特徵



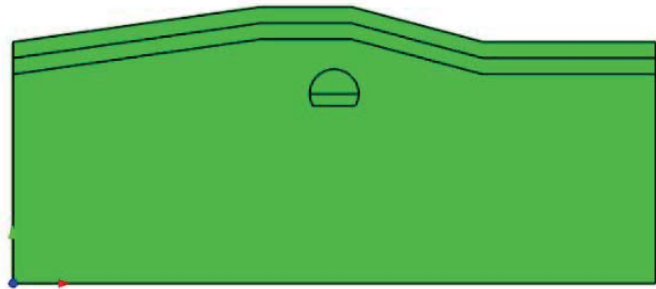
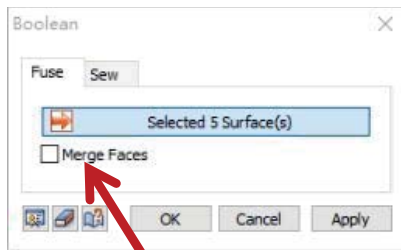
面特徵模型建立-2

依序完成其它特徵面建立

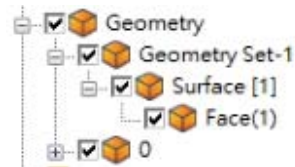
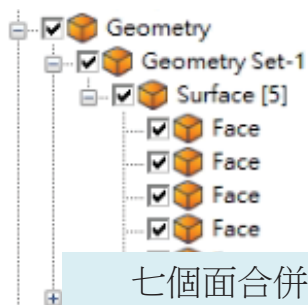




合併面特徵模型



勾選Merge Faces,共線特徵不會保留



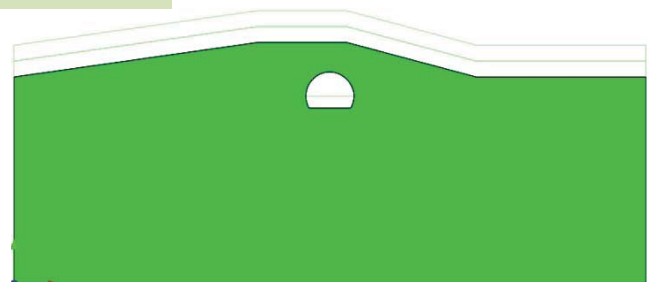
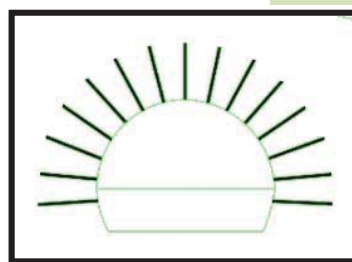
七個面合併成一個面,合併面目的是網格化時讓節點共點



投影線特徵

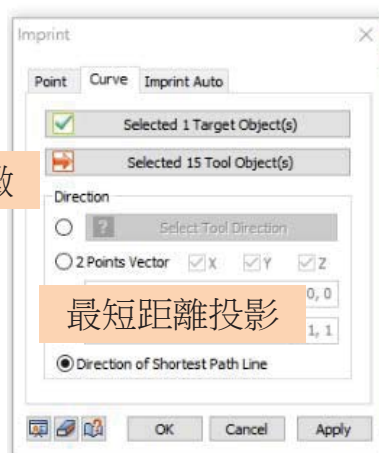


岩石螺栓線特徵
=>投影在面特徵

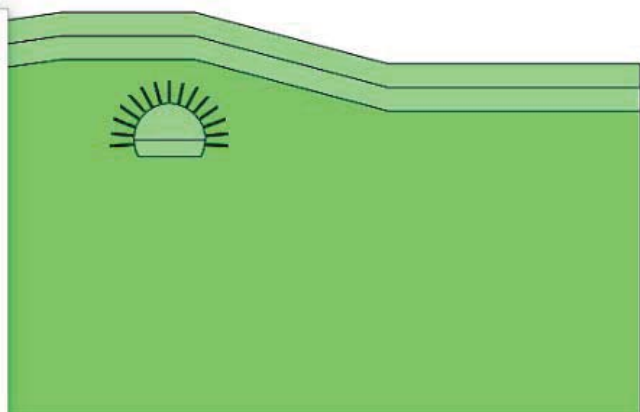


面特徵

岩石螺栓線特徵



最短距離投影

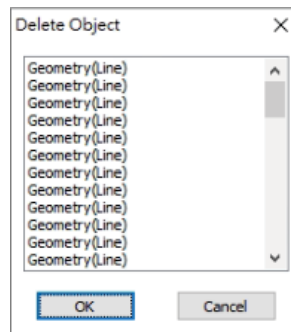


刪除多餘幾何特徵



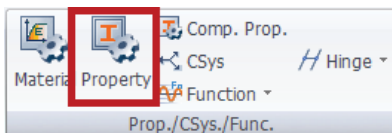
選取0幾何集

鍵盤DELETE

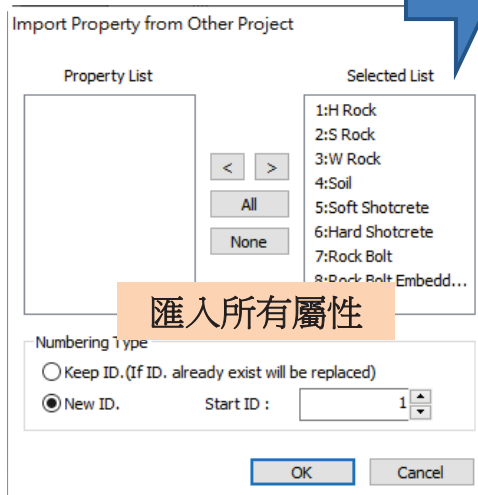
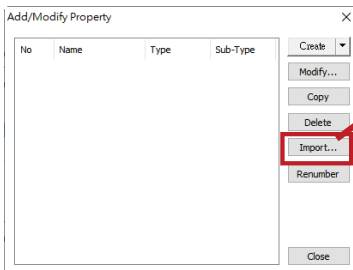


匯入材料&屬性

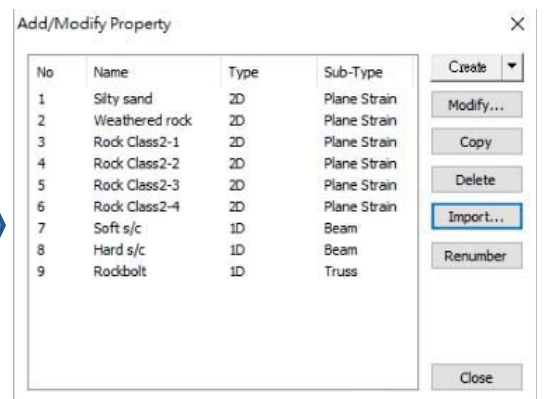
匯入屬性同時自動匯入材料性質



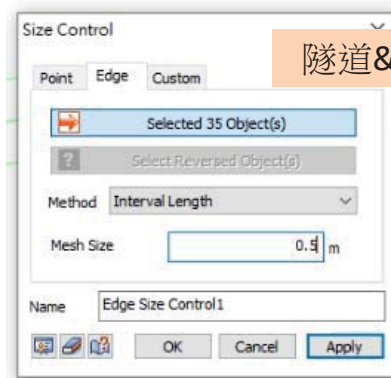
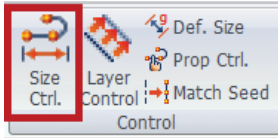
選擇檔案



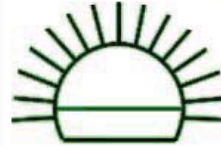
匯入所有屬性



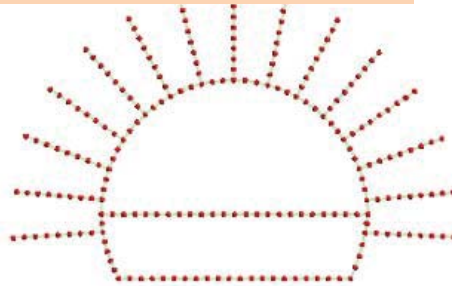
手動網格尺寸指定



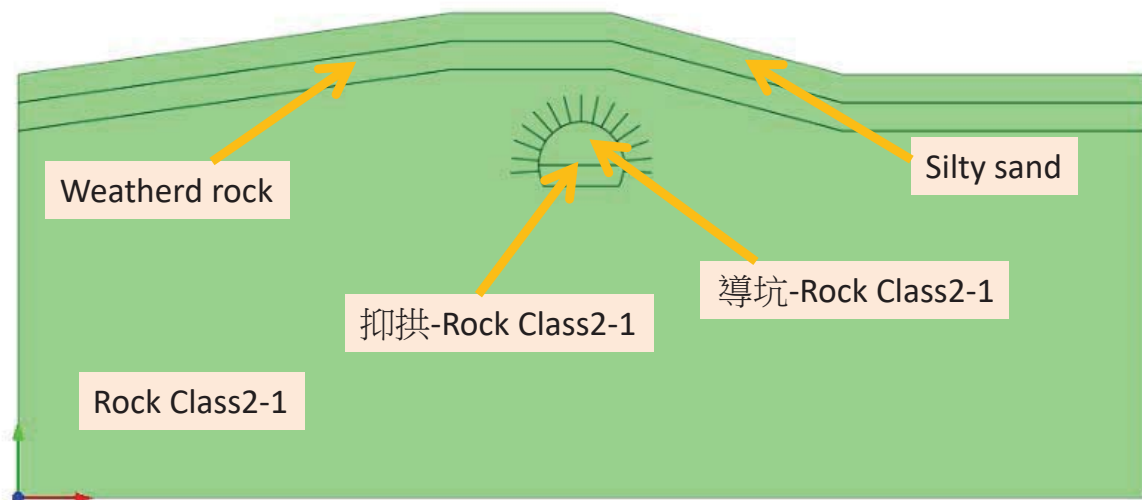
隧道&岩石螺栓周邊尺寸:0.5m



顯示網格大致分佈情況



網格集名稱(面特徵)使用材料&屬性

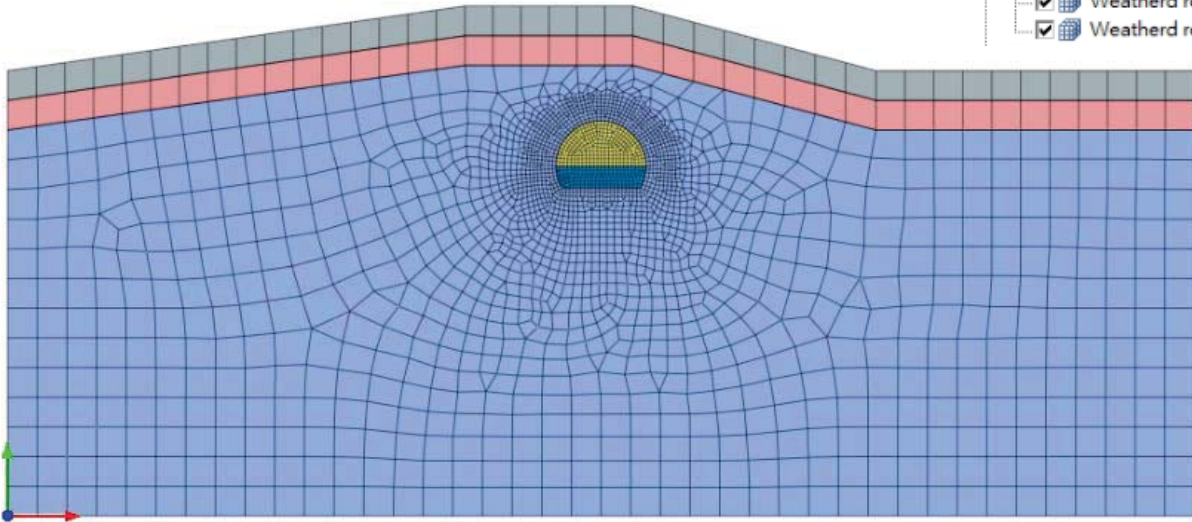


2D網格生成



網格尺寸: 2

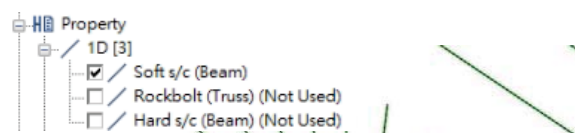
自訂網格集名稱



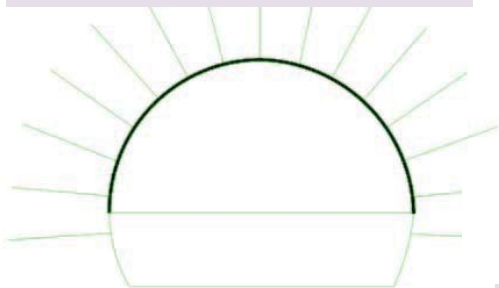
1D網格生成-噴射混凝土



勾選Soft s/c 檢視截面



Mesh Set : Shotcrete Up
Property: Soft S/C



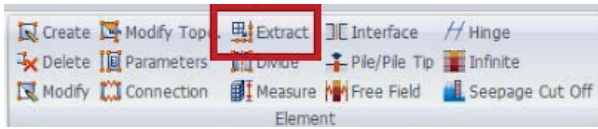
Mesh Set : Shotcrete Down
Property: Soft S/C



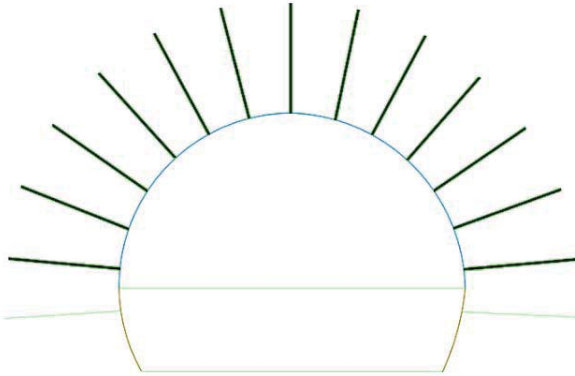
註:若截面顯示不正確可以調整元素方向



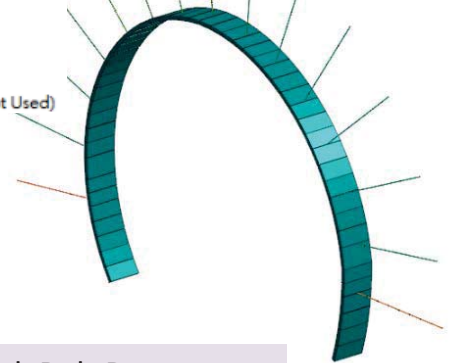
1D網格生成-岩石螺栓



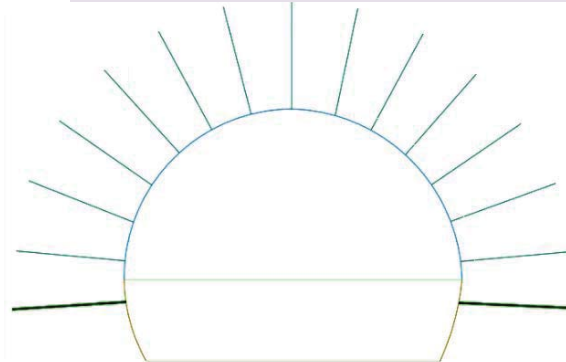
Mesh Set : Rock Bolt Up
Property: Rock Bolt



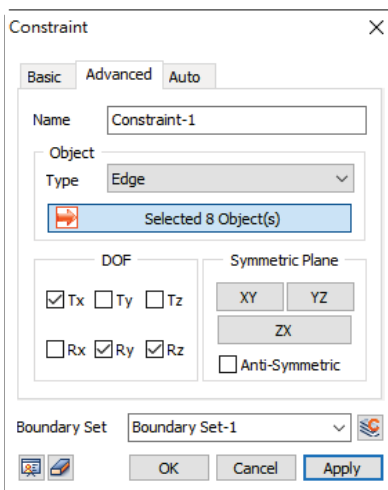
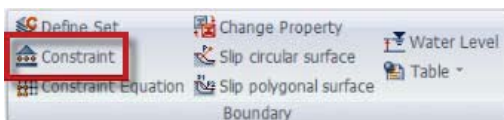
勾選Rock Bolt檢視截面



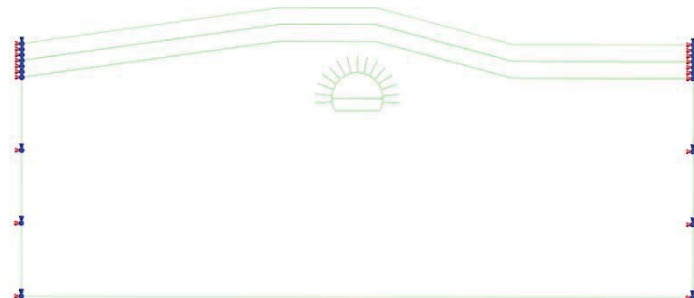
Mesh Set : Rock Bolt Down
Property: Rock Bolt



拘束條件-1



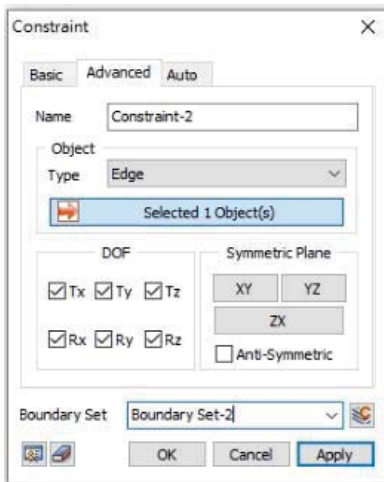
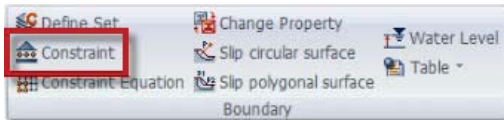
Edge特徵施加
拘束:Tx/Ry/Rz



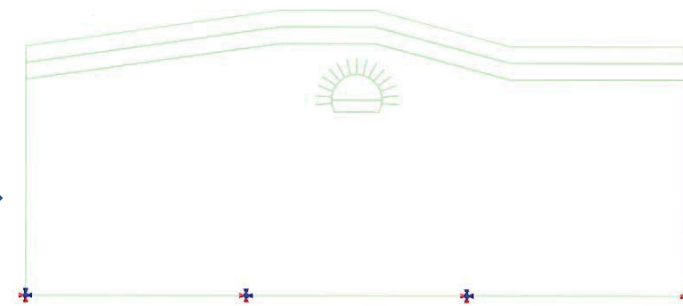
註:本題目採2D操作,可忽略Z方向自由度。



拘束條件-2



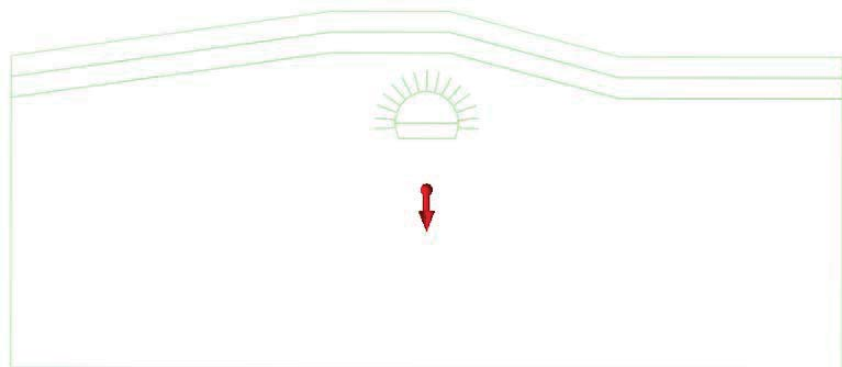
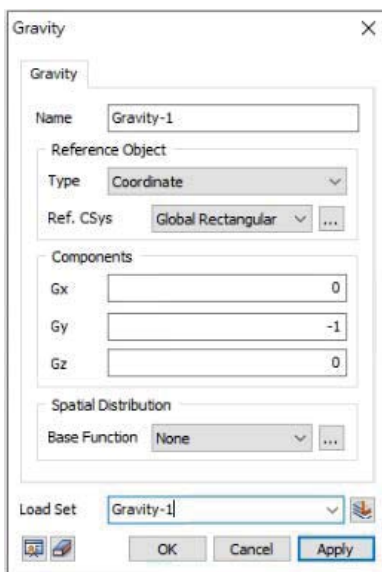
底部Edge特徵施加
拘束:Tx/Ty/Tz/Rx/Ry/Rz



註:本題目採2D操作,可忽略Z方向自由度。



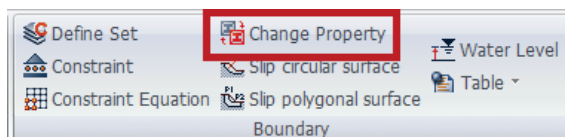
自重



噴射混凝土-1

施工階段分次施加噴射混凝土

利用Change Property調整噴射混凝土強度



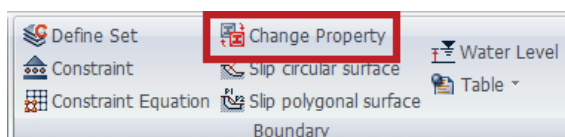
Shotcrete Up-Hard



噴射混凝土-2

施工階段分次施加噴射混凝土

利用Change Property調整噴射混凝土強度

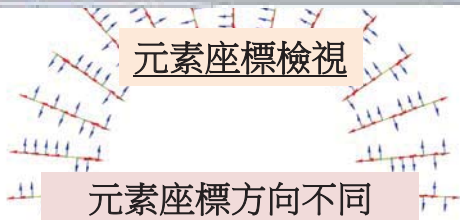


Shotcrete Down-Hard

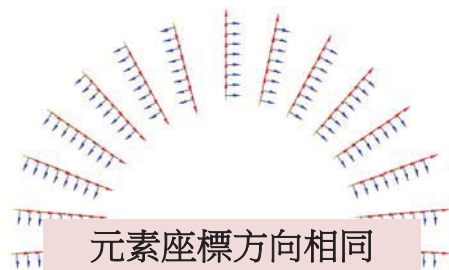




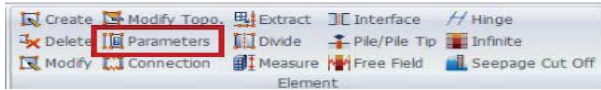
元素座標檢視



元素座標方向不同

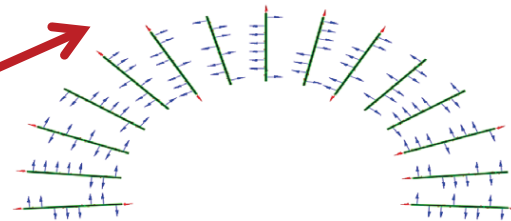
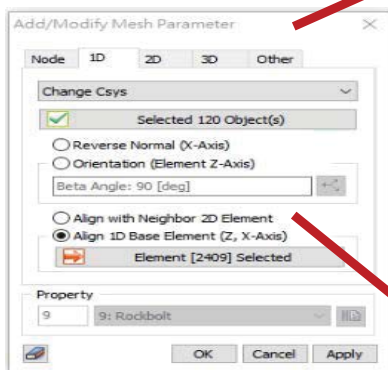


元素座標方向相同



元素參數調整

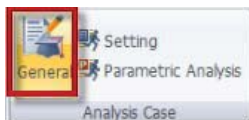
枉選所有Rock Bolt 元素



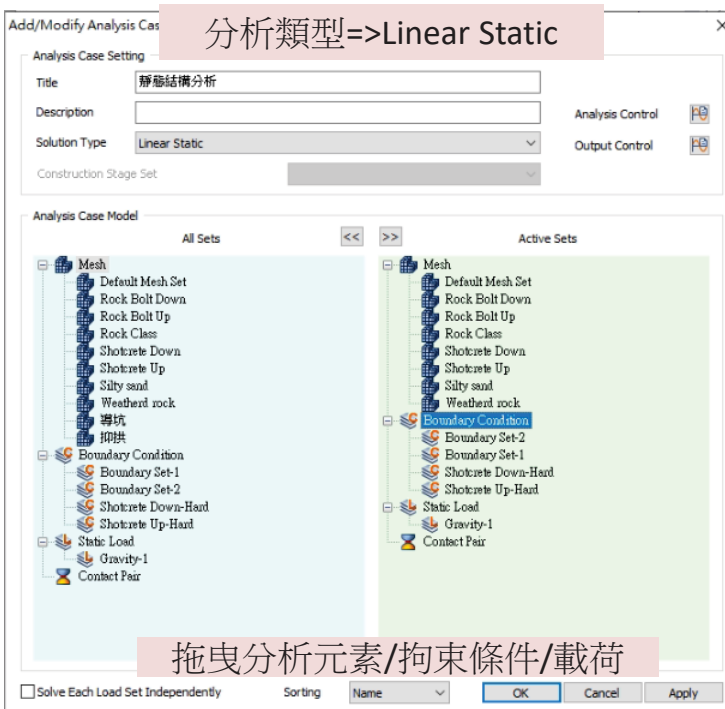
選手1元素作為元素座標指定標準



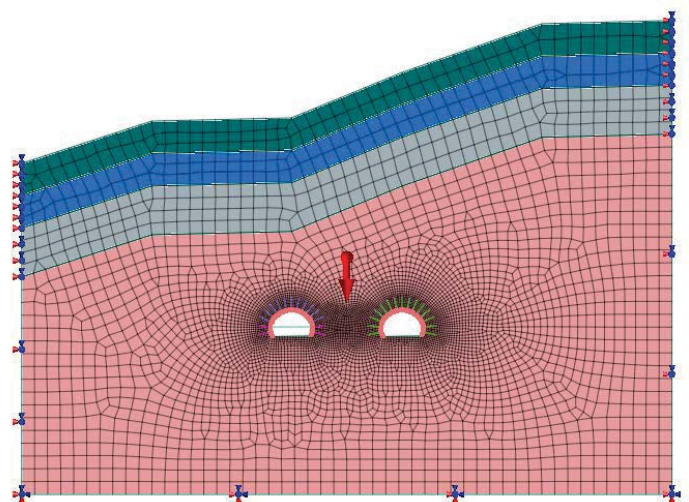
MIDAS



靜態結構分析



拖曳分析元素/拘束條件/載荷

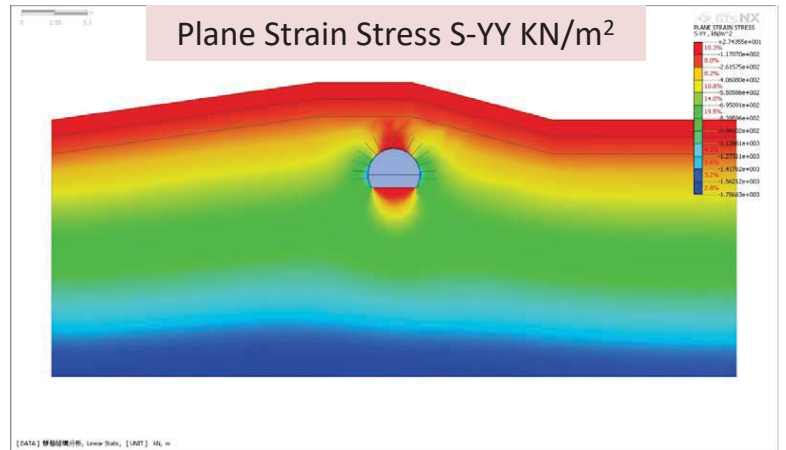
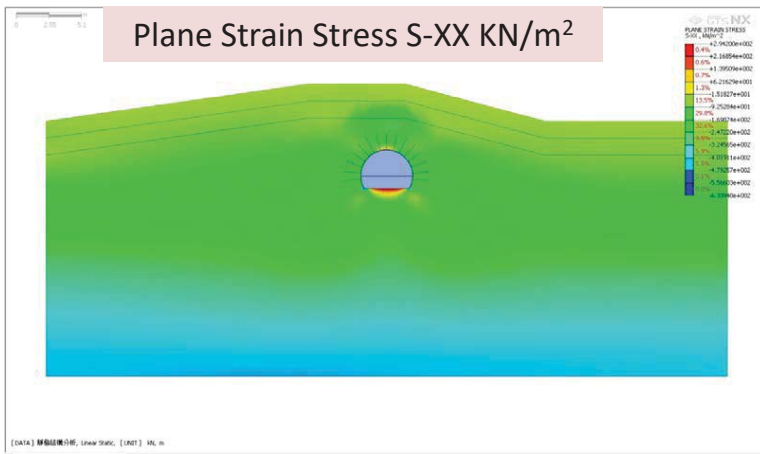


In-Situ Analysis

- ☒ Include In-Situ Analysis with Self-Weight
- ☐ Apply K0 Condition
- ☐ Estimate Initial Stress of Activated Elements
- ☐ Clear Displacement/Strain

MIDAS



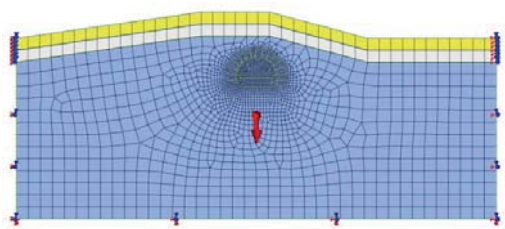


MIDAS



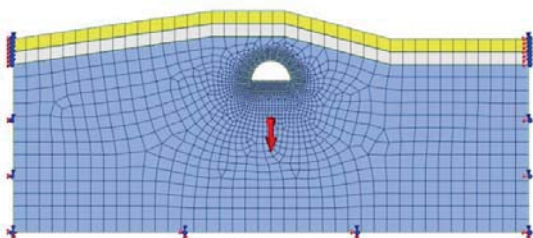
施工階段-1

Stage 1 初始情況



- ☒ Clear Displacement
- ☐ Slope Stability (SRM)
- ☐ Slope Stability (SAM)

Stage 2 移除上半部



Load Distribution Factor 分配係數

- ☐ Sub Stage...
- ☒ LDF...
- ☐ Clear Displacement
- ☐ Slope Stability (SRM)
- ☐ Slope Stability (SAM)

Load Distribution Factor

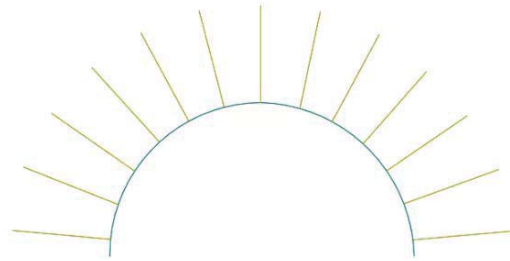
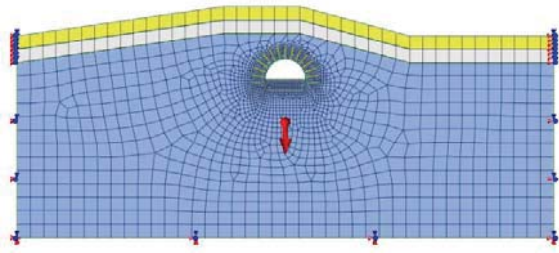
	After Current Stage	Distribution Factor
	0	0.4
	1	0.3
	2	0.3
+		

MIDAS

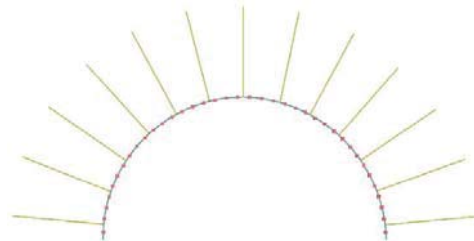
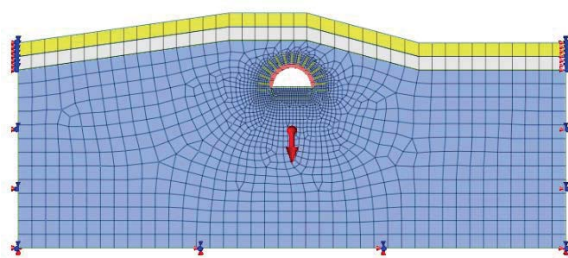


施工階段-2

Stage3 上半部岩石螺栓&第1層噴射混凝土



Stage4 上半部第2層噴射混凝土



MIDAS



施工階段-3

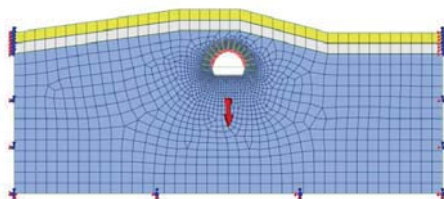
Stage5 移除下半部

Load Distribution Factor 分配係數

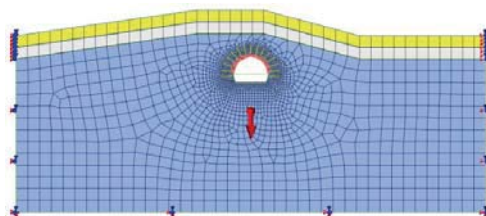
Load Distribution Factor

	After Current Stage	Distribution Factor
	0	0.4
	1	0.3
	2	0.3
+		

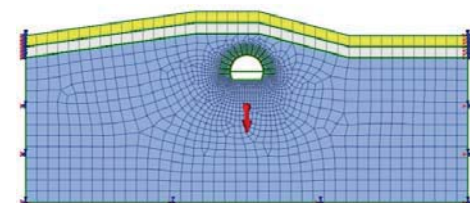
- ☐ Sub Stage...
- ☒ LDF...
- ☐ Clear Displacement
- ☐ Slope Stability(SRM)
- ☐ Slope Stability(SAM)



Stage6 下半部岩石螺栓&第1層噴射混凝土



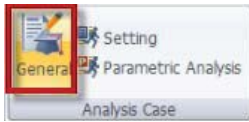
Stage7 下半部第2層噴射混凝土



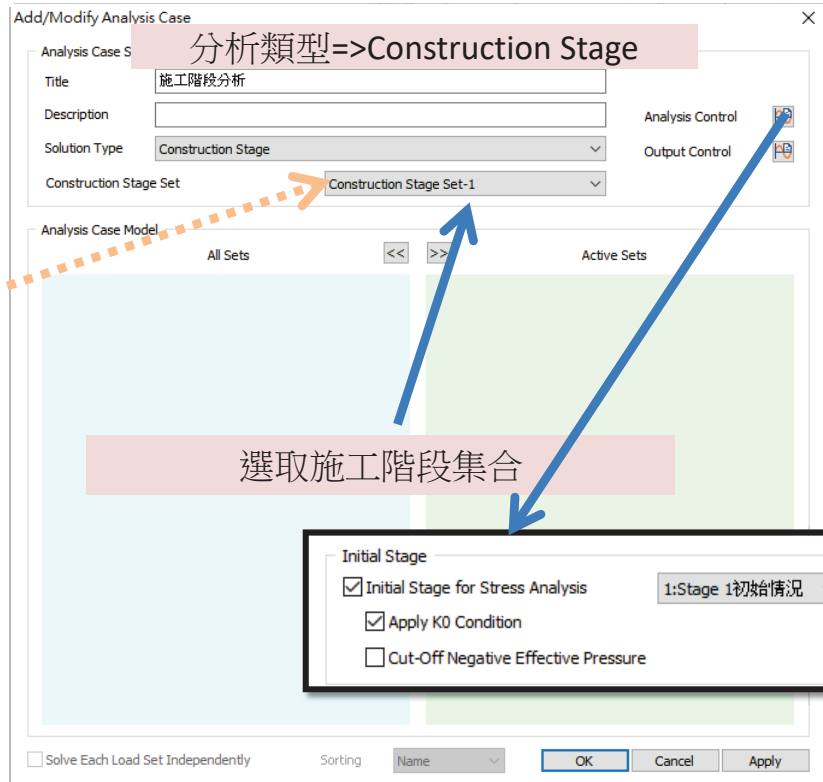
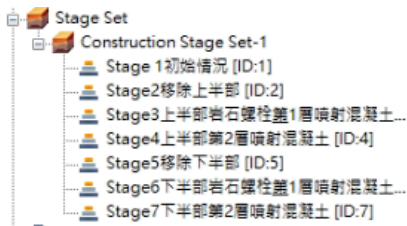
MIDAS



施工階段分析

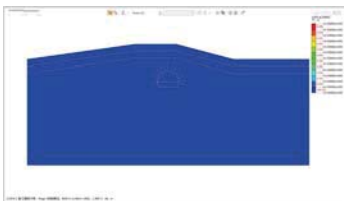


將施工階段定義指定
成分析工况

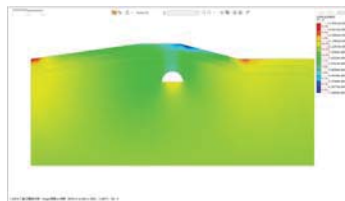


施工階段分析結果-Displacement(m)-Ty

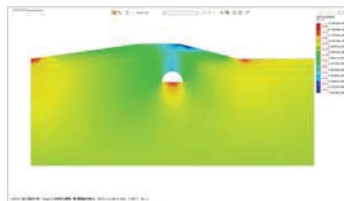
Stage1



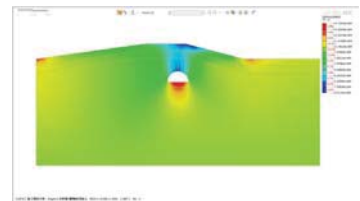
Stage2



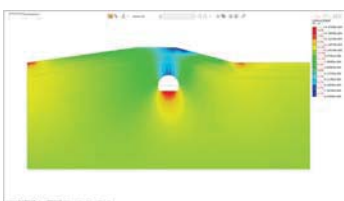
Stage3



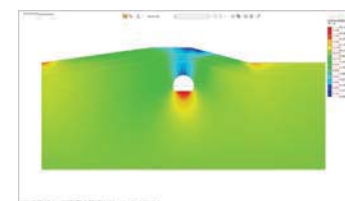
Stage4



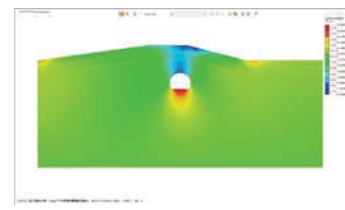
Stage5



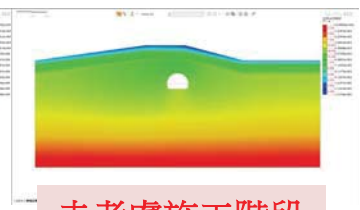
Stage6



Stage7



未考慮施工階段



Property & Ground Material

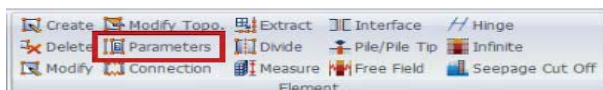
比較不同Ko計算結果

[Unit : KN, m]

Name	Silty sand	Weathered rock	Rock Class 2-1	Rock Class 2-2	Rock Class 2-3	Rock Class 2-4
Material	Isotropic	Isotropic	Isotropic	Isotropic	Isotropic	Isotropic
Model Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
General						
Elastic Modulus(E)	2.0E+04	2.0E+05	1.0E+07	1.0E+07	1.0E+07	1.0E+07
Poisson's Ratio(ν)	0.35	0.33	0.22	0.22	0.22	0.22
Unit Weight(γ)	18	21	26	26	26	26
Ko	0.5	0.5	0.5	1.0	1.5	2.0
Porous						
Unit Weight (Saturated)	19	22	27	27	27	27
Initial Void Ratio(e_0)	0.5	0.5	0.5	0.5	0.5	0.5
Drainage Parameters	Drained	Drained	Drained	Drained	Drained	Drained
Non-Linear						
Cohesion(C)	0	30	3000	3000	3000	3000
Frictional Angle	30	33	43	43	43	43

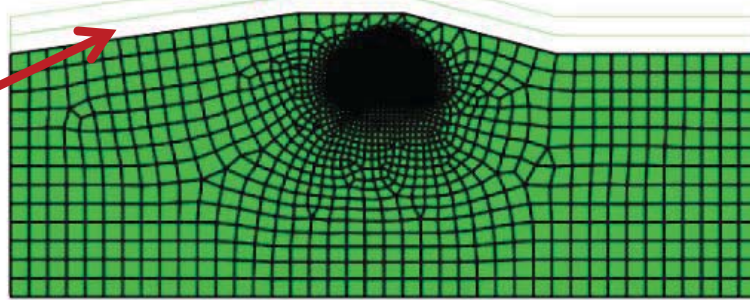
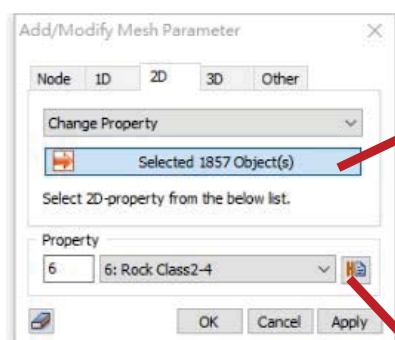
[Unit : KN, m]

Name	Silty sand	Weathered rock	Rock Class 2-1	Rock Class 2-2	Rock Class 2-3	Rock Class 2-4
Type	2D	2D	2D	2D	2D	2D
Sub-Type	Plane Strain	Plane Strain	Plane Strain	Plane Strain	Plane Strain	Plane Strain
Material	Silty sand	Weathered rock	Rock Class 2-1	Rock Class 2-2	Rock Class 2-3	Rock Class 2-4



元素屬性調整

枉選所有Rock Class元素



選取調整後屬性(使用k0=2)

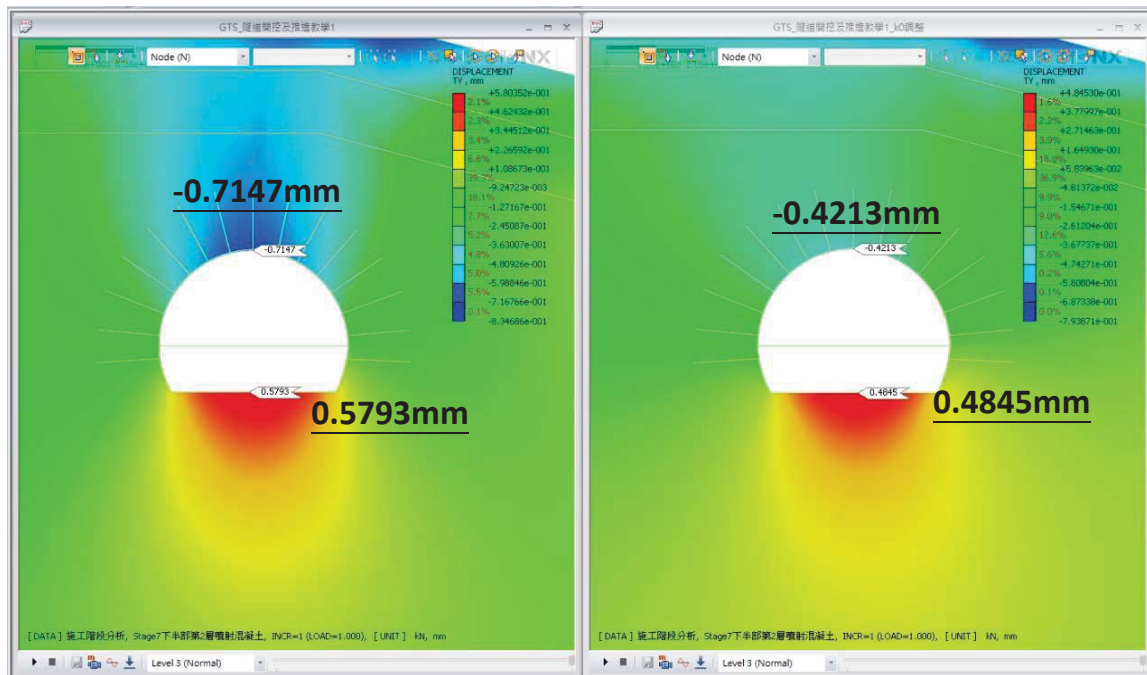
- 1: Silty sand
- 2: Weathered rock
- 3: Rock Class2-1
- 4: Rock Class2-2
- 5: Rock Class2-3
- 6: Rock Class2-4



Stage7-分析結果-Displacement(m)-Ty

K0=0.5

K0=2

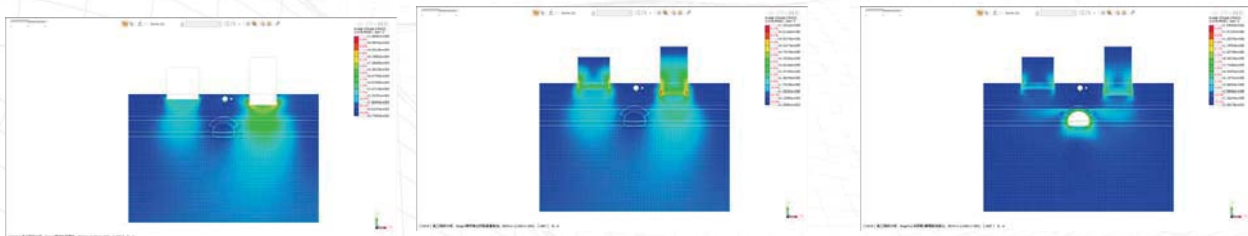


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GTS NX
Geo-Technical analysis System New eXperience

GTS_隧道開挖及推進教學2

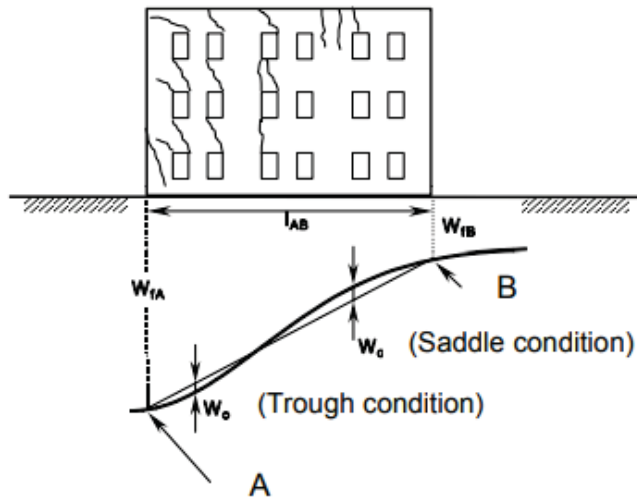


台灣邁達斯

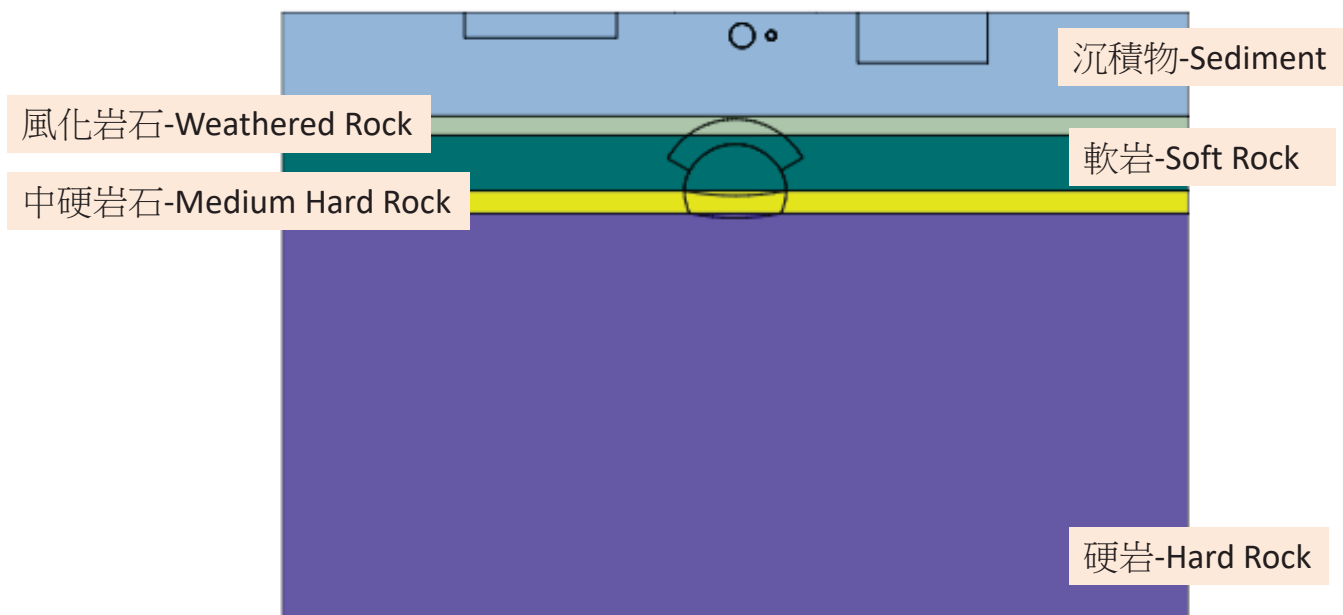
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相鄰結構-角畸變&沉陷定義

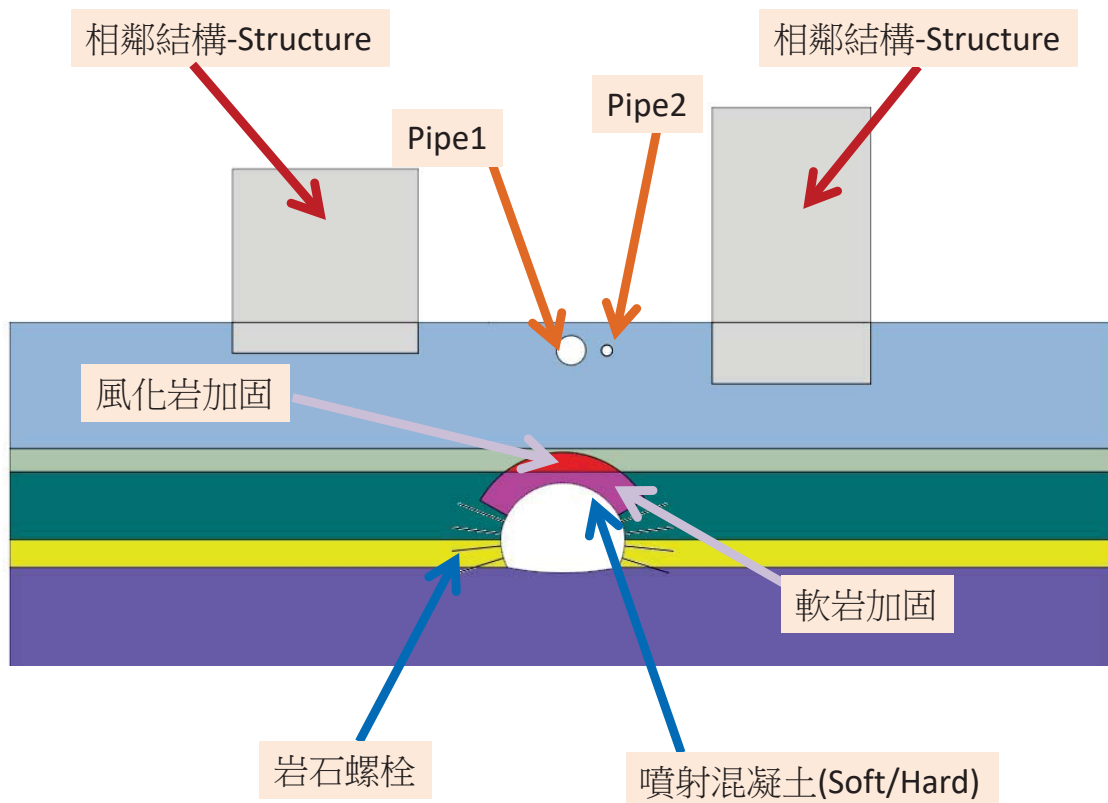
- Angular Distortion角畸變
 - Angular Distortion= $(W_{fA}-W_{fB})/l_{AB}$
- Maximum Settlement最大沉陷
 - Maximum Settlement= $\text{MAX}[W_1, W_2, W_3, W_4, \dots]$
- Differential Settlement差異沉陷
 - Differential Settlement= $W_1 - W_2$



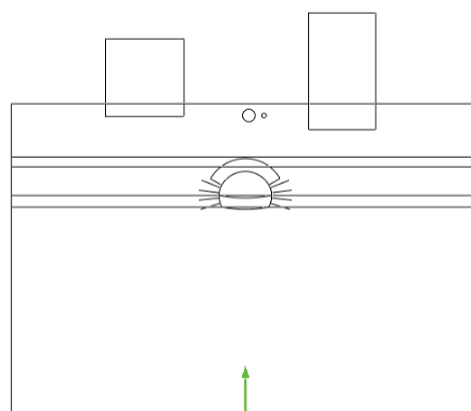
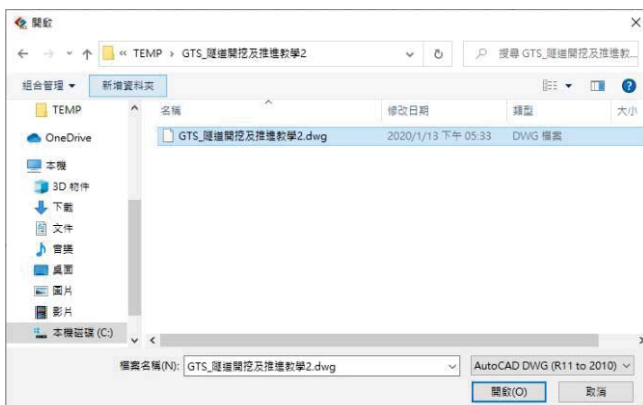
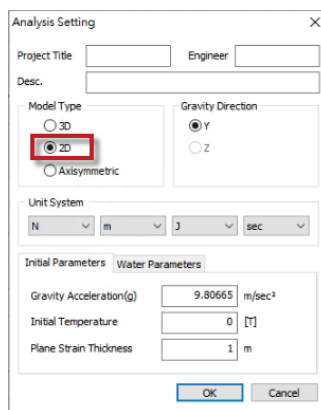
網格集名稱(面特徵)使用材料&屬性 (未開挖前)



網格集名稱(面特徵)使用材料&屬性 (施工完成後)

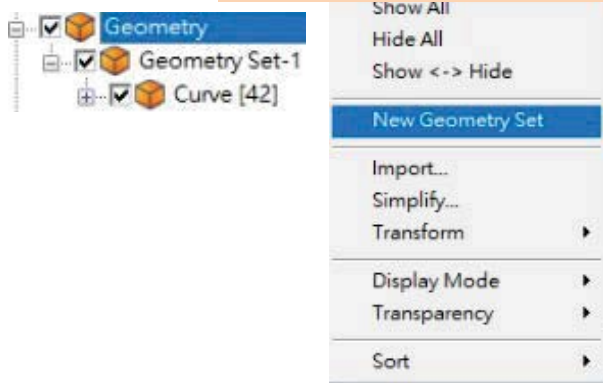


隧道系統-草圖匯入



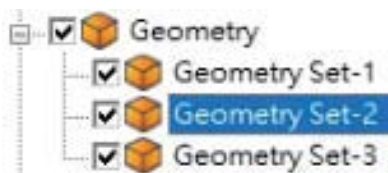
新增幾何集

滑鼠右鍵(新增2組幾何特徵)



隧道系統面特徵&隧道系統線特徵

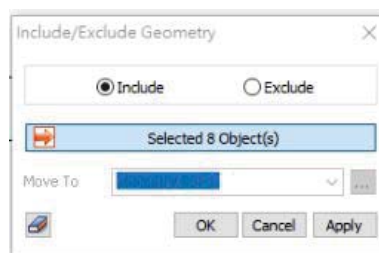
點選新增集合集,鍵盤F2(編輯名稱)



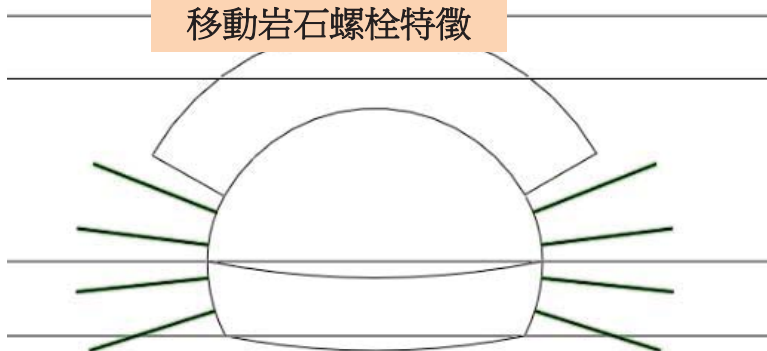
移動線特徵



滑鼠右鍵



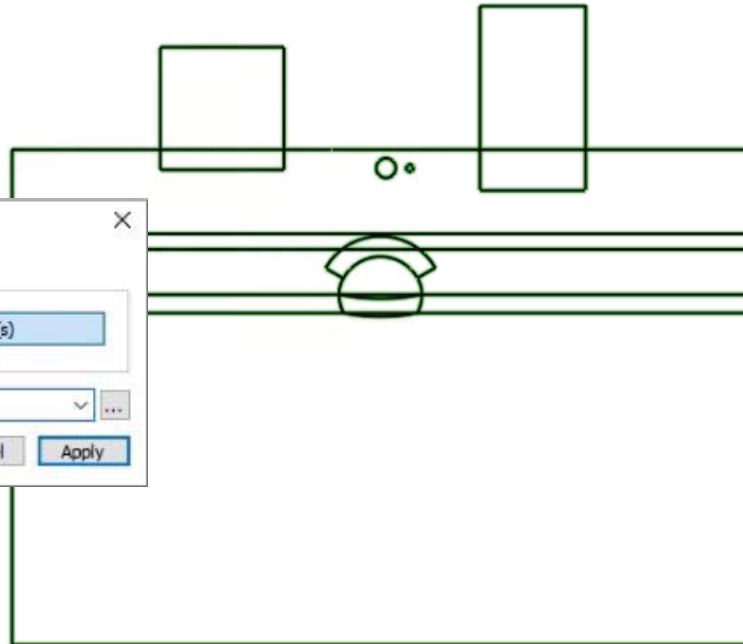
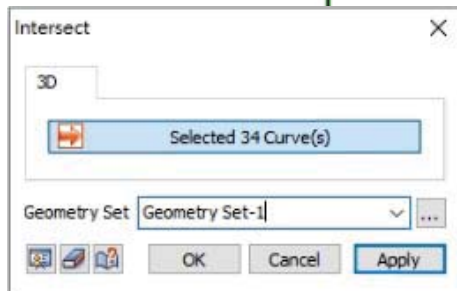
移動岩石螺栓特徵



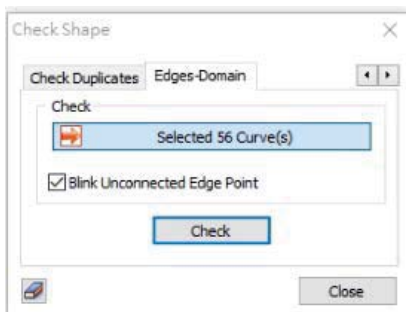
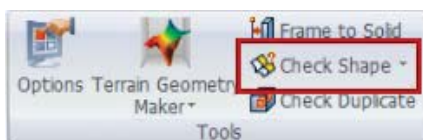
線特徵-交叉分割



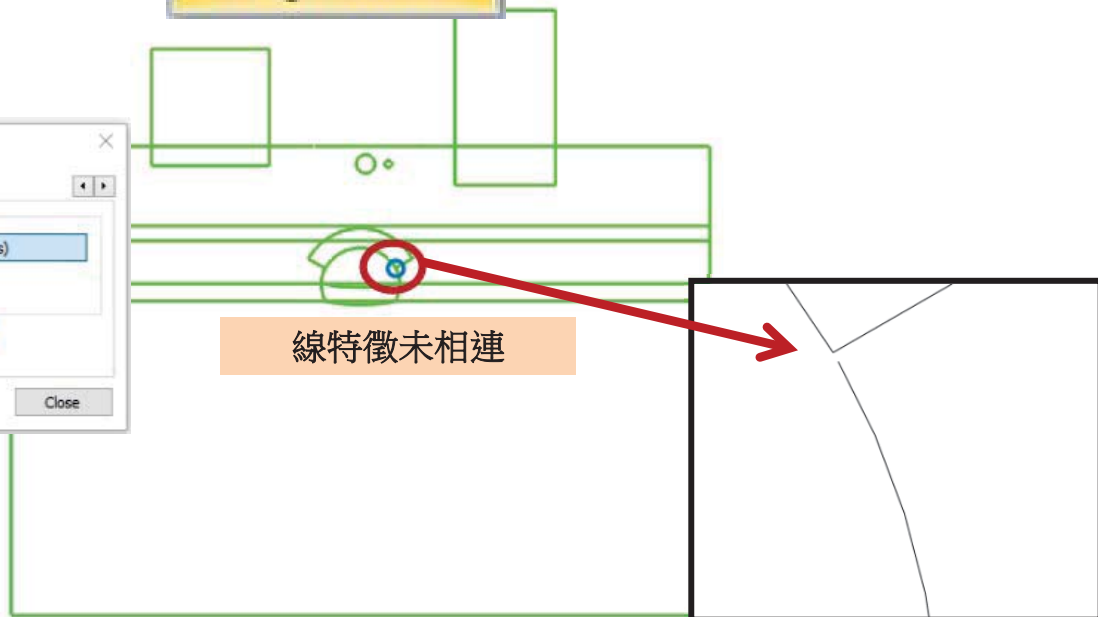
Geometry Set-1其餘線特徵-交叉分割



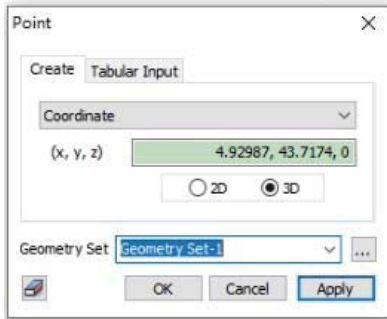
線特徵-幾何檢查



線特徵未相連



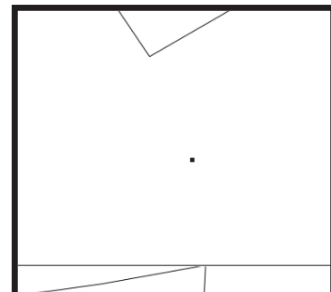
新增點&刪除線特徵



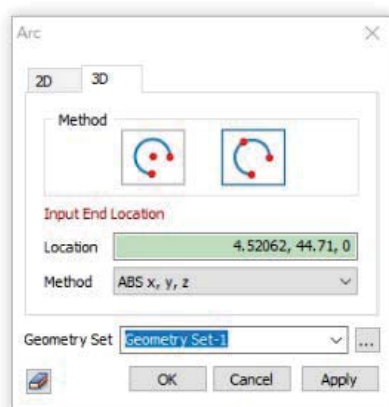
新增點特徵至
Geometry Set-1



選取線特徵
鍵盤(Delete)



新增曲線特徵



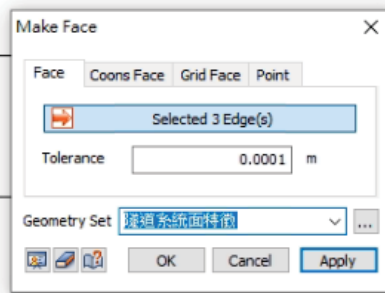
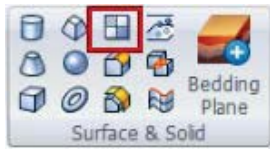
Point 3

Point 2

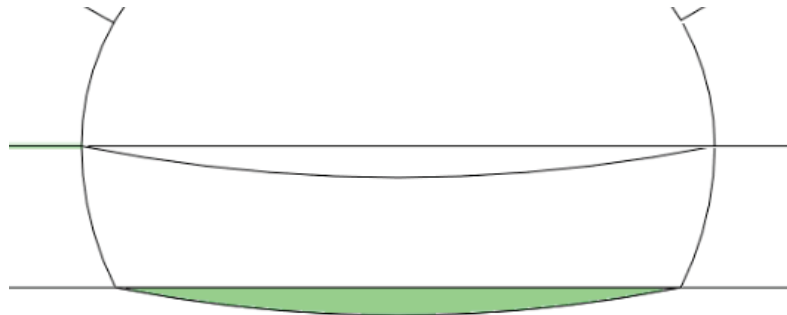
Point 1



面特徵模型建立-1



選擇封閉線特徵
(新增面特徵放在隧道系統面特徵)

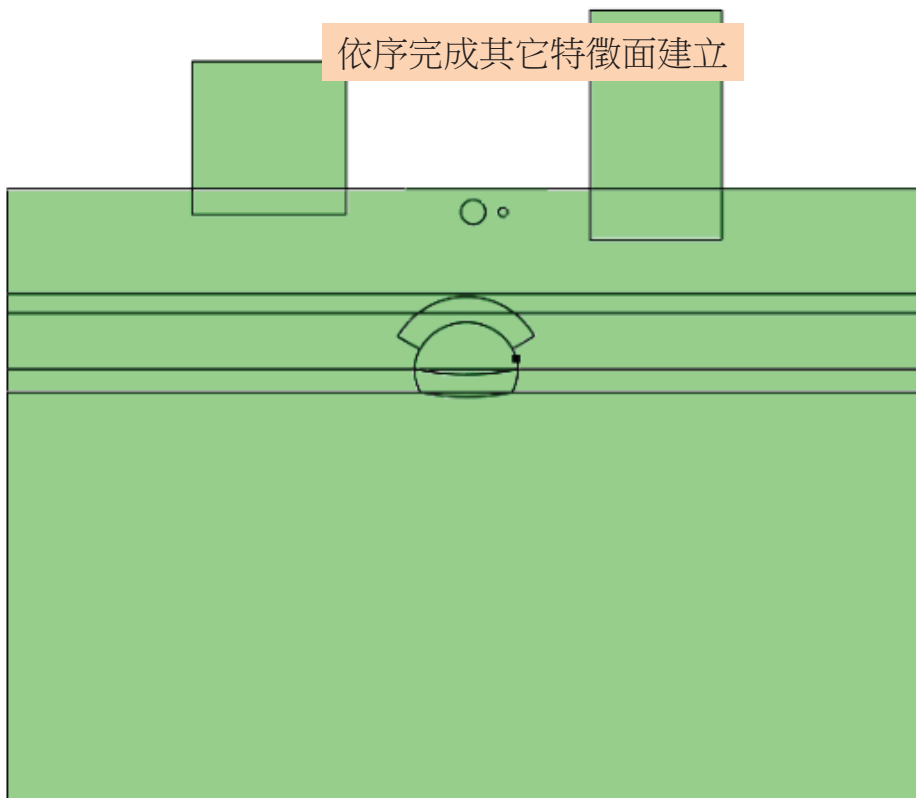


註:非封閉特徵無法產生面特徵



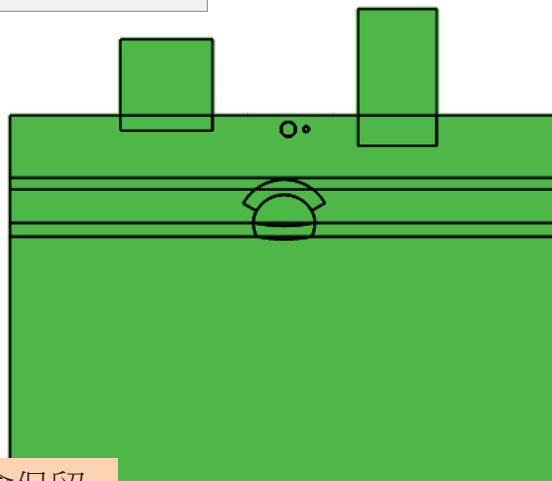
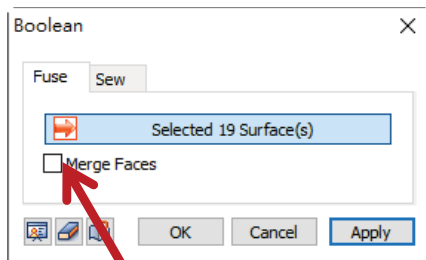
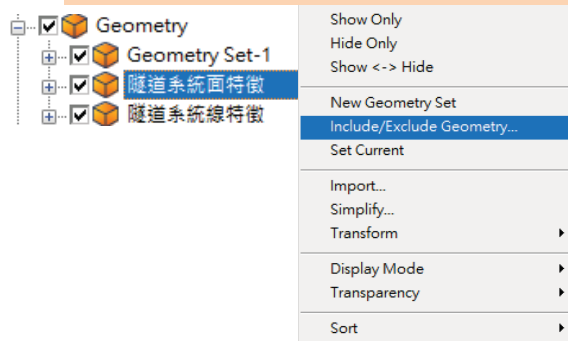
面特徵模型建立-2

依序完成其它特徵面建立



合併面特徵模型

指定當前使用幾何特徵集

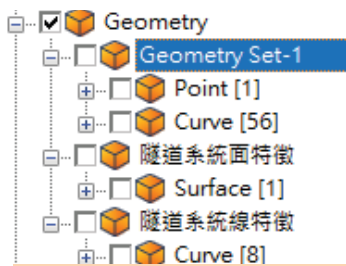


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勾選Merge Faces,共線特徵不會保留

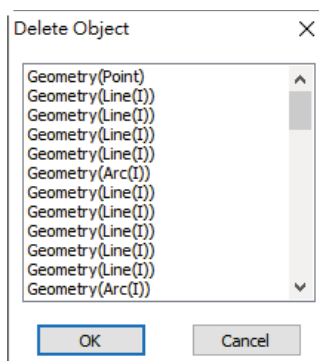


刪除多餘幾何特徵



選取Geometry Set-1

鍵盤DELETE



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匯入材料&屬性

匯入屬性同時自動匯入材料性質

選擇檔案



GTS_隧道開挖及
推進教學2.gts

Add/Modify Property

No	Name	Type	Sub-Type
1	風化岩加固	2D	Plane Strain
2	軟岩加固	2D	Plane Strain
3	Soft 噴射混凝土	1D	Beam
4	Hard 噴射混凝土	1D	Beam
5	Pipe1	1D	Beam
6	中硬岩石-Mediu...	2D	Plane Strain
7	沉積物-Sediment	2D	Plane Strain
9	硬岩-Hard Rock	2D	Plane Strain
10	軟岩-Soft Rock	2D	Plane Strain
11	結構-Structure	2D	Plane Strain
12	風化岩石-Weat...	2D	Plane Strain
13	Rock Bolt Embed...	1D	Embedded...
	Pipe2	1D	Beam

Buttons: Create, Modify..., Copy, Delete, Import..., Renumber, Close

Import Property from Other Project

Property List

Selected List

- 1:H Rock
- 2:S Rock
- 3:W Rock
- 4:Soil
- 5:Soft Shotcrete
- 6:Hard Shotcrete

Buttons: <, >, All, None, Add...

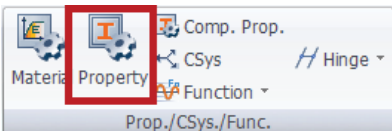
Numbering Type

☐ Keep ID. (If ID. already exist will be replaced)

☒ New ID. Start ID : 1

Buttons: OK, Cancel

匯入所有屬性



Add/Modify Property

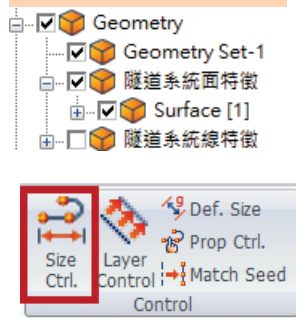
Buttons: Create, Modify..., Copy, Delete, Import..., Renumber, Close

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手動網格尺寸指定

隱藏線特徵



Size Control

Point Edge Custom

Selected 20 Obj

Select Reversed Object(s)

Method Interval Length

Mesh Size 0.5 m

Name Edge Size Control1

Buttons: OK, Cancel, Apply

隧道&岩石螺栓&管道周邊網格尺寸:0.5m



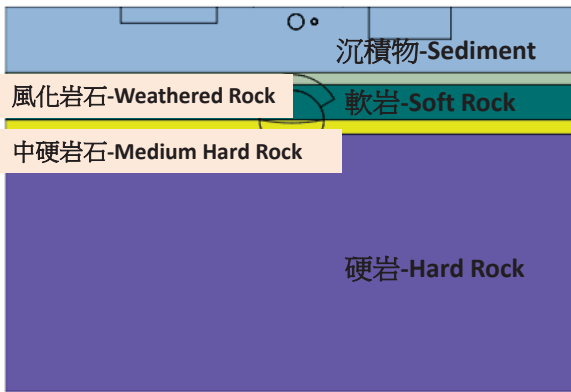
顯示網格大致分佈情況



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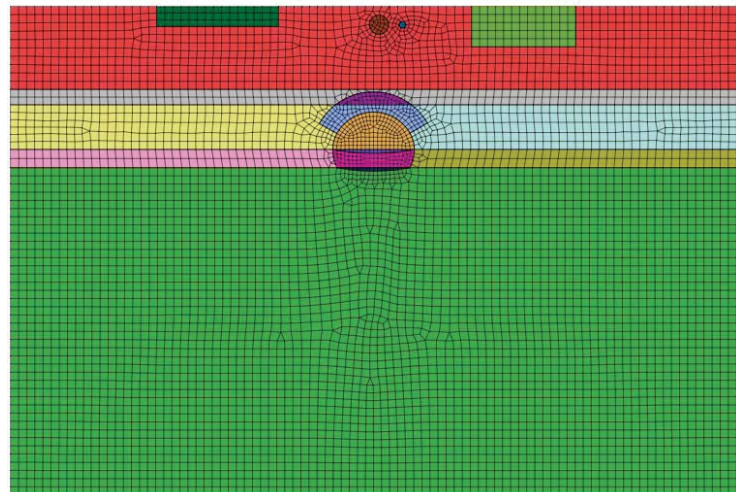
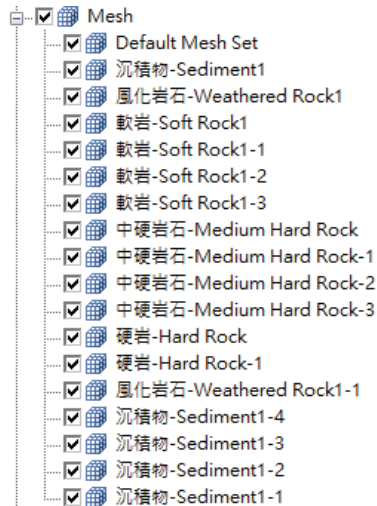


未開挖前-2D網格生成



網格尺寸: 1

- ☒ Skip Meshed Face(s)
- ☒ Pattern Mesh
- ☒ Register Each Mesh Independently

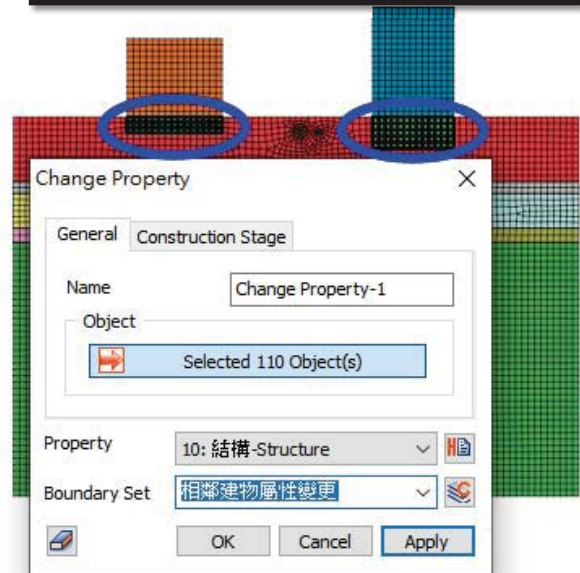
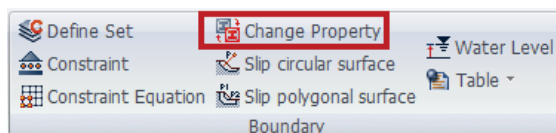
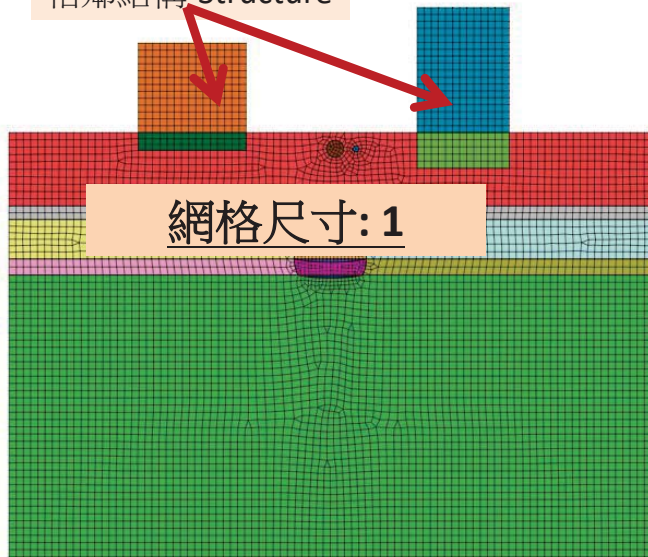


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相鄰建物-2D網格生成&屬性變更

相鄰結構-Structure

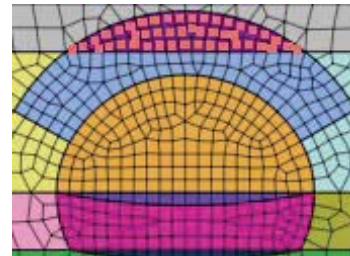
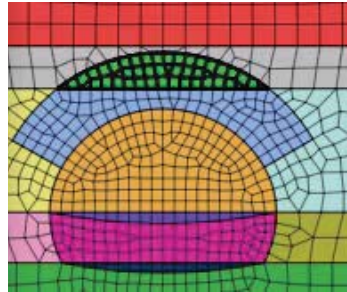
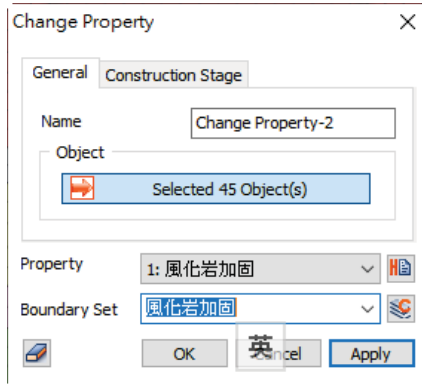
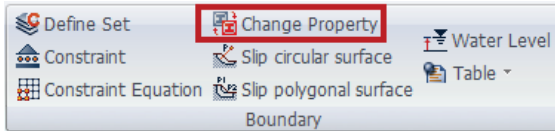


相鄰建物屬性變更

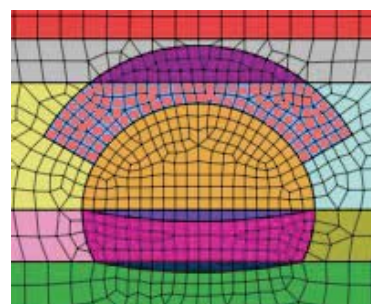
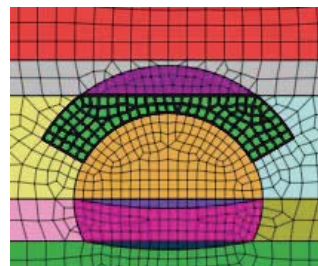
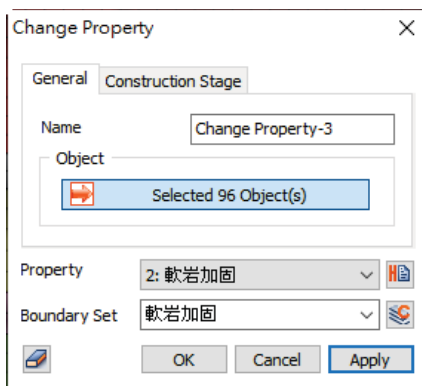
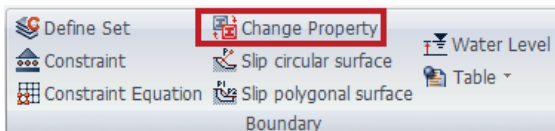
MIDAS



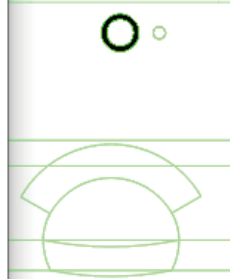
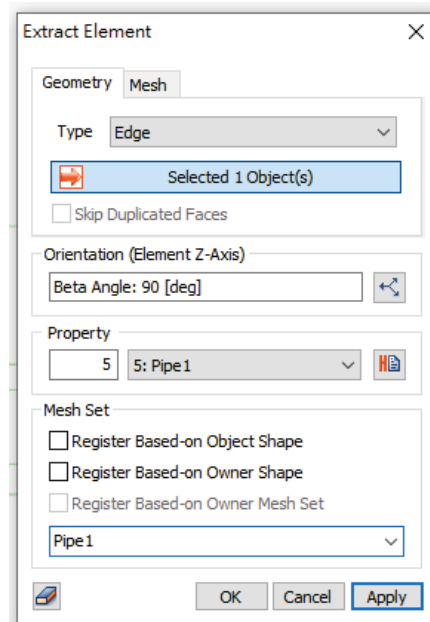
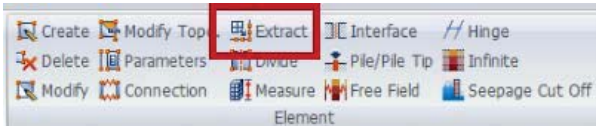
風化岩加固-屬性變更



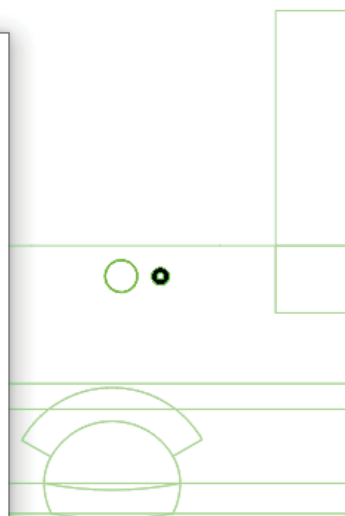
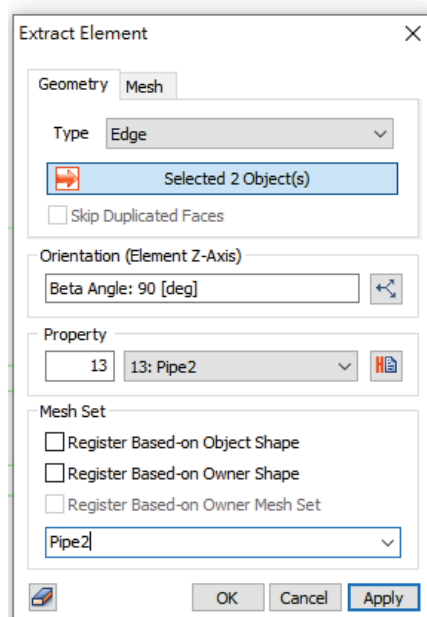
軟岩加固-屬性變更



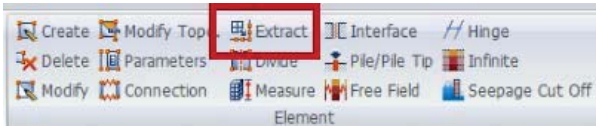
1D網格提取-Pipe1



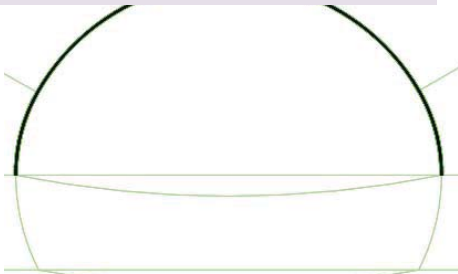
1D網格提取-Pipe2



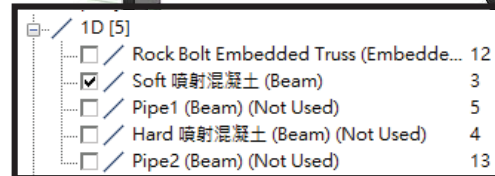
1D網格提取-噴射混凝土



Mesh Set : 噴射混凝土-UP
Property: Soft 噴射混凝土



勾選Soft 噴射混凝土檢視截面



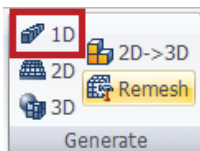
Mesh Set : 噴射混凝土-Down
Property: Soft 噴射混凝土



註:若截面顯示不正確可以調整元素方向

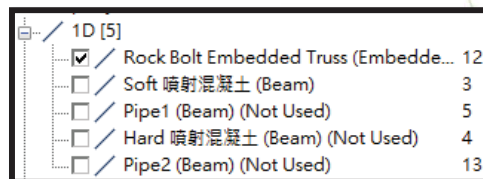


1D網格生成-岩栓

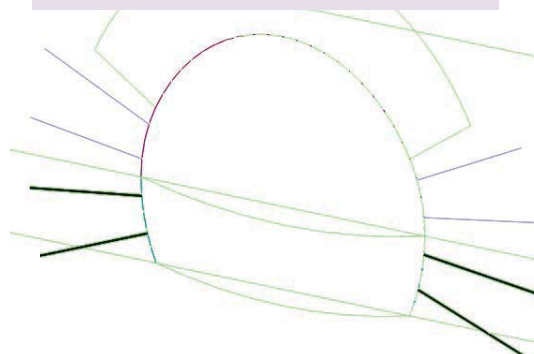
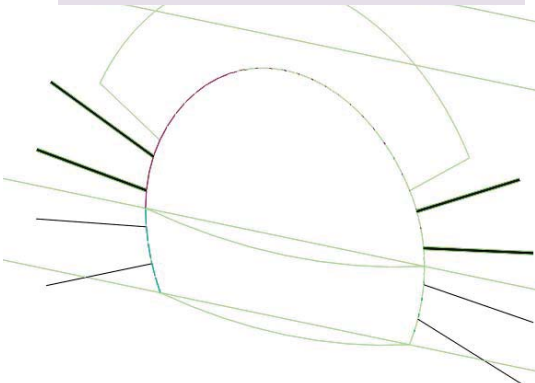


Mesh Set : Rock Bolt Up
Property: Rock Bolt
Division:10

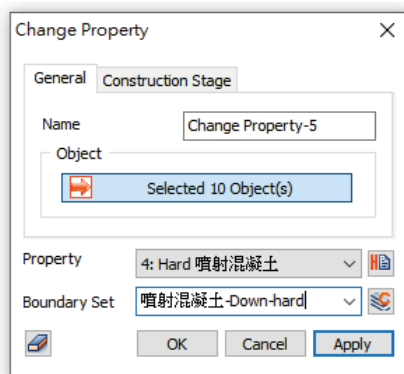
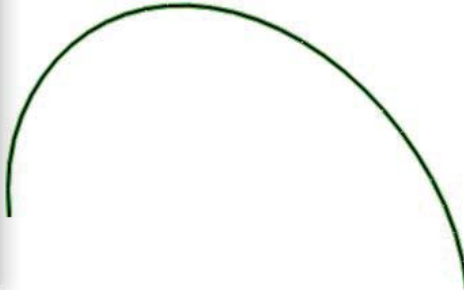
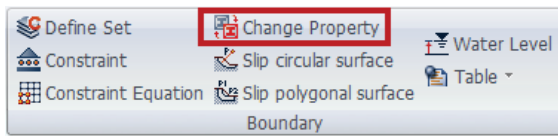
勾選Rock Bolt檢視截面



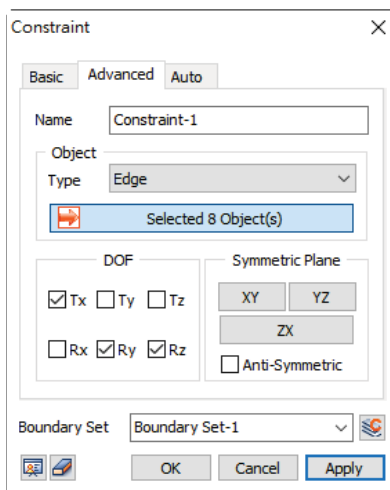
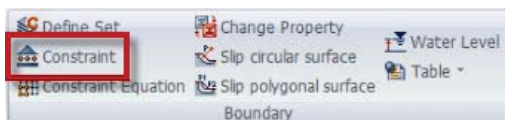
Mesh Set : Rock Bolt Down
Property: Rock Bolt
Division:10



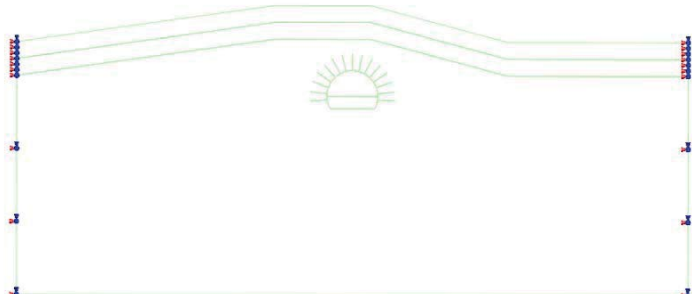
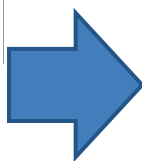
1D網格提取-噴射混凝土加固



拘束條件-1



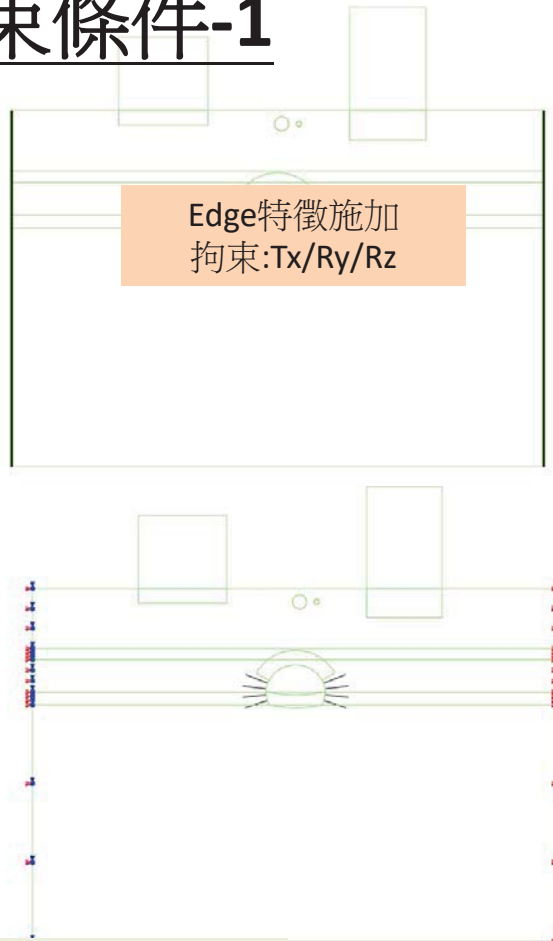
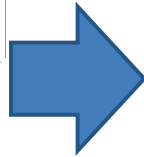
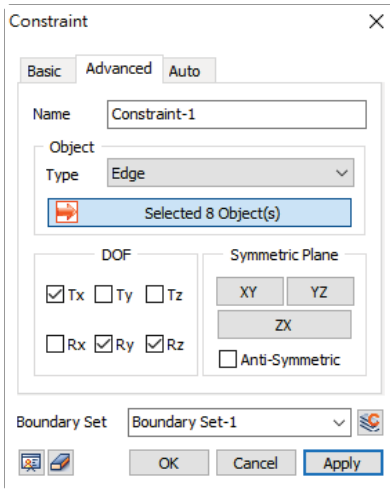
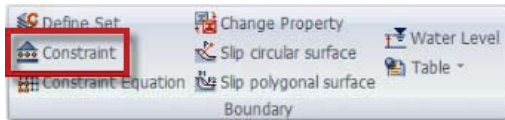
Edge特徵施加
拘束:Tx/Ry/Rz



註:本題目採2D操作,可忽略Z方向自由度。



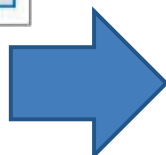
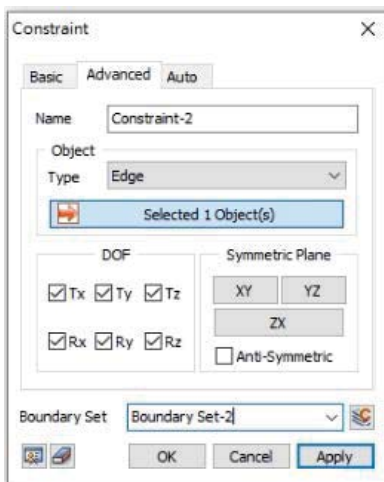
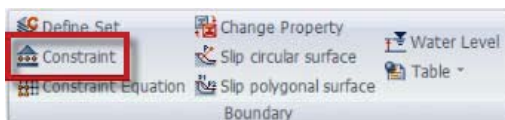
拘束條件-1



註:本題目採2D操作,可忽略Z方向自由度。



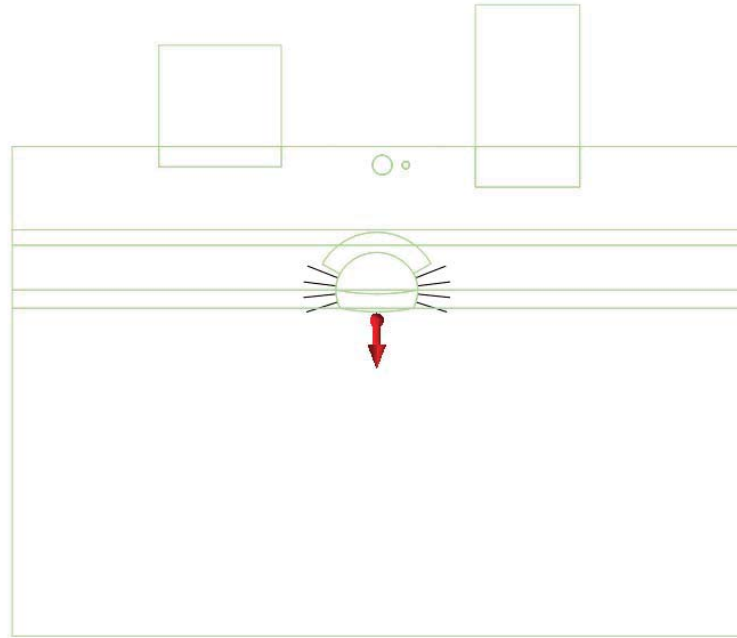
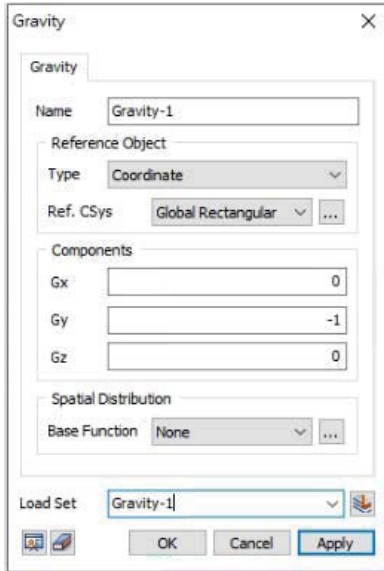
拘束條件-2



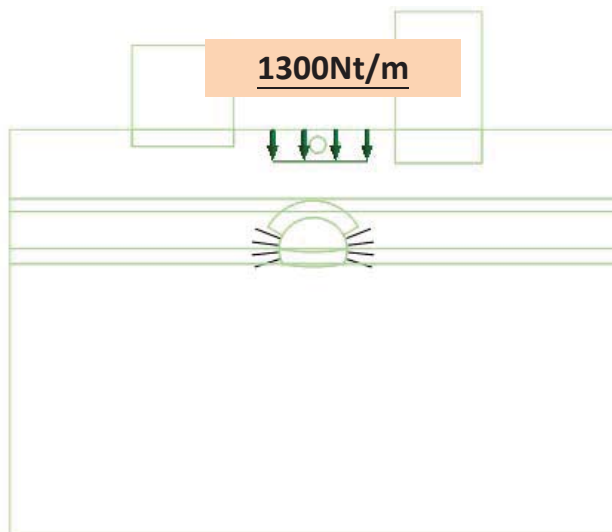
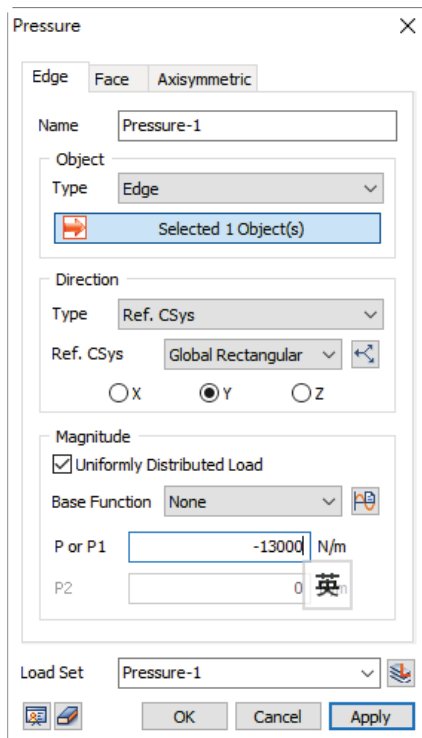
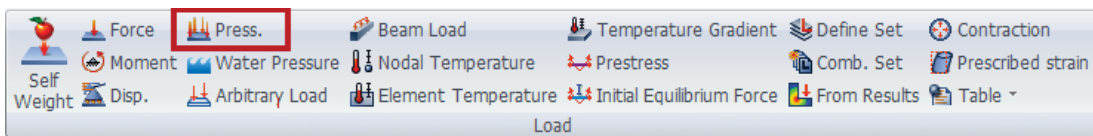
註:本題目採2D操作,可忽略Z方向自由度。



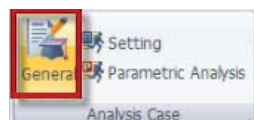
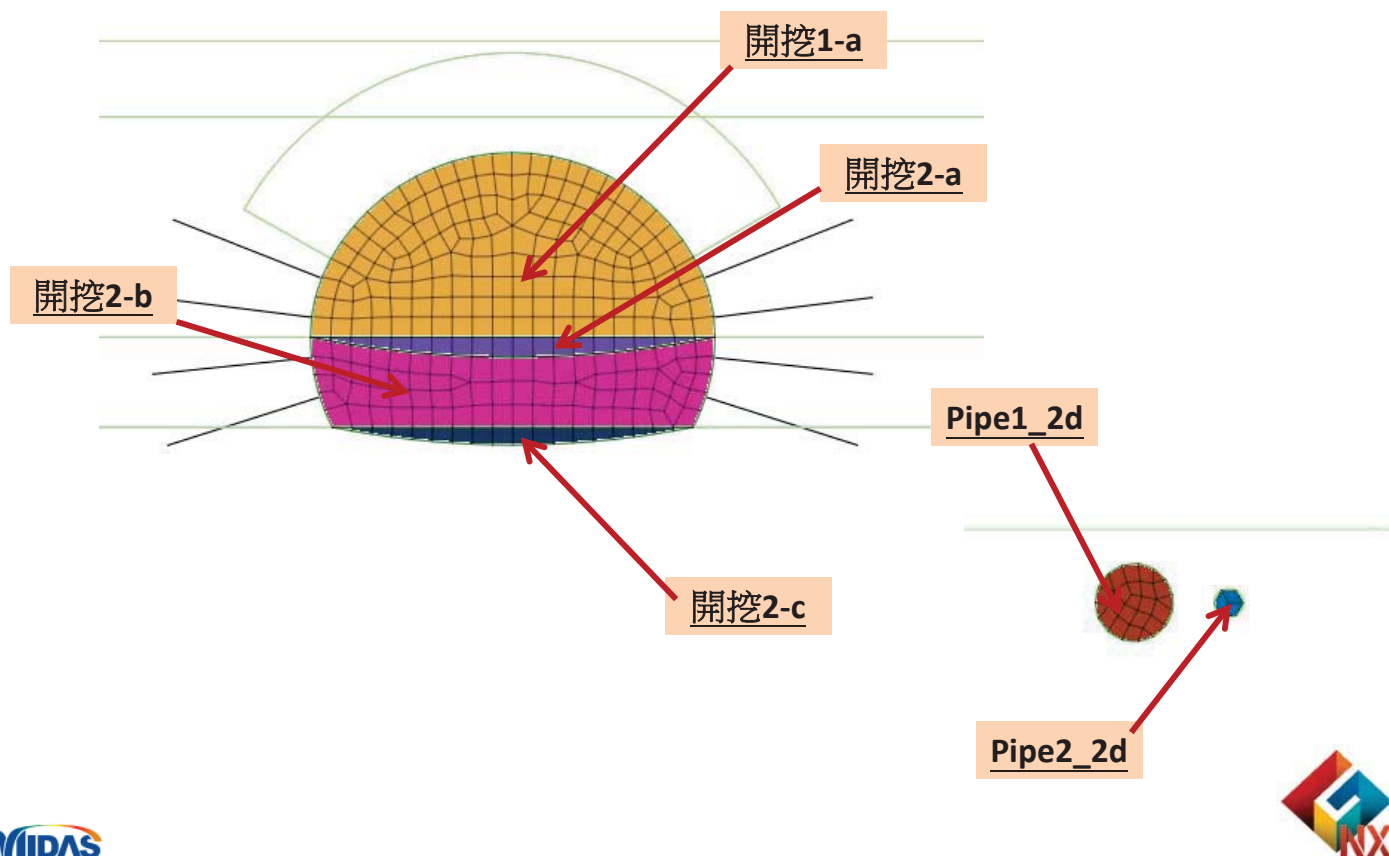
自重



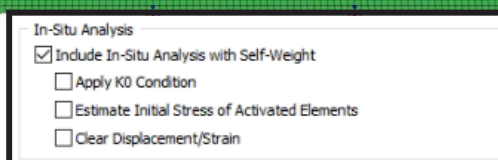
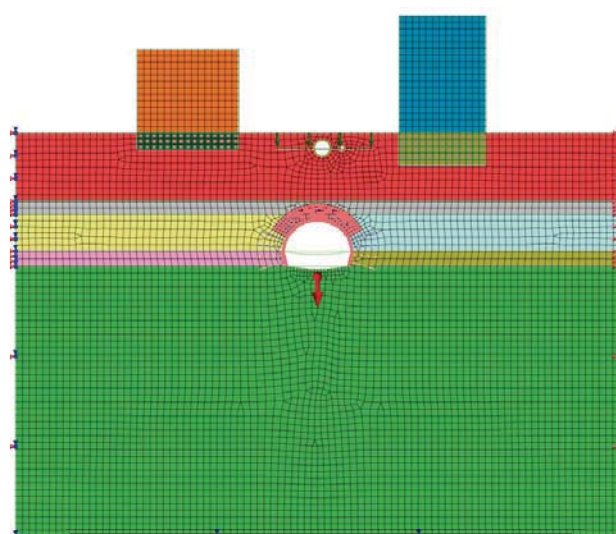
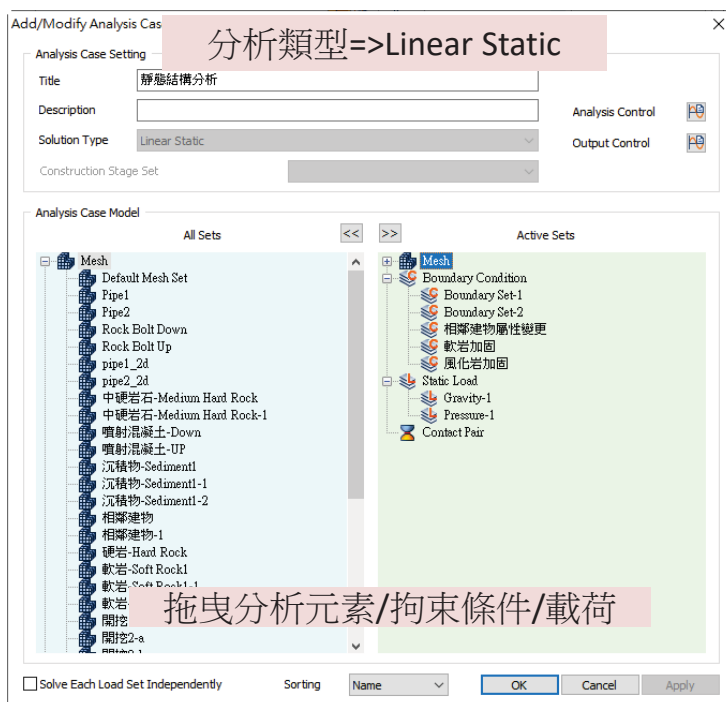
車行載重-Pressure



編輯網格集名稱



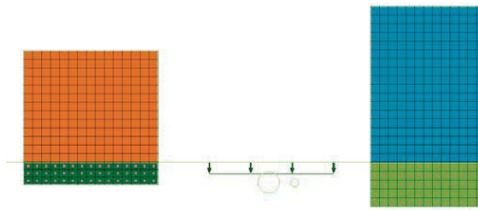
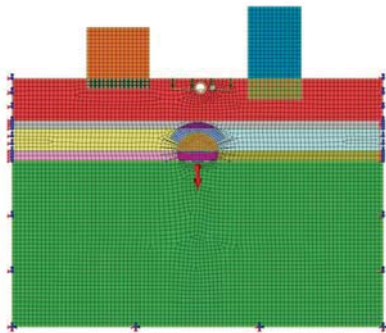
靜態結構分析



施工階段-2

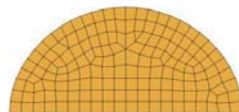
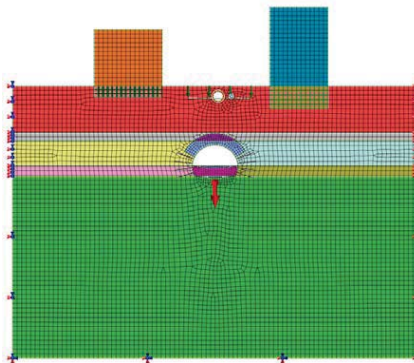
Stage3 建物建立和路載重施加

新增



Stage4 隧道上半部開挖

移除



- ☐ Sub Stage...
- ☒ LDF...
- ☐ Clear Displacement
- ☐ Slope Stability (SRM)
- ☐ Slope Stability (SAM)

Load Distribution Factor

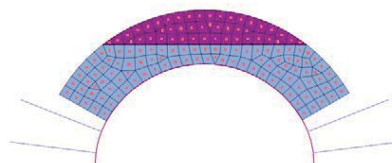
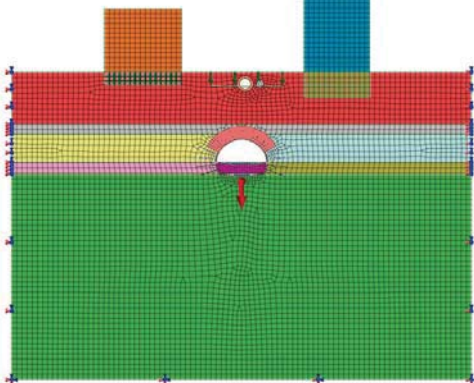
	After Current Stage	Distribution Factor
	0	0.4
	1	0.3
	2	0.3
+		



施工階段-3

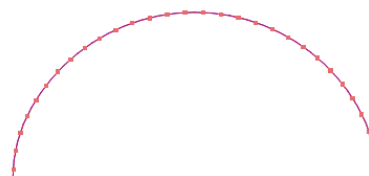
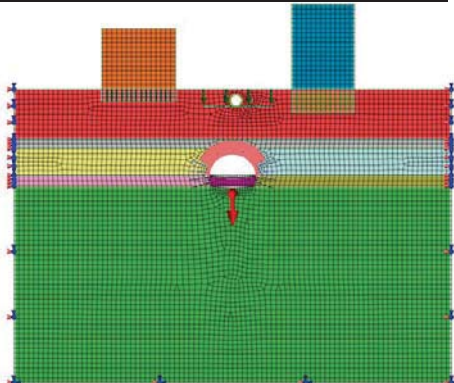
Stage5 上半部岩石螺栓&第1層噴射混凝土&岩石補強

新增



Stage6 上半部第2層噴射混凝土

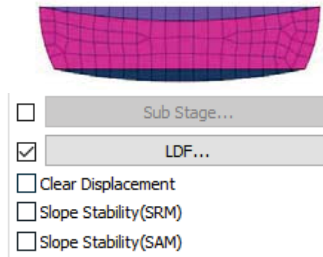
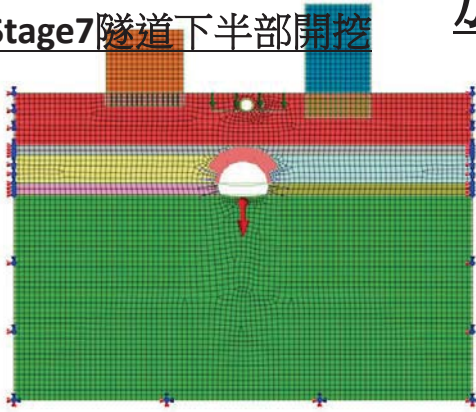
新增



施工階段-4

Stage7 隧道下半部開挖

移除



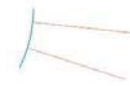
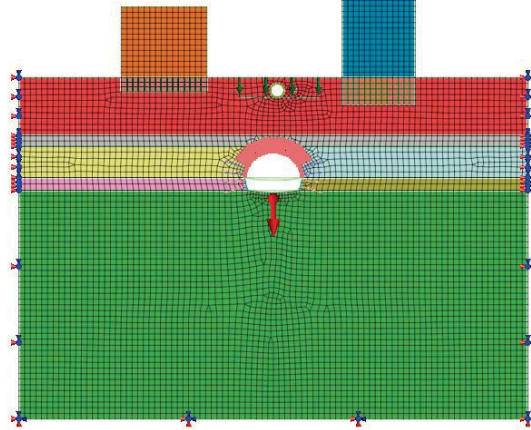
- ☐ Sub Stage...
- ☒ LDF...
- ☐ Clear Displacement
- ☐ Slope Stability(SRM)
- ☐ Slope Stability(SAM)

Load Distribution Factor

	After Current Stage	Distribution Factor
	0	0.4
	1	0.3
	2	0.3
+		

Stage8 下半部岩石螺栓&第1層噴射混凝土

新增



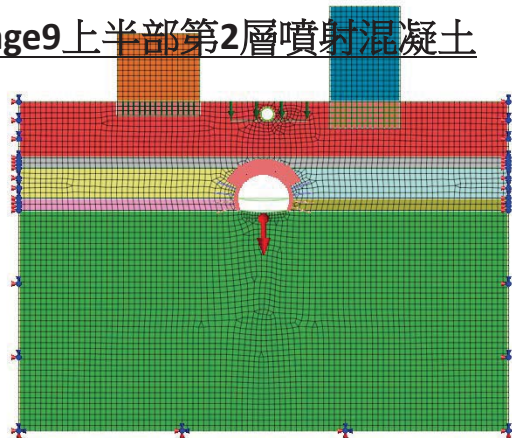
MIDAS



施工階段-5

Stage9 上半部第2層噴射混凝土

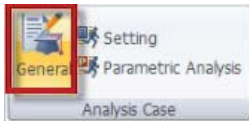
新增



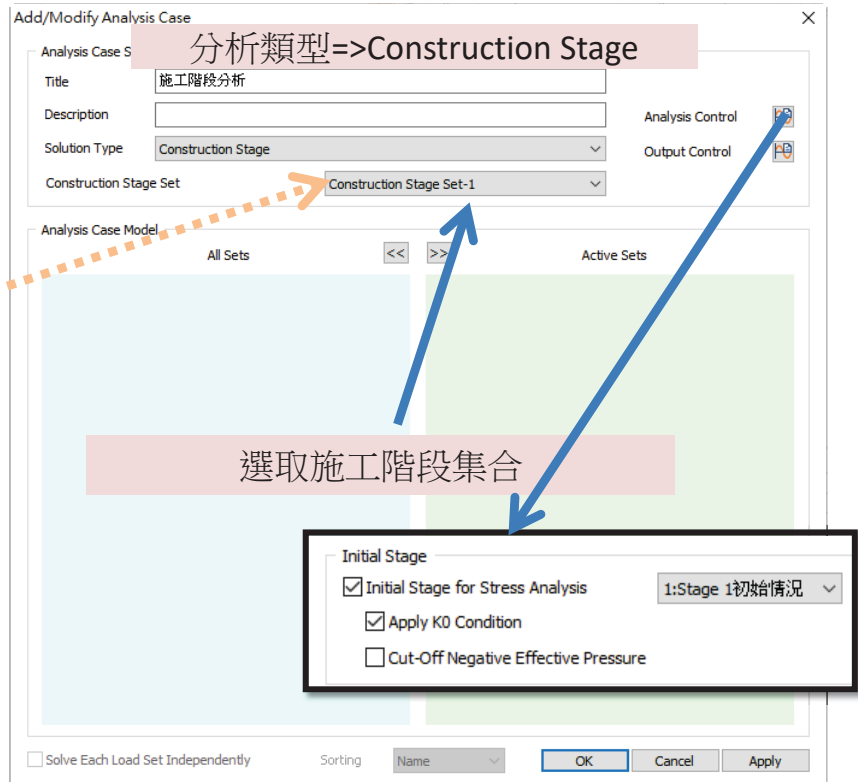
MIDAS



施工階段分析



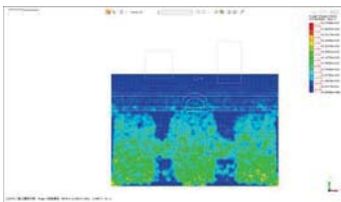
將施工階段定義指定
成分析工况



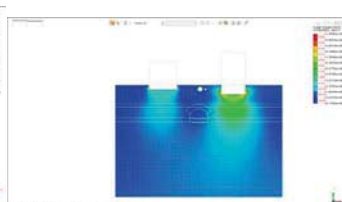
施工階段分析結果

Von-Mises Stress(N/m²)

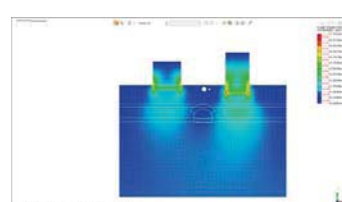
Stage1



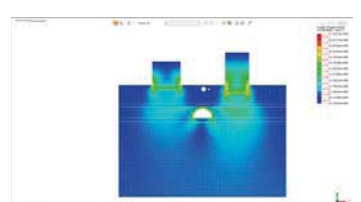
Stage2



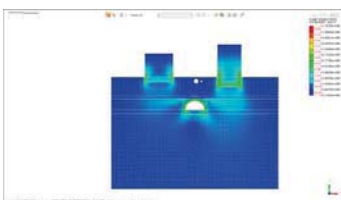
Stage3



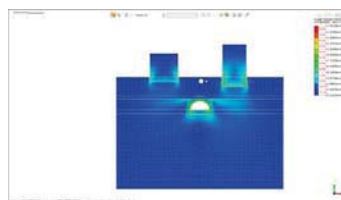
Stage4



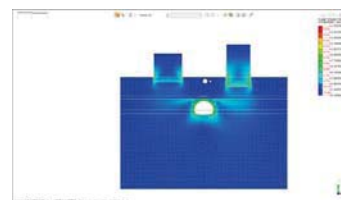
Stage5



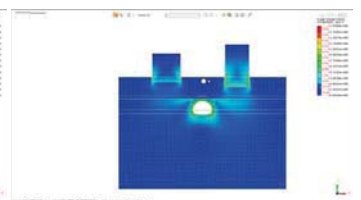
Stage6



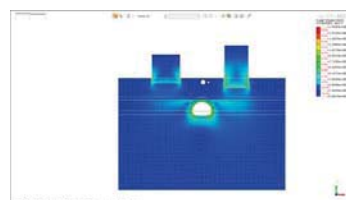
Stage7



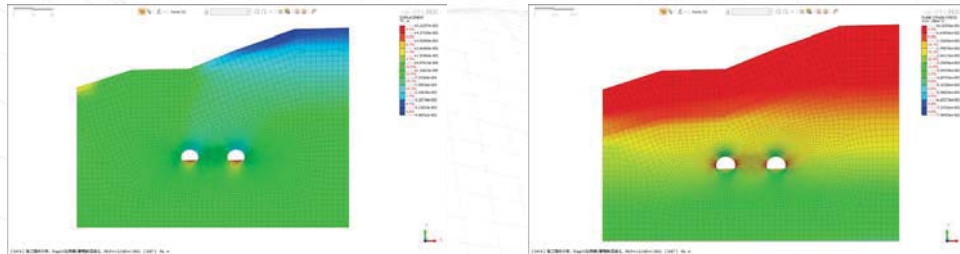
Stage8



Stage9



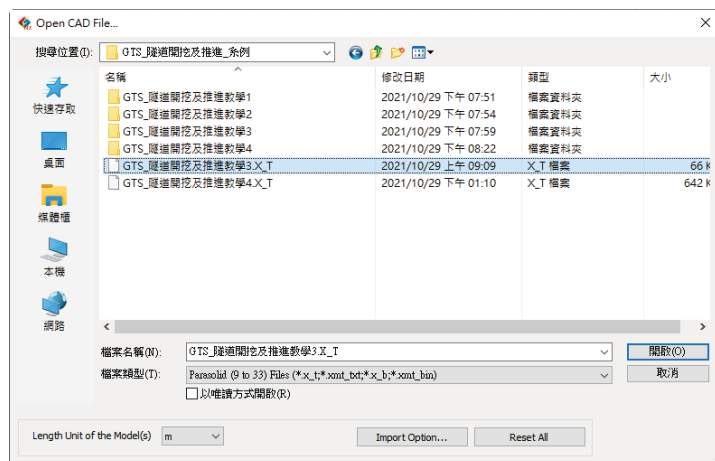
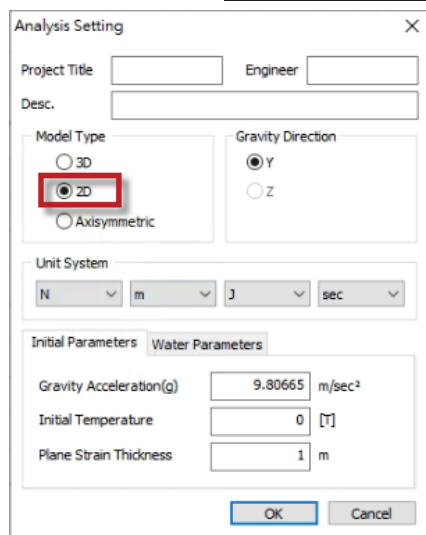
GTS_隧道開挖及推進教學3



台灣邁達斯

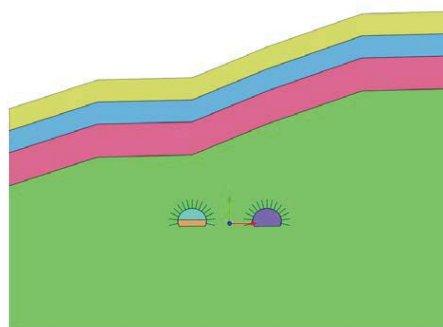
MIDAS

隧道系統2D-面特徵模型

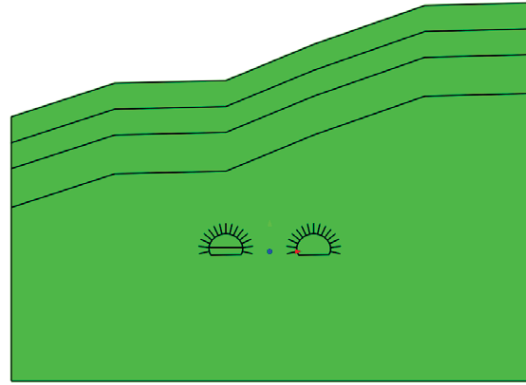
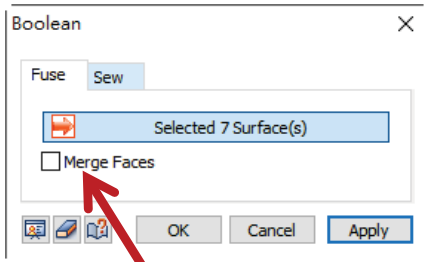


GTS NX支援常用3D格式

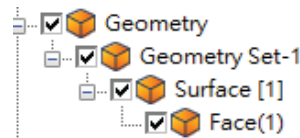
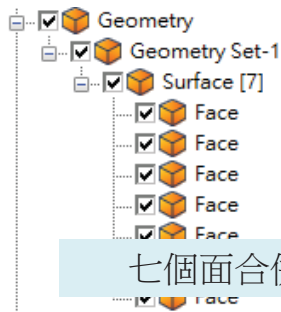
Parasolid (9 to 31) Files (*.x_t;*.xmt_bdt;*.x_b;*.xmt_bin)
ACIS (R1 - 2020 1.0) Files (*.sat;*.sab;*.asat;*.asab)
STEP (AP203, AP214, AP242) Files (*.stp;*.step)
IGES (Up to 5.3) Files (*.igs;*.iges)
Pro-E (16 - Creo 6.0) Files (*.prt;*.prt.*;*.asm;*.asm.*)
CATIA V4 (CATIA 4.1.9 - 4.2.4) Files (*.model;*.exp;*.session)
CATIA V5 (V5 R8 - V5-6R2020) Files (*.CATPart;*.CATProduct)
SolidWorks (98 - 2020) Files (*.sldprt;*.sldasm)
Unigraphics (11 - NX1899) Files (*.prt)
Inventor Part (V6 - V2020) Files (*.ipt)
Inventor Assembly (V11 - V2020) Files (*.iam)



合併面特徵模型



勾選Merge Faces,共線特徵不會保留

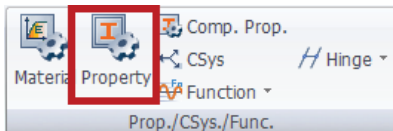


七個面合併成一個面,合併面目的是網格化時讓節點共點

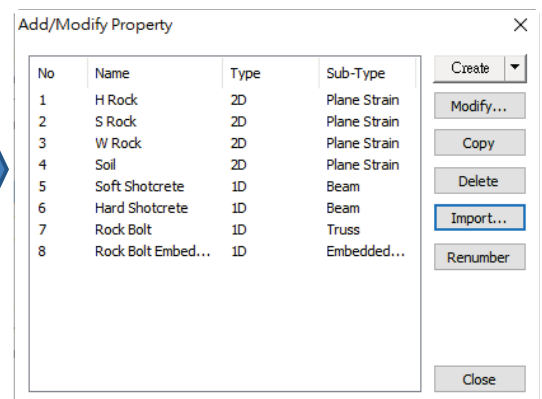
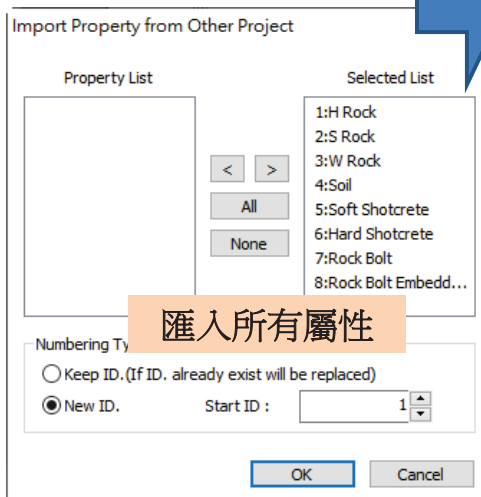
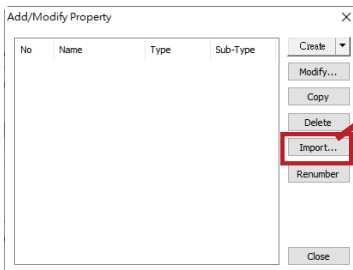


匯入材料&屬性

匯入屬性同時自動匯入材料性質



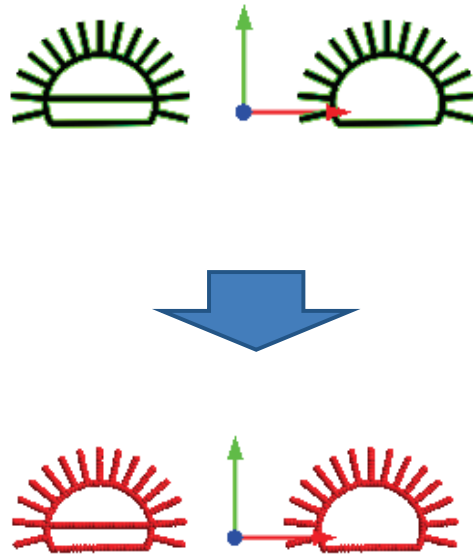
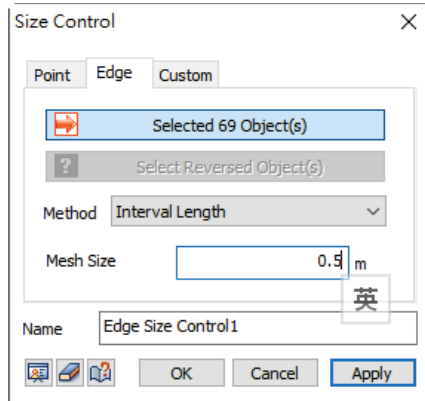
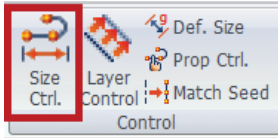
選擇檔案



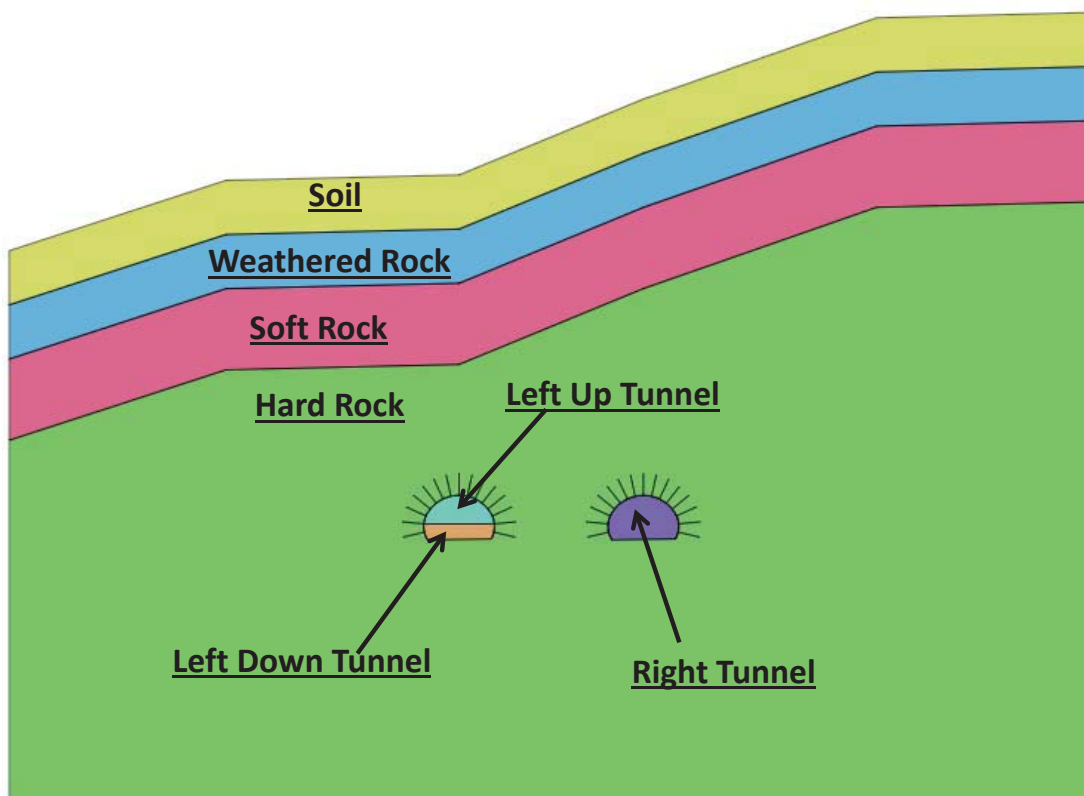
匯入所有屬性



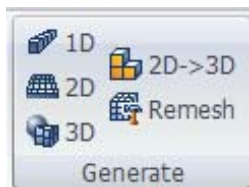
手動網格尺寸指定



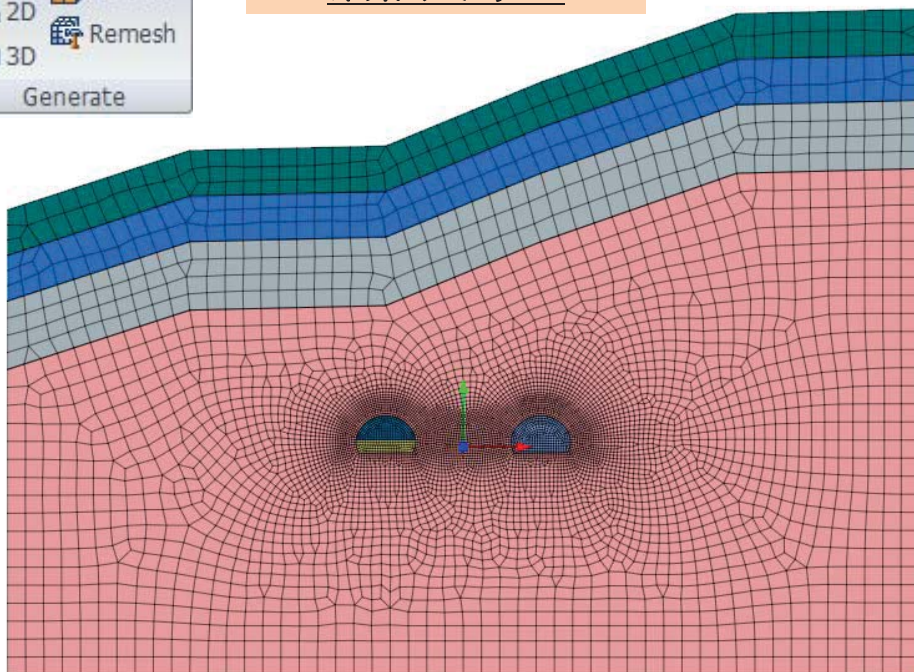
網格集名稱(面特徵)使用材料&屬性



2D網格生成



網格尺寸: 4

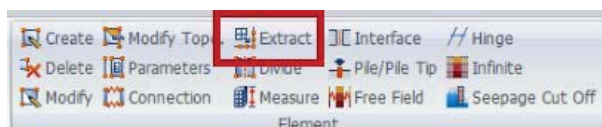


自訂網格集名稱

- ☒ Mesh
 - ☒ Default Mesh Set
 - ☒ Left Up Tunnel
 - ☒ Left Down Tunnel
 - ☒ Right Tunnel
 - ☒ Hard Rock
 - ☒ Soft Rock
 - ☒ Weathered Rock
 - ☒ Soil



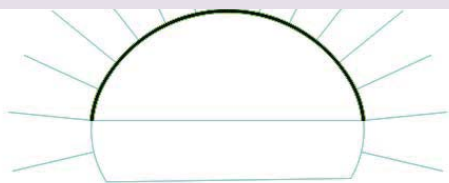
1D網格生成-噴射混凝土



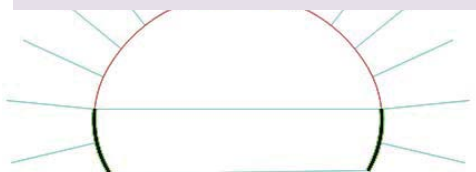
勾選Soft Shotcrete檢視截面

Property	
1D [4]	
☐ Rock Bolt (Truss) (Not Used)	7
☐ Hard Shotcrete (Beam) (Not Used)	6
☐ Rock Bolt Embedded Truss (Embedde...	8
☒ Soft Shotcrete (Beam)	5

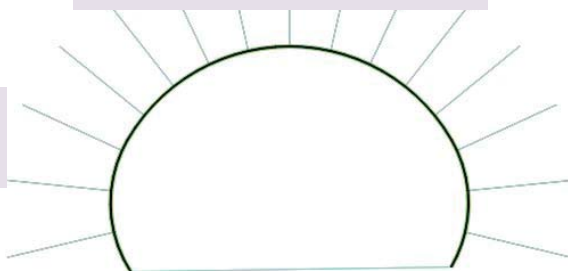
Mesh Set : Shotcrete Left Up
Property: Soft Shotrete



Mesh Set : Shotcrete Left Down
Property: Soft Shotrete



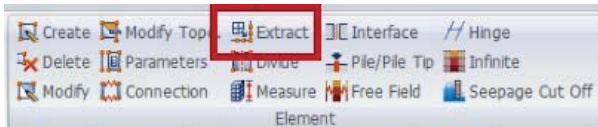
Mesh Set : Shotcrete Right
Property: Soft Shotrete



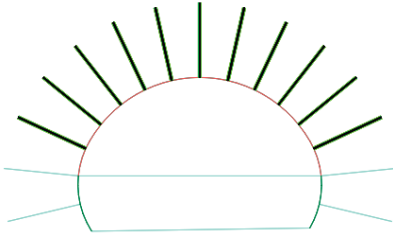
註:若截面顯示不正確可以調整元素方向



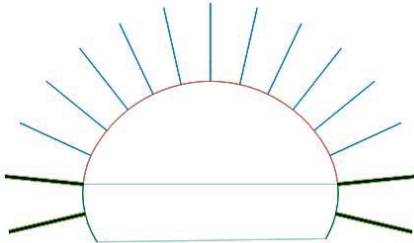
1D網格生成-岩石螺栓



Mesh Set : Rock Bolt Left Up
Property: Rock Bolt



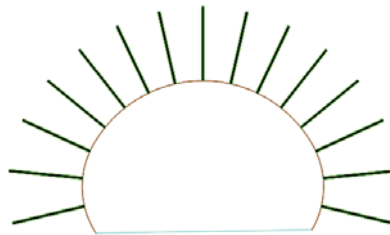
Mesh Set : Rock Bolt Left Down
Property: Rock Bolt



勾選Rock Bolt檢視截面

1D [4]		
☒	Rock Bolt (Truss)	7
☐	Hard Shotcrete (Beam) (Not Used)	6
☐	Rock Bolt Embedded Truss (Embedded Truss) (Not Use...	8
☐	Soft Shotcrete (Beam)	5

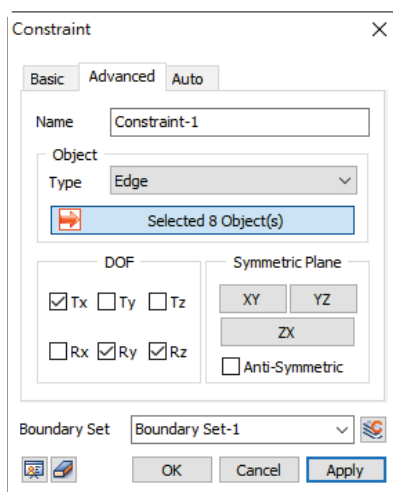
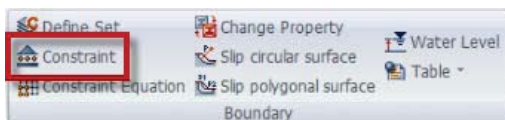
Mesh Set : Rock Bolt Right
Property: Rock Bolt



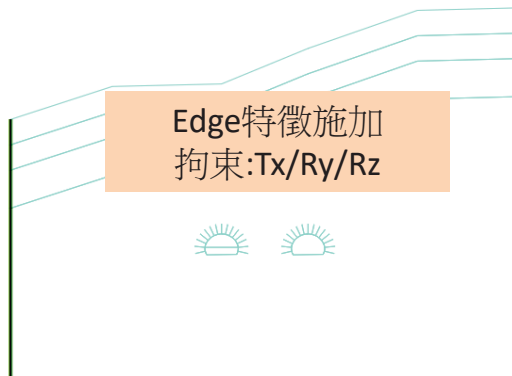
註:Truss Element要共點, Embedded Truss Element不需要共點。



拘束條件-1



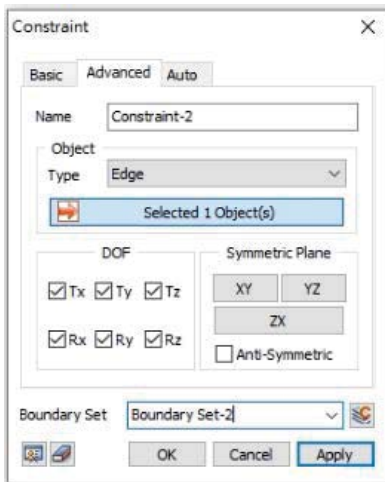
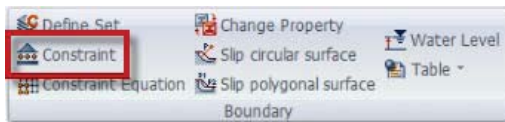
Edge特徵施加
拘束:Tx/Ry/Rz



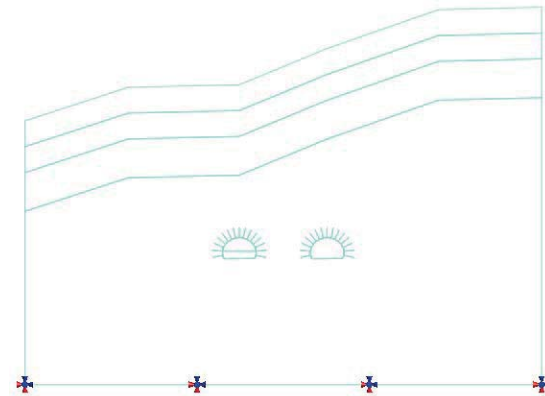
註:本題目採2D操作,可忽略Z方向自由度。



拘束條件-2



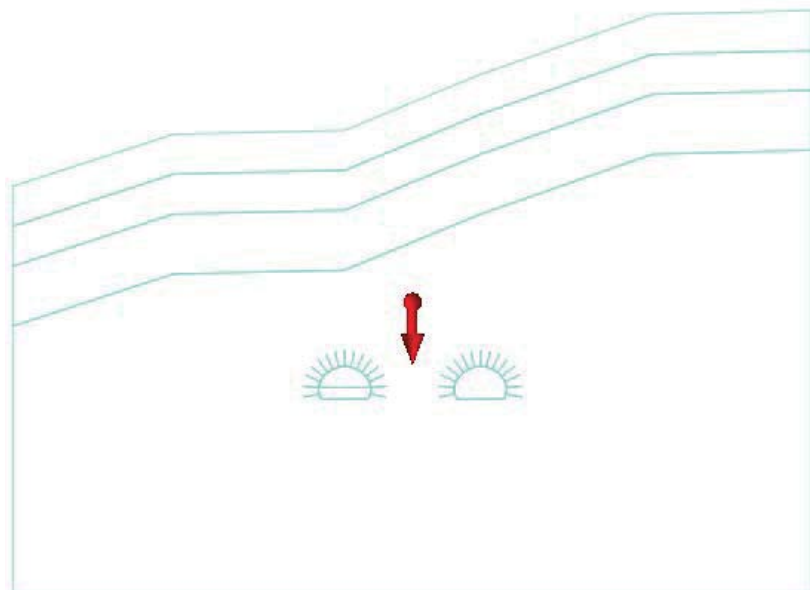
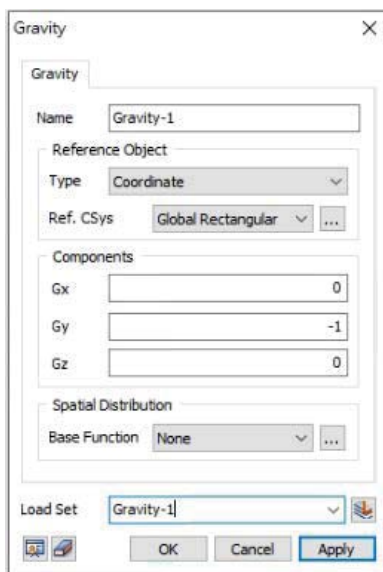
底部Edge特徵施加
拘束:Tx/Ty/Tz/Rx/Ry/Rz



註:本題目採2D操作,可忽略Z方向自由度。



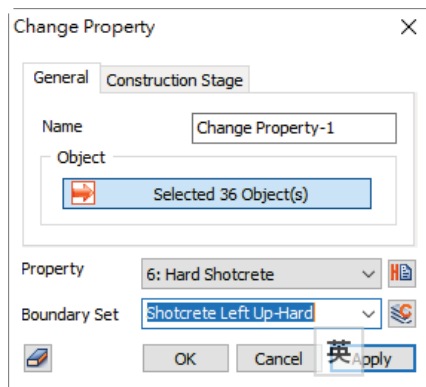
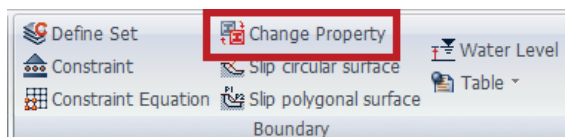
自重



噴射混凝土-1

施工階段分次施加噴射混凝土

利用Change Property調整噴射混凝土強度

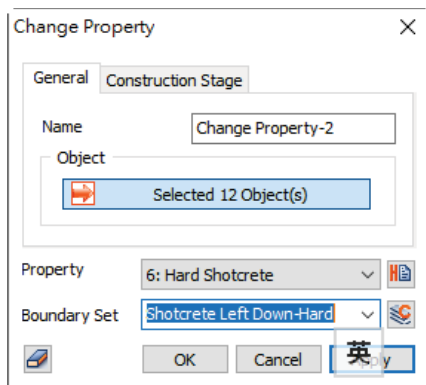


Mesh Set : Rock Bolt Left Up
Property: Soft Shotrete

BC SET: Shotcrete Left Up-Hard

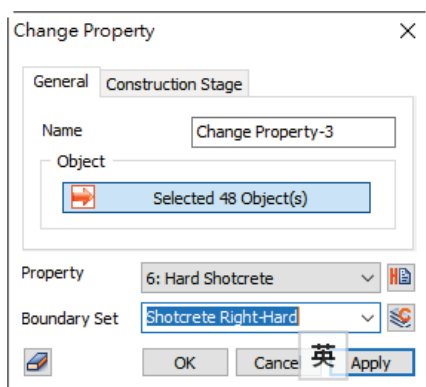


噴射混凝土-2



Mesh Set : Shotcrete Left Down
Property: Soft Shotrete

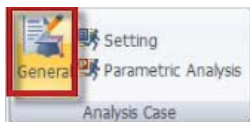
BC SET: Shotcrete Left Down-Hard



Mesh Set : Shotcrete Right
Property: Soft Shotrete

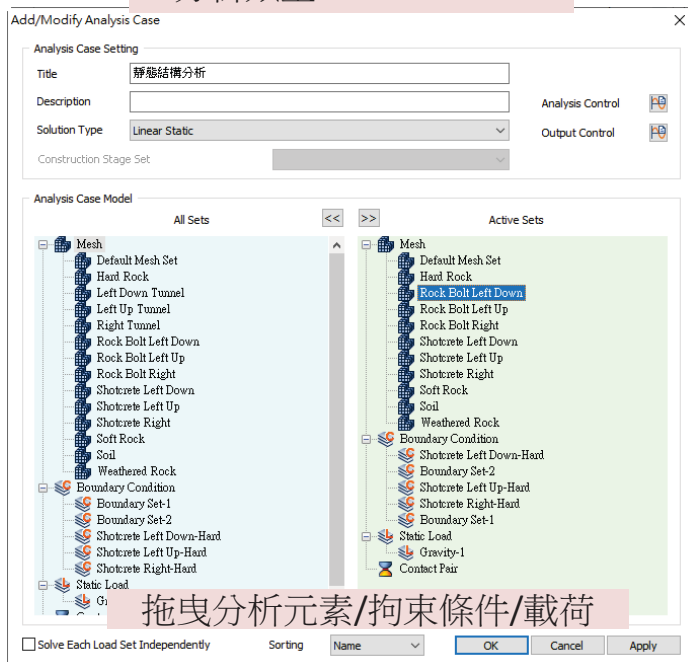
BC SET: Shotcrete Right-Hard



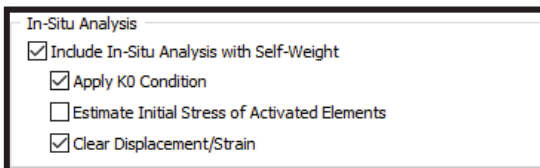
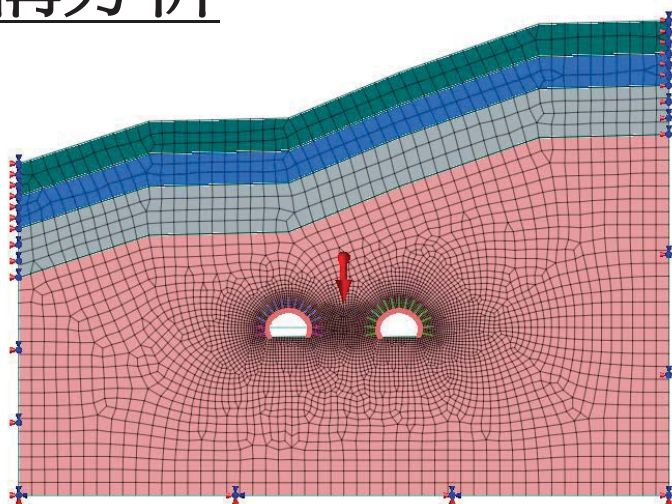


靜態結構分析

分析類型=>Linear Static

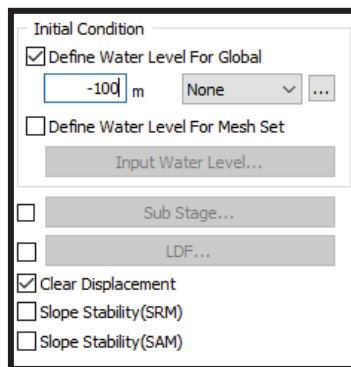
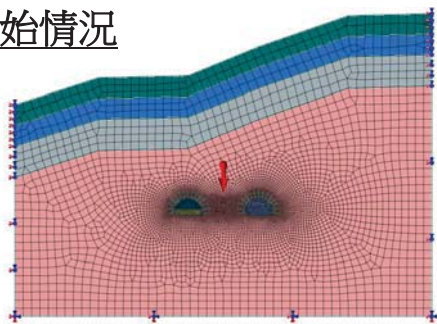


拖曳分析元素/拘束條件/載荷



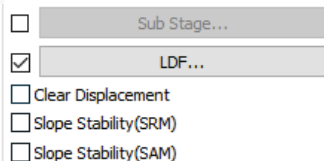
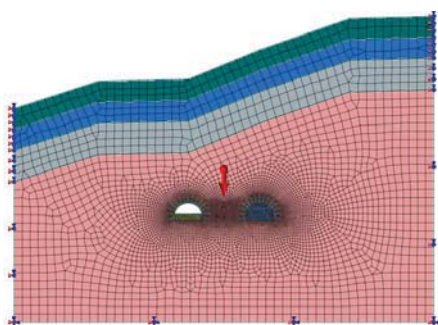
施工階段-1

Stage 1 初始情況



Stage 2 移除左側上半部

Load Distribution Factor 分配係數

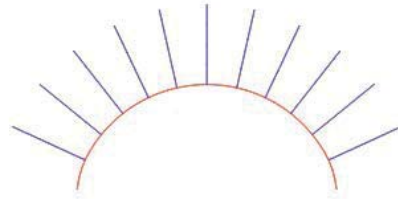
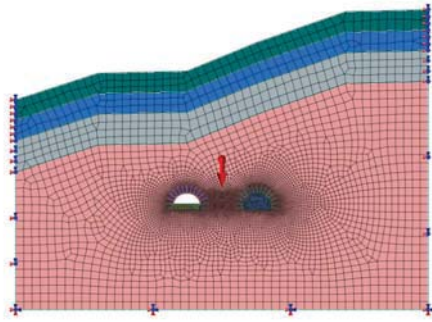


Load Distribution Factor		
	After Current Stage	Distribution Factor
	0	0.5
	1	0.25
	2	0.25
+		
Total		1

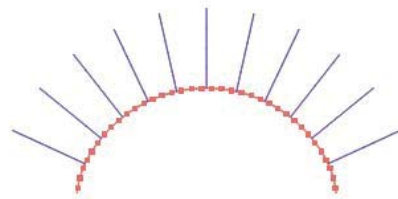
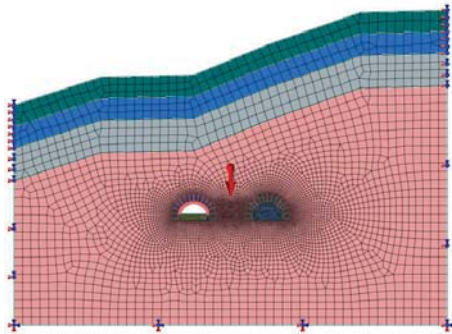


施工階段-2

Stage3左側上半部岩石螺栓&第1層噴射混凝土



Stage4左側上半部第2層噴射混凝土

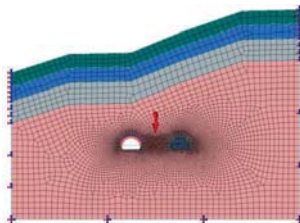


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施工階段-3

Stage5移除左側下半部

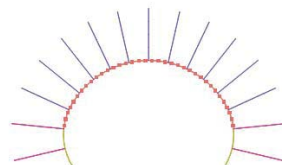
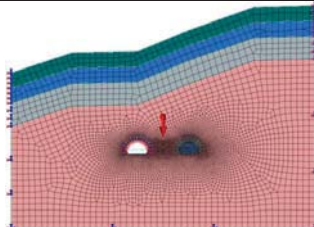


Load Distribution Factor分配係數

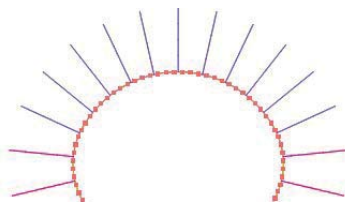
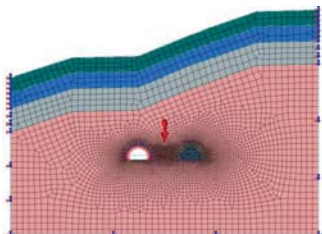
- ☐ Sub Stage...
- ☒ LDF...
- ☐ Clear Displacement
- ☐ Slope Stability(SRM)
- ☐ Slope Stability(SAM)

Load Distribution Factor			X	
	After Current Stage	Distribution Factor		
	0	0.5		
	1	0.25		
	2	0.25		
+				

Stage6左側下半部岩石螺栓&第1層噴射混凝土



Stage7左側下半部第2層噴射混凝土

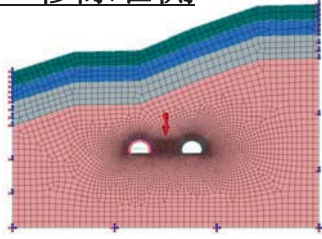


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施工階段-4

Stage8移除右側



Load Distribution Factor分配係數

☐ Sub Stage...

☒ LDF...

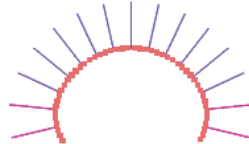
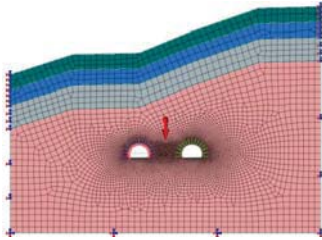
☐ Clear Displacement

☐ Slope Stability(SRM)

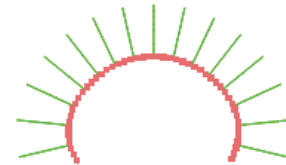
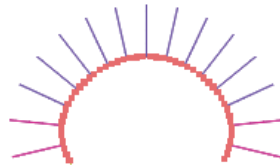
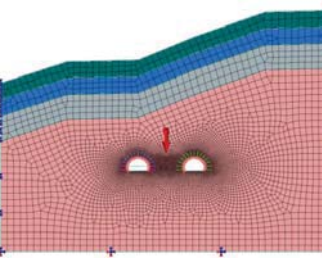
☐ Slope Stability(SAM)

Load Distribution Factor		
	After Current Stage	Distribution Factor
	0	0.5
	1	0.25
	2	0.25
+		

Stage9右側岩石螺栓&第1層噴射混凝土



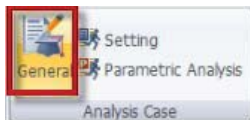
Stage10右側第2層噴射混凝土



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施工階段分析



將施工階段定義指定
成分析工况

- Stage Set
 - Construction Stage Set-1
 - Stage 1初始情况 [ID:1]
 - Stage 2移除左側上半部 [ID:2]
 - Stage 3左側上半部岩石螺栓蓋1層噴射混凝土 [ID:3...]
 - Stage 4左側上半部第2層噴射混凝土 [ID:4]
 - Stage 5移除左側下半部 [ID:5]
 - Stage 6左側下半部岩石螺栓蓋1層噴射混凝土 [ID:6...]
 - Stage 7左側下半部第2層噴射混凝土 [ID:7]
 - Stage 8移除右側 [ID:8]
 - Stage 9右側岩石螺栓蓋1層噴射混凝土 [ID:9]
 - Stage 10右側第2層噴射混凝土 [ID:10]

Add/Modify Analysis Case

分析類型=>Construction Stage

Title: 施工階段分析

Description:

Solution Type: Construction Stage

Construction Stage Set: Construction Stage Set-1

Analysis Case Model

All Sets: << >>

Active Sets:

選取施工階段集合

Initial Stage

☒ Initial Stage for Stress Analysis 1:Stage 1初始情况

☒ Apply K0 Condition

☐ Cut-Off Negative Effective Pressure

☐ Solve Each Load Set Independently

Sorting: Name

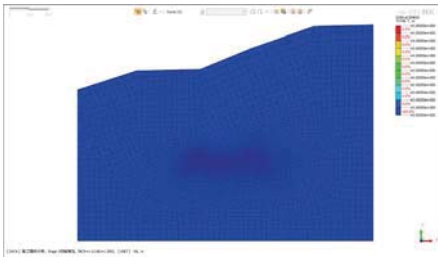
OK Cancel Apply

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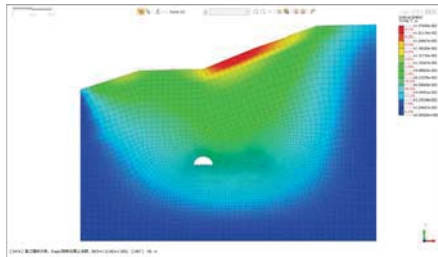


施工階段分析結果-Displacement(m)

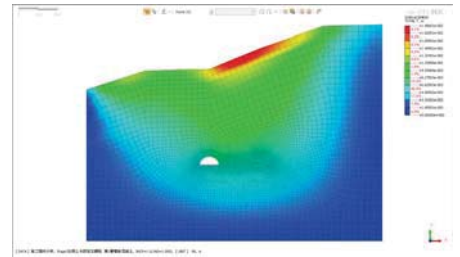
Stage1



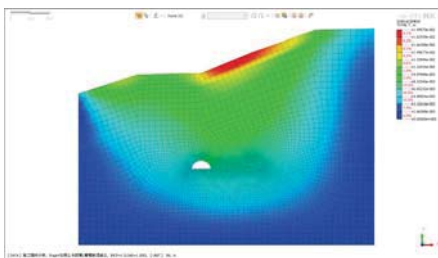
Stage2



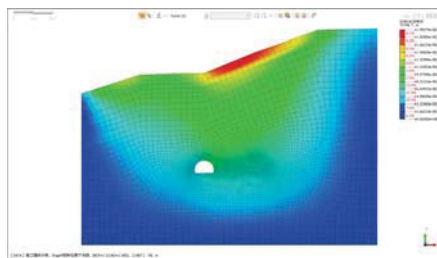
Stage3



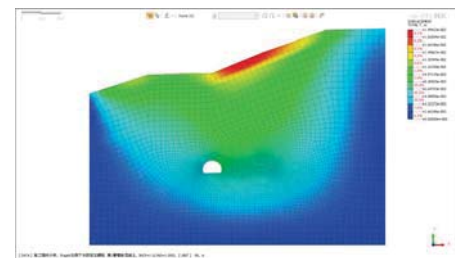
Stage4



Stage5



Stage6

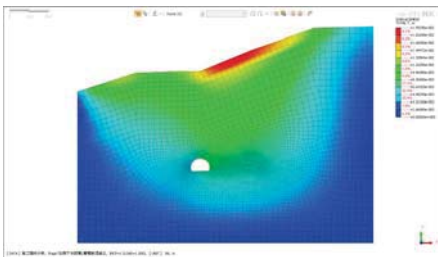


MIDAS

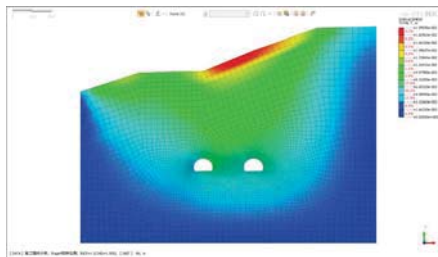


施工階段分析結果-Displacement(m)

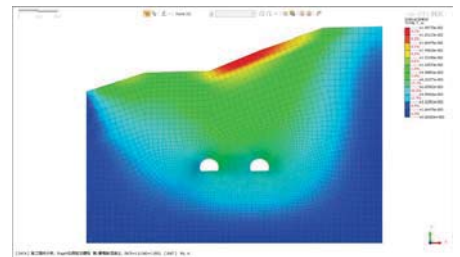
Stage7



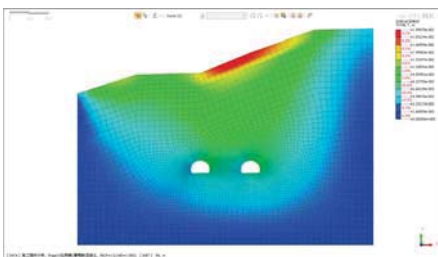
Stage8



Stage9



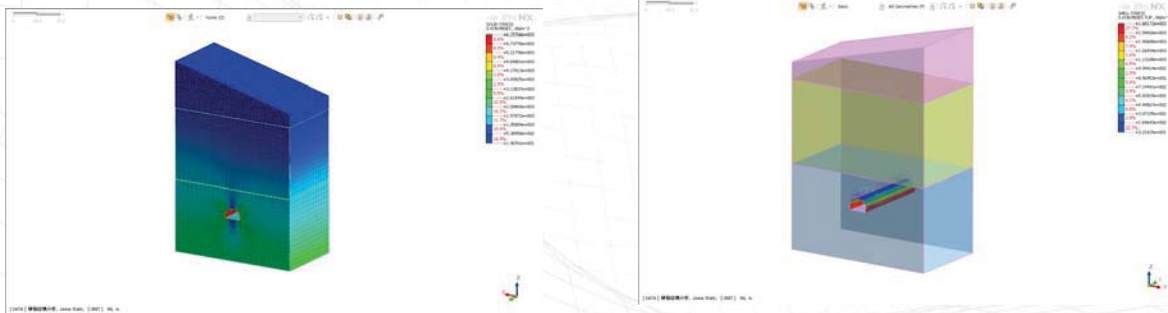
Stage10



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GTS_隧道開挖及推進教學4



台灣邁達斯

註:教學4和教學5是連續題

MIDAS

隧道系統3D-特徵模型

Analysis Setting

Project Title: Engineer:

Desc.:

Model Type: ☒ 3D ☐ 2D ☐ Axisymmetric

Gravity Direction: ☐ Y ☒ Z

Unit System: kN m J sec

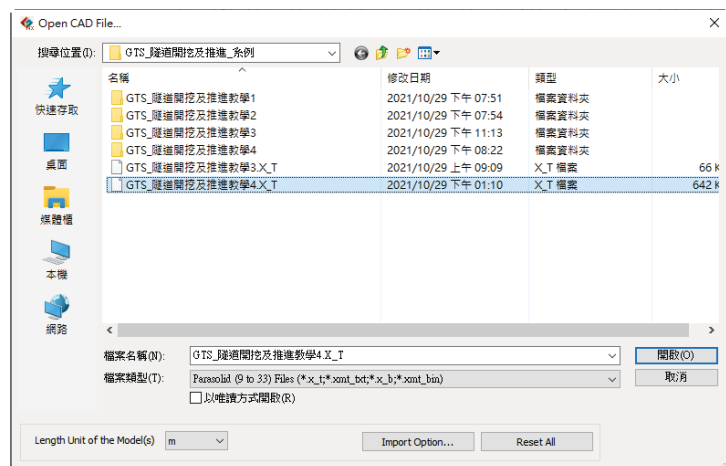
Initial Parameters Water Parameters

Gravity Acceleration(g): 9.80665 m/sec²

Initial Temperature: 0 [T]

Plane Strain Thickness: 1 m

OK Cancel



GTS NX支援常用3D格式

Parasolid (9 to 31) Files (*.x_t;*.xmt_bin;*.x_b;*.xmt_bin)

ACIS (R1 - 2020 1.0) Files (*.sat;*.sab;*.asat;*.asab)

STEP (AP203, AP214, AP242) Files (*.stp;*.step)

IGES (Up to 5.3) Files (*.igs;*.iges)

Pro-E (16 - Creo 6.0) Files (*.prt;*.prt.*;*.asm;*.asm.*)

CATIA V4 (CATIA 4.1.9 - 4.2.4) Files (*.model;*.exp;*.session)

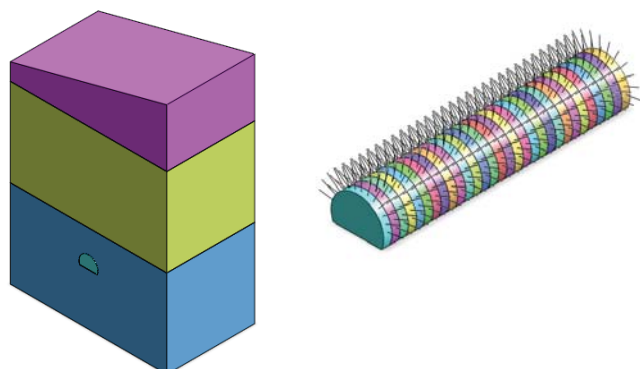
CATIA V5 (V5 R8 - V5-6R2020) Files (*.CATPart;*.CATProduct)

SolidWorks (98 - 2020) Files (*.sldprt;*.sldasm)

Unigraphics (11 - NX1899) Files (*.prt)

Inventor Part (V6 - V2020) Files (*.ipt)

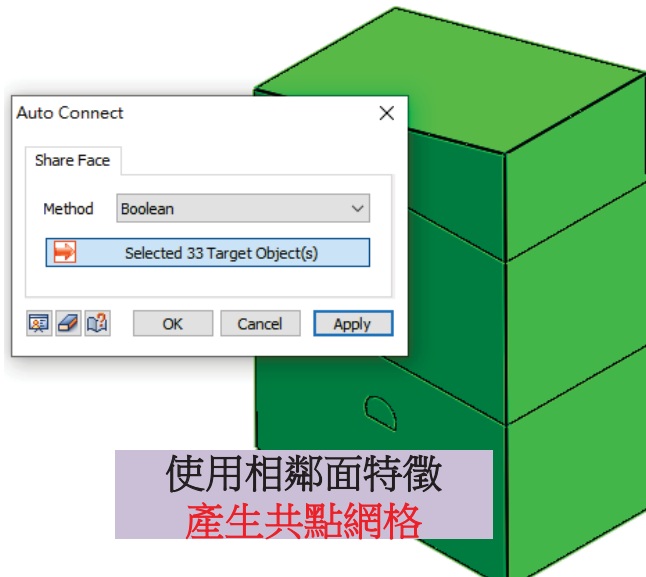
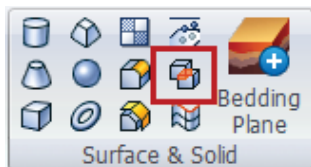
Inventor Assembly (V11 - V2020) Files (*.iam)



MIDAS

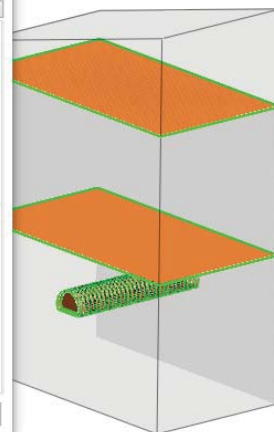
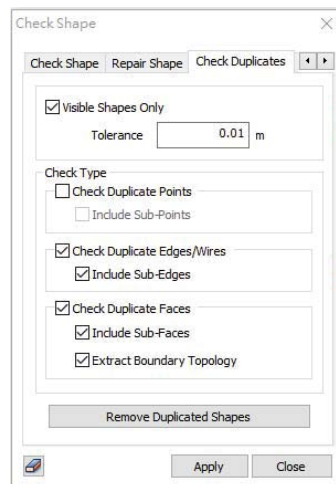
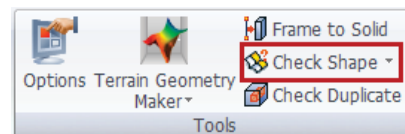
GTS NX

相鄰面特徵建立



使用相鄰面特徵
產生共點網格

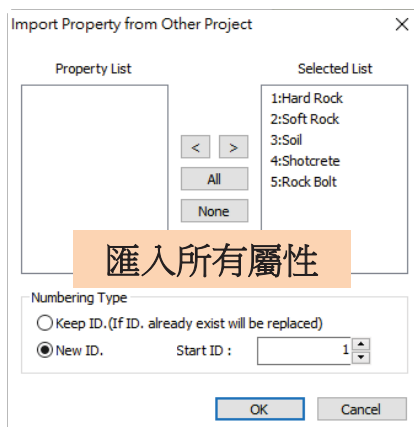
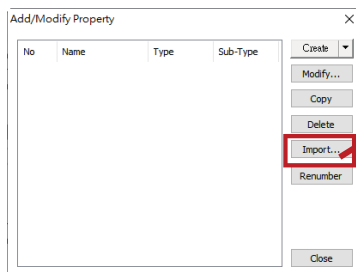
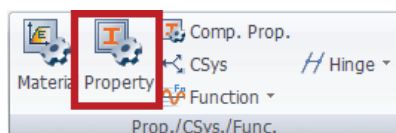
檢查幾何共面特徵



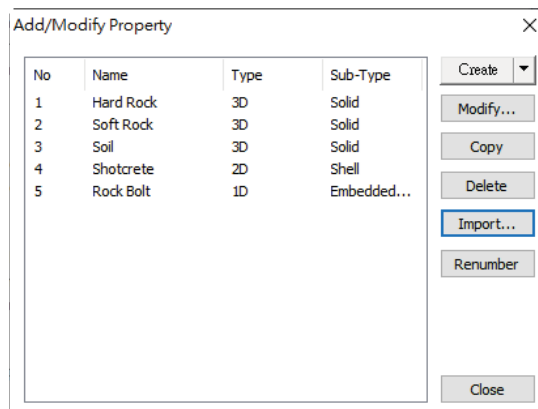
匯入材料&屬性

匯入屬性同時自動匯入材料性質

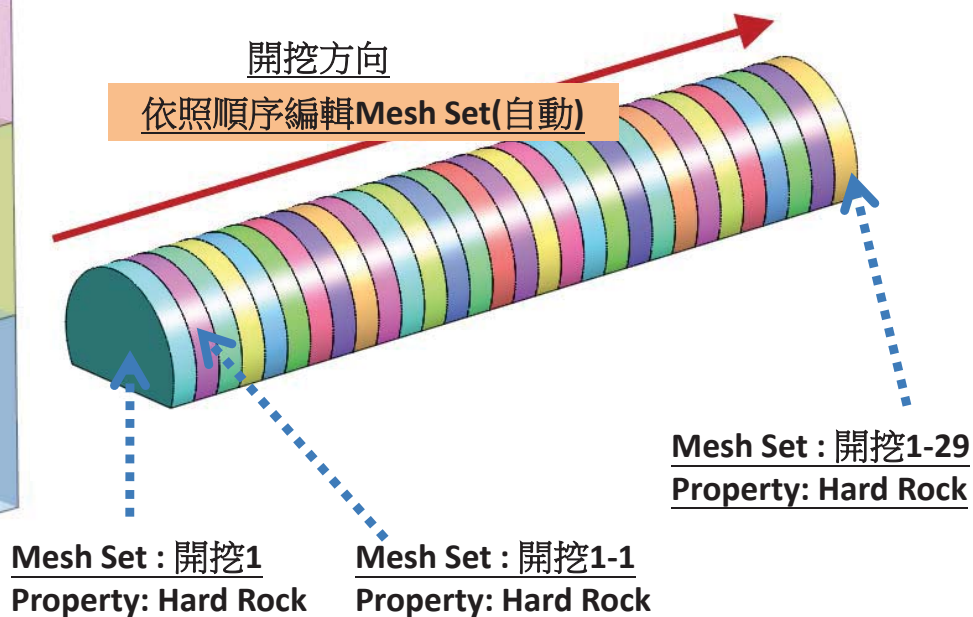
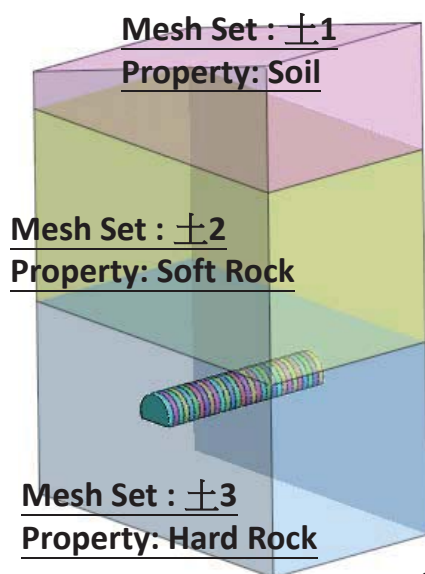
選擇檔案



匯入所有屬性

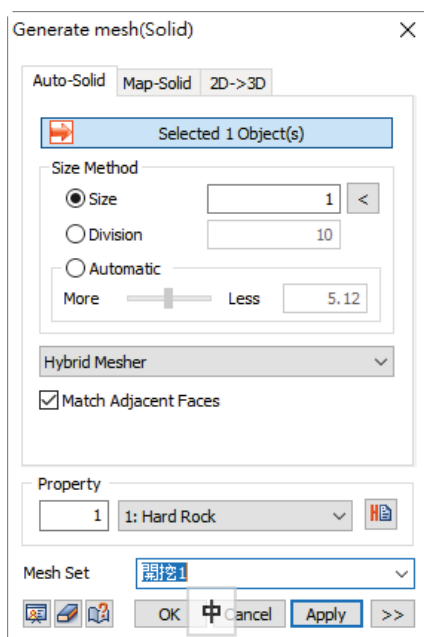


網格集名稱(實特徵)使用材料&屬性

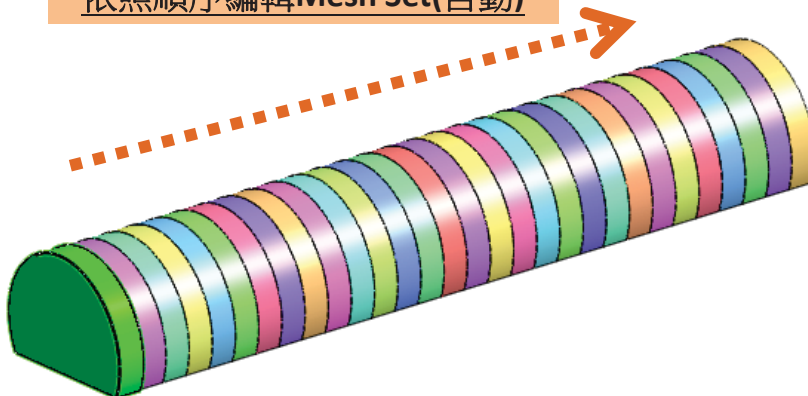


3D網格生成-開挖區域-1

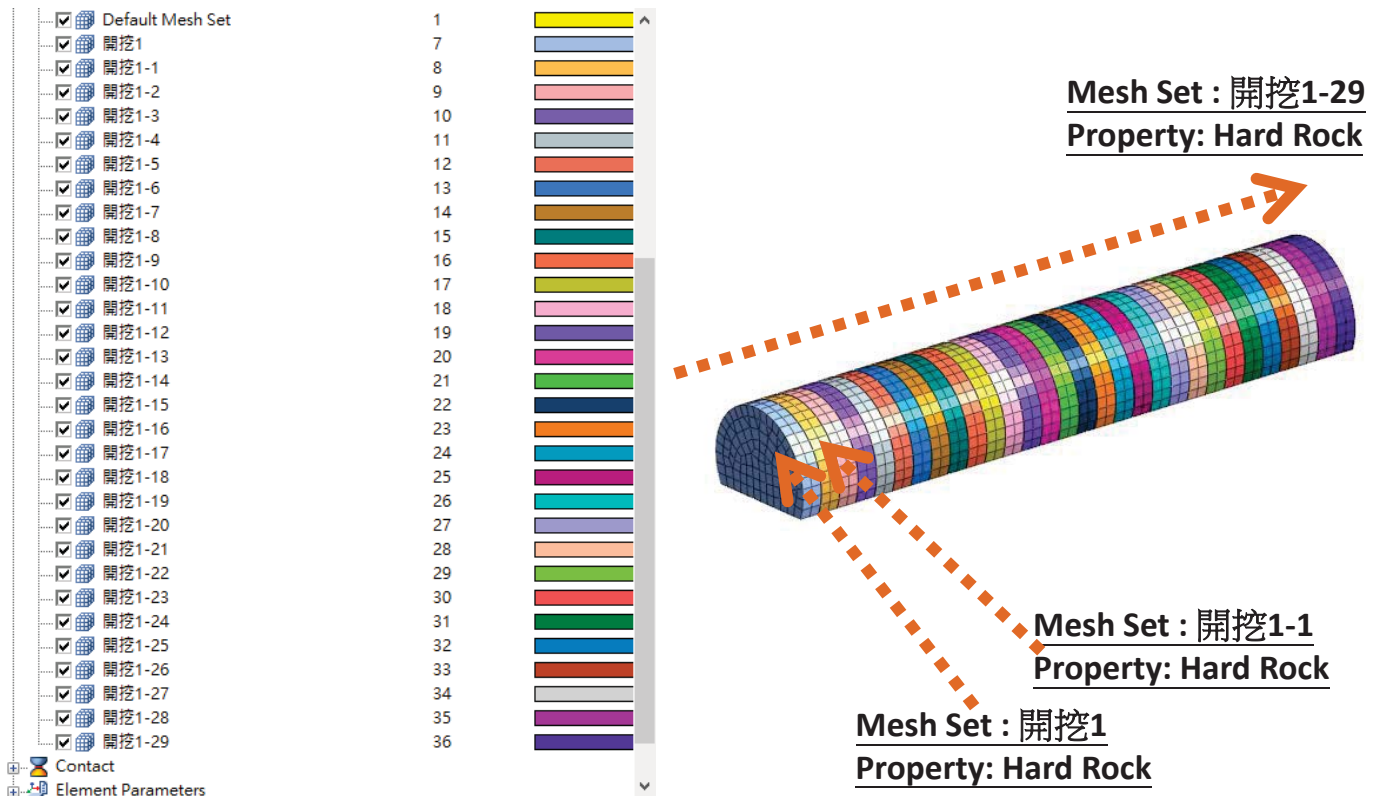
網格尺寸: 1



依照順序編輯Mesh Set(自動)



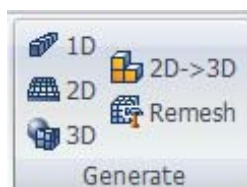
3D網格生成-開挖區域-2



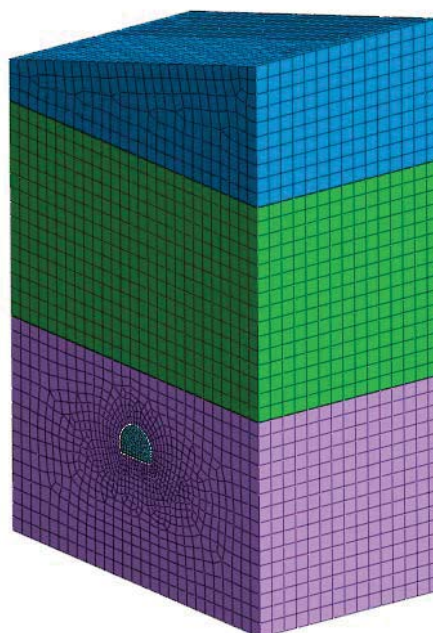
MIDAS



3D網格生成-地層區域



網格尺寸: 4



Mesh Set : ± 1
Property: Soil

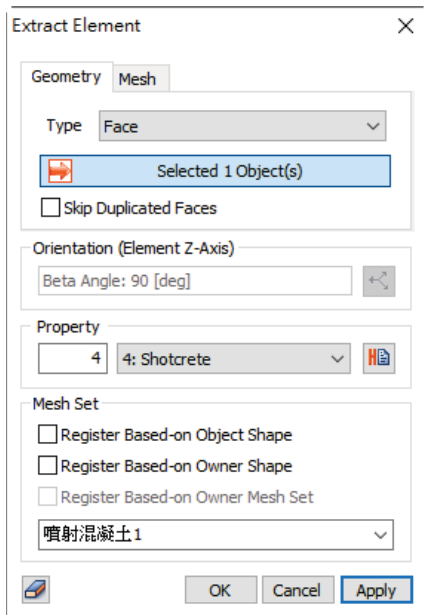
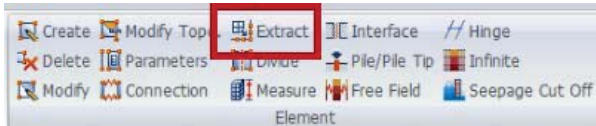
Mesh Set : ± 2
Property: Soft Rock

Mesh Set : ± 3
Property: Hard Rock

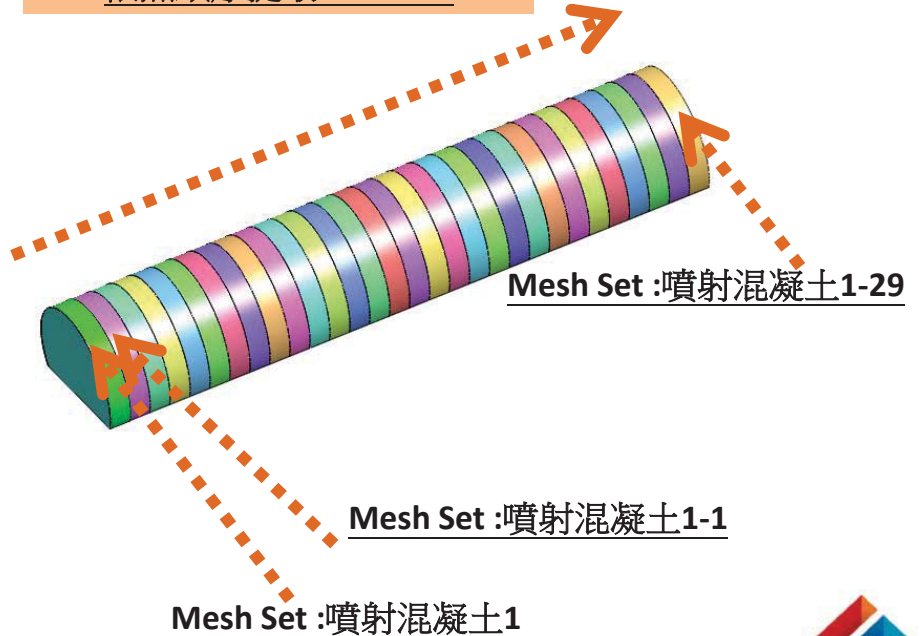
MIDAS



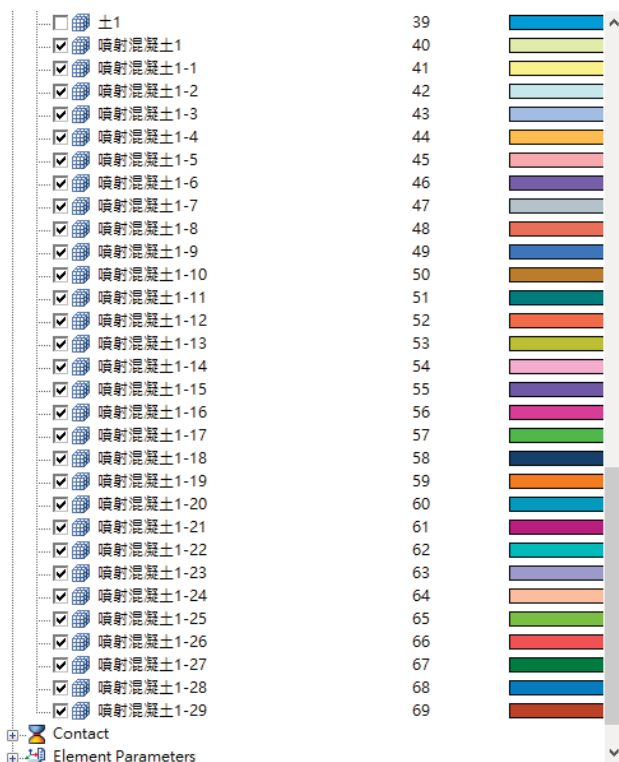
2D網格生成-噴射混凝土-1



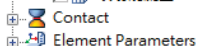
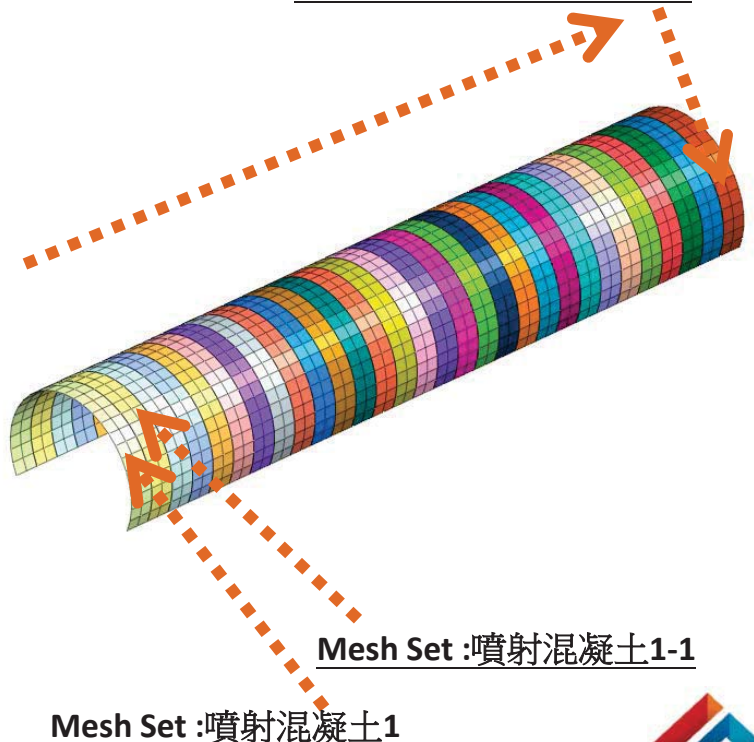
依照順序提取Mesh Set



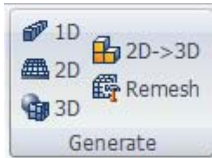
2D網格生成-噴射混凝土-2



Mesh Set : 噴射混凝土1-29

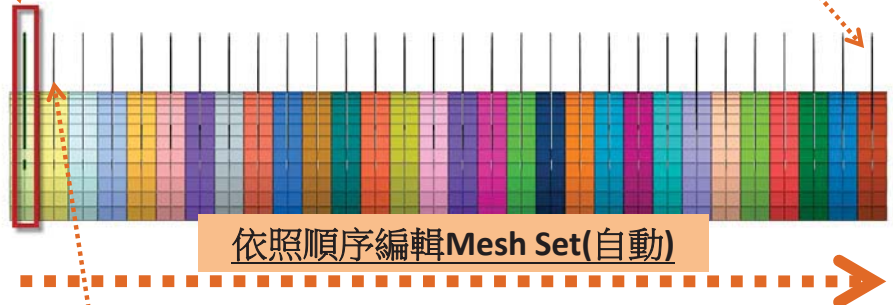
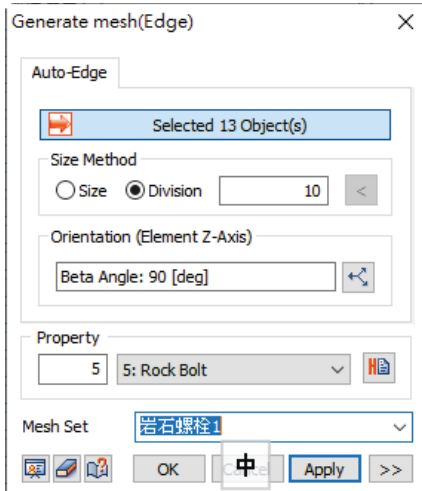


1D網格生成-岩石螺栓



Mesh Set :岩石螺栓1

Mesh Set :岩石螺栓1-29



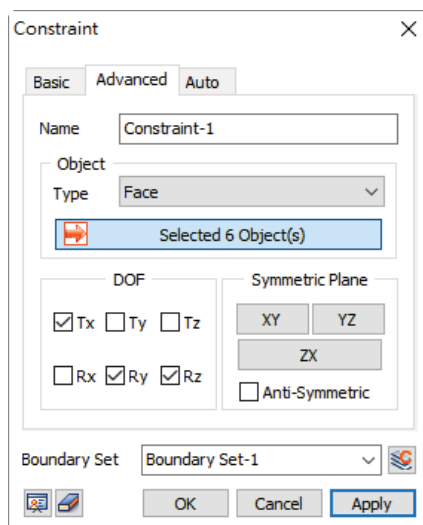
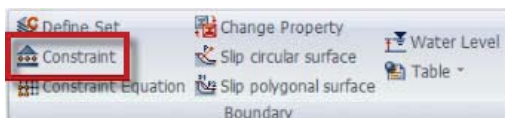
Mesh Set :岩石螺栓1-1



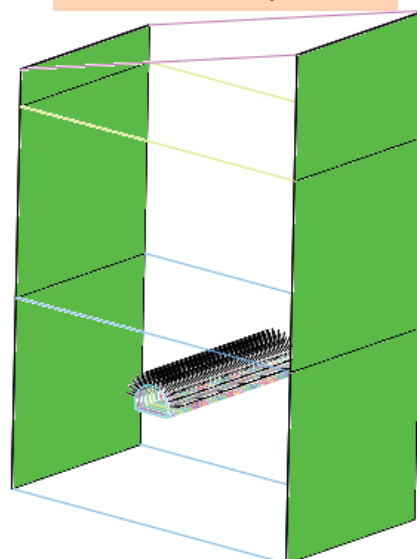
註:Truss Element要共點, Embedded Truss Element不需要共點。



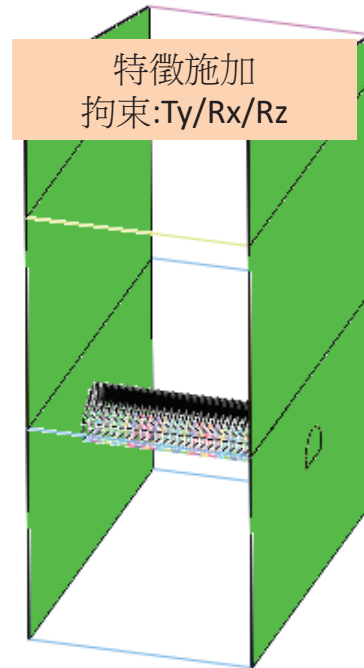
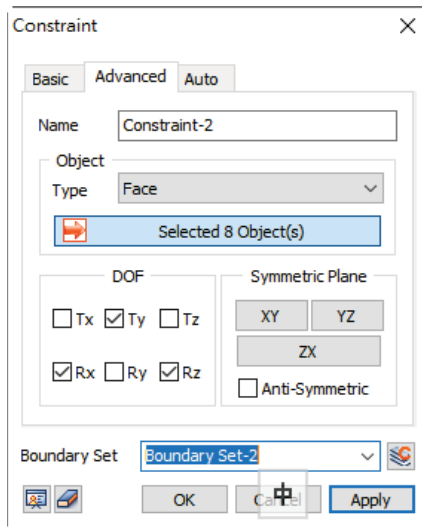
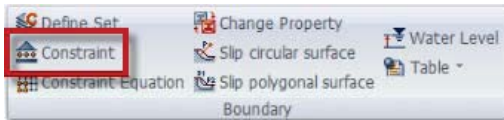
拘束條件-1



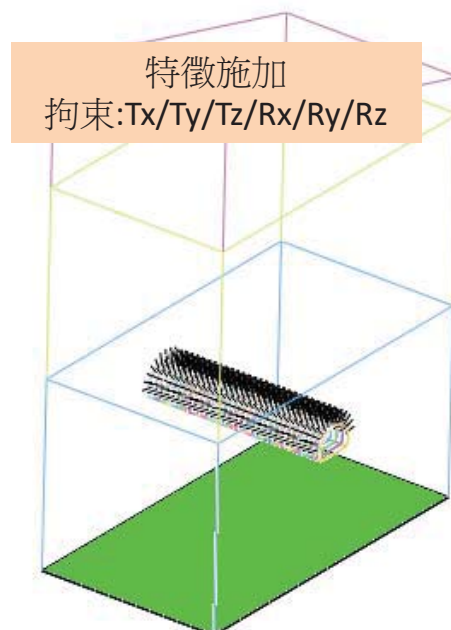
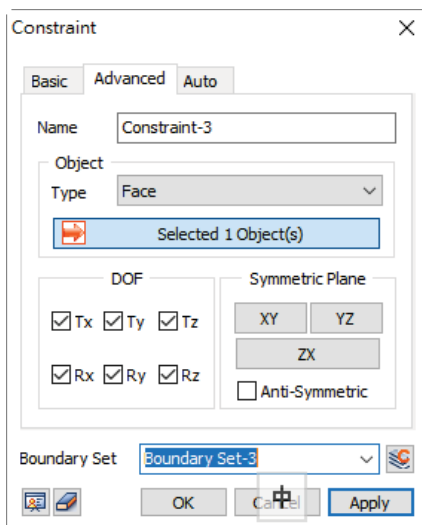
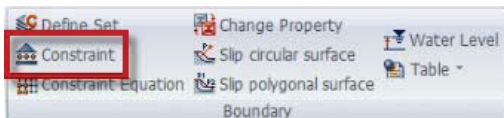
特徵施加
拘束:Tx/Ry/Rz



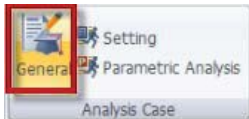
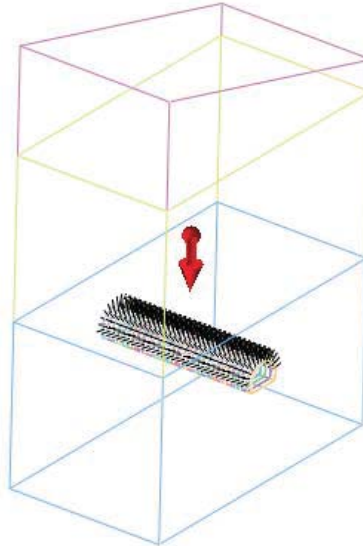
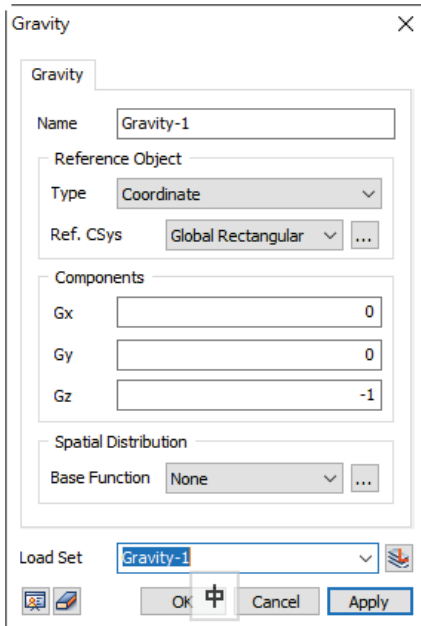
拘束條件-2



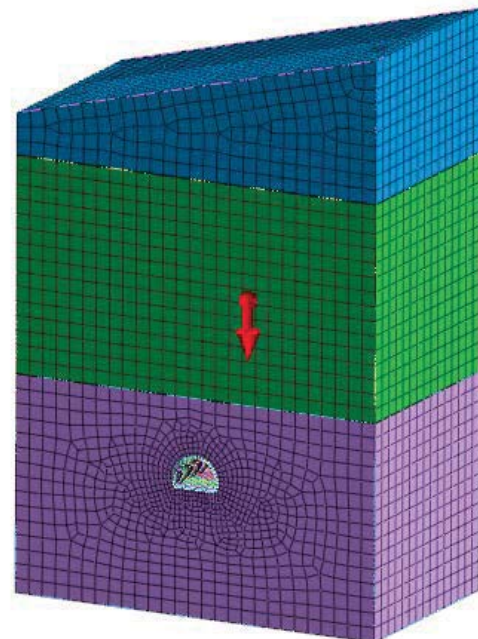
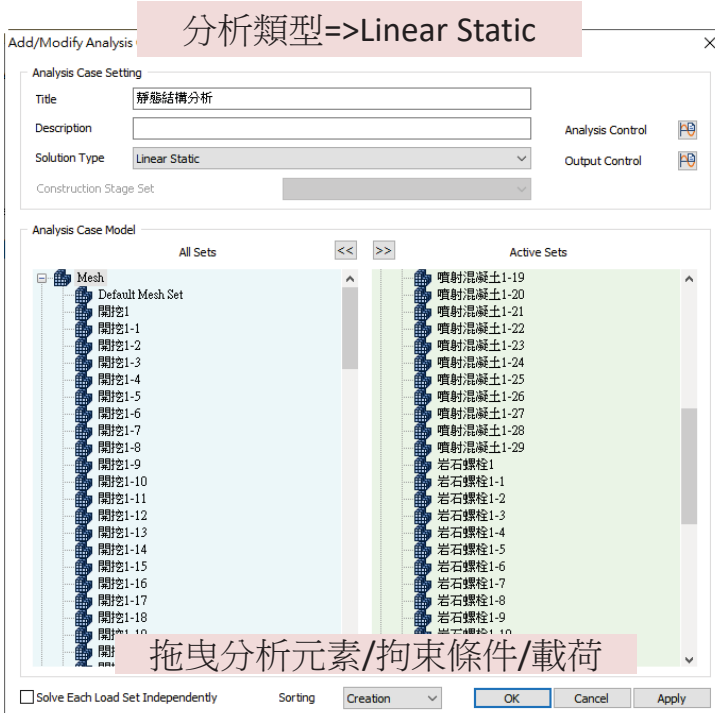
拘束條件-3



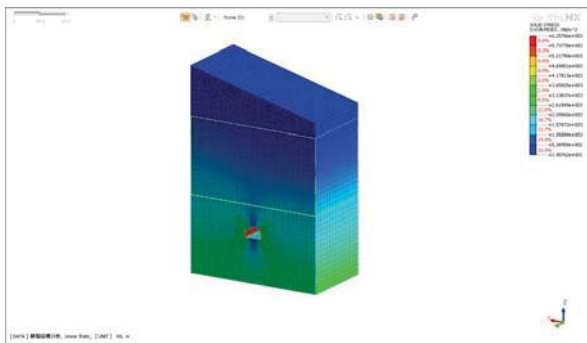
自重



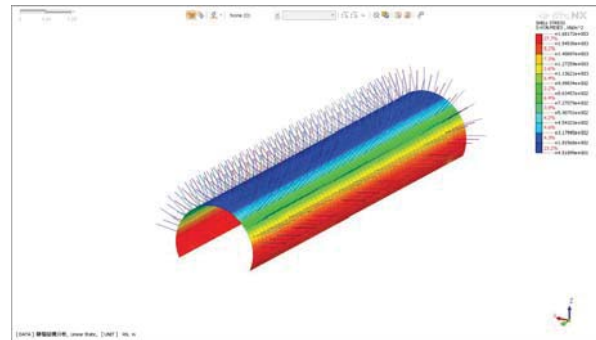
靜態結構分析



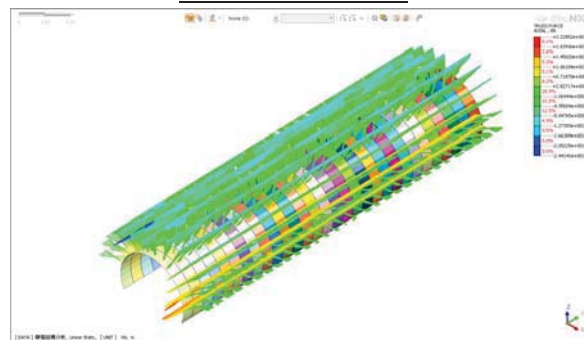
Solid Stress Von-Mises (KN/m²)



Shell Stress Von-Mises (KN/m²)

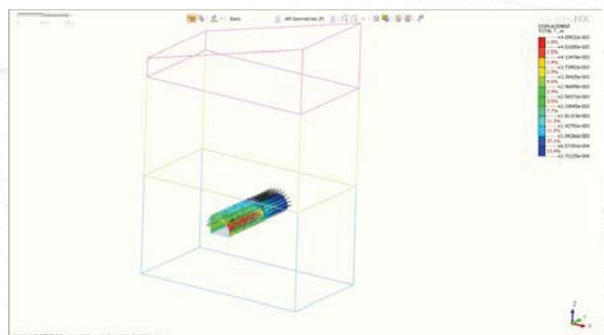
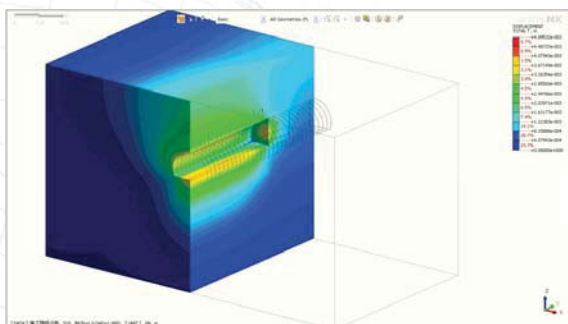


Truss Force(KN)



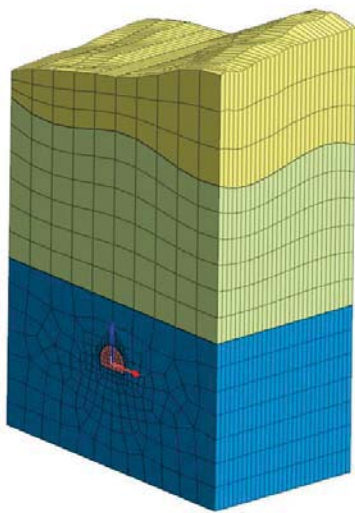
GTS NX
Geo-Technical analysis System New eXperience

GTS_隧道開挖及推進教學5

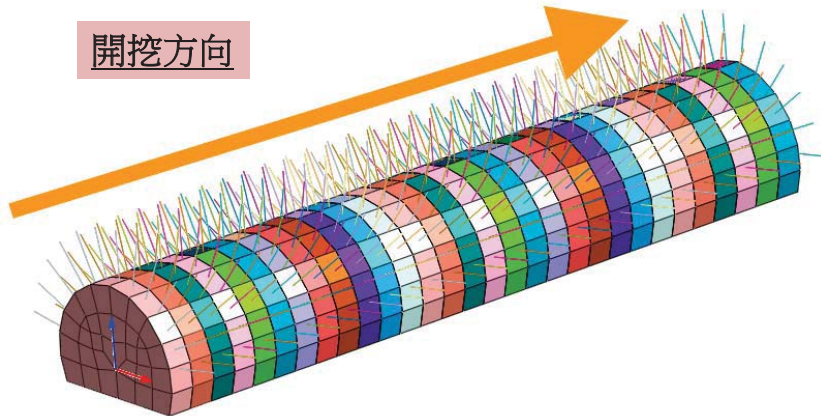


台灣邁達斯

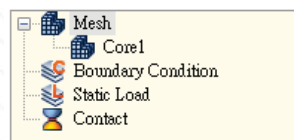
註:教學4和教學5是連續題



開挖方向



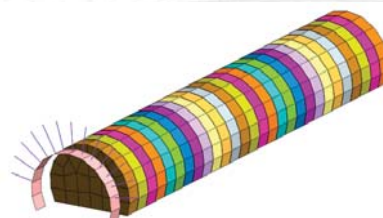
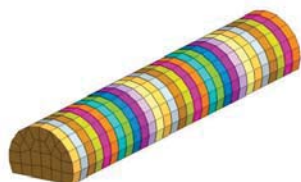
Deactivated Data



Activated Data

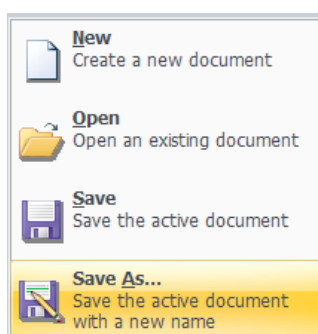
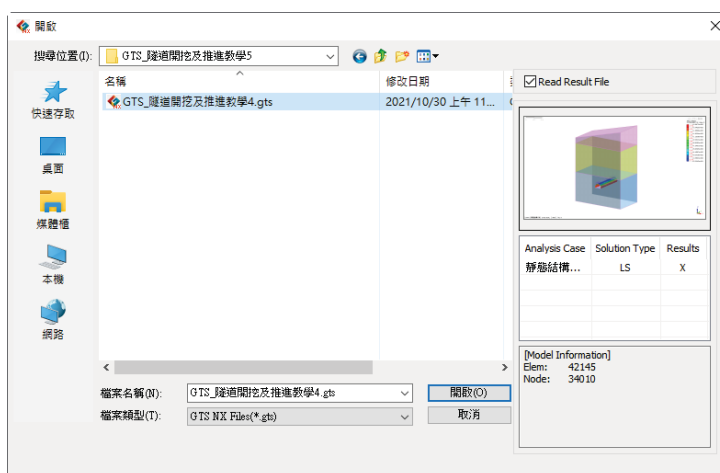
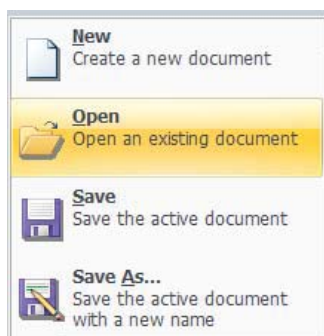


Deactivated Data



MIDAS

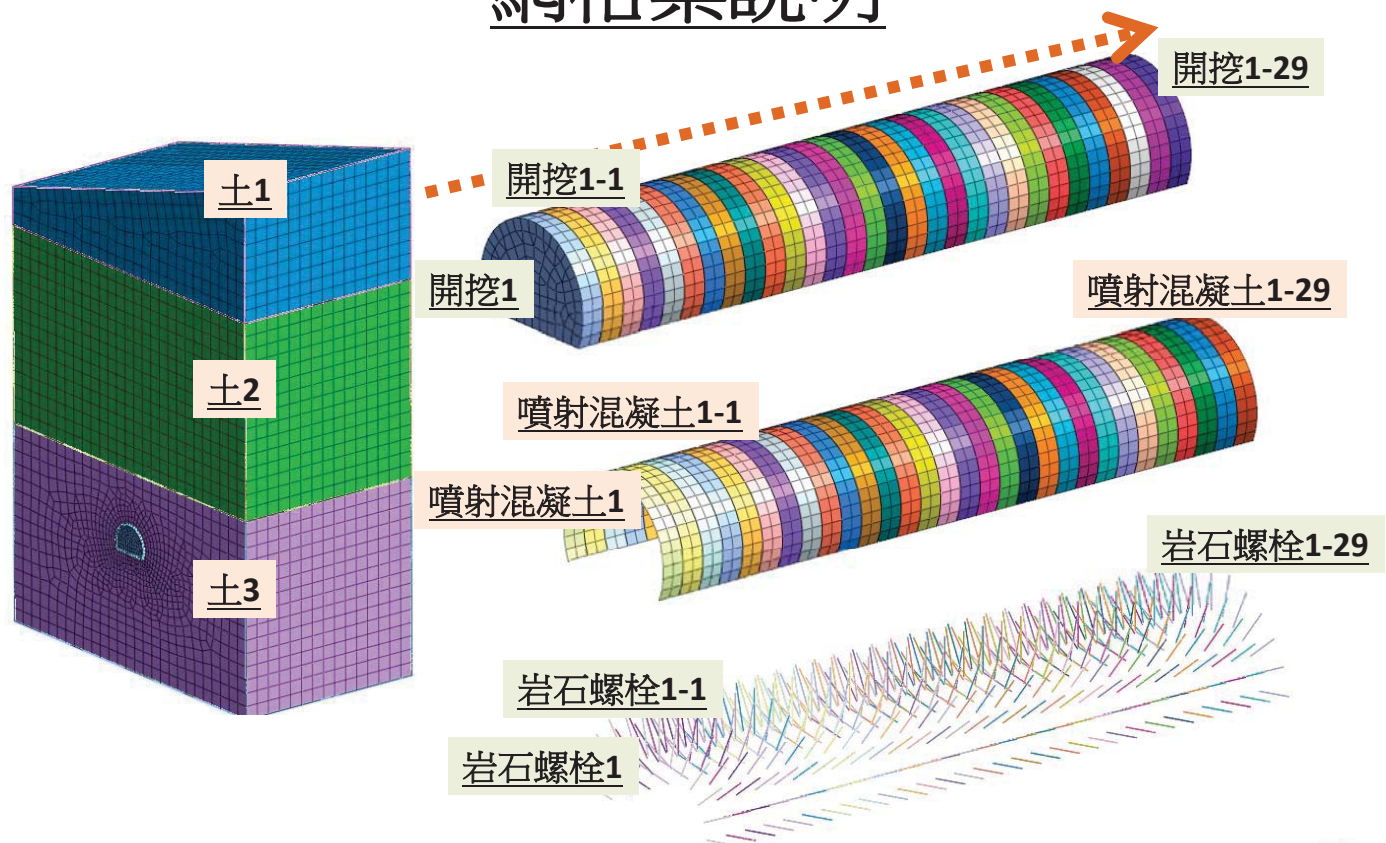
開啓教學4範例



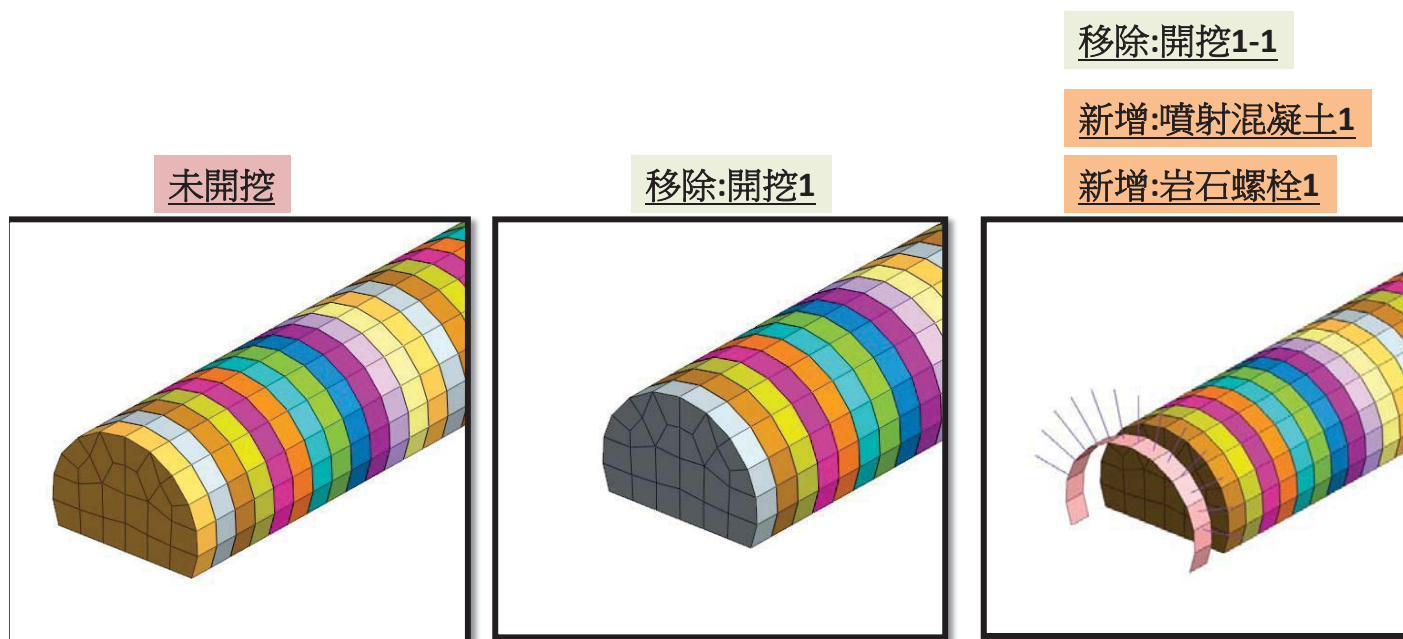
MIDAS



網格集說明



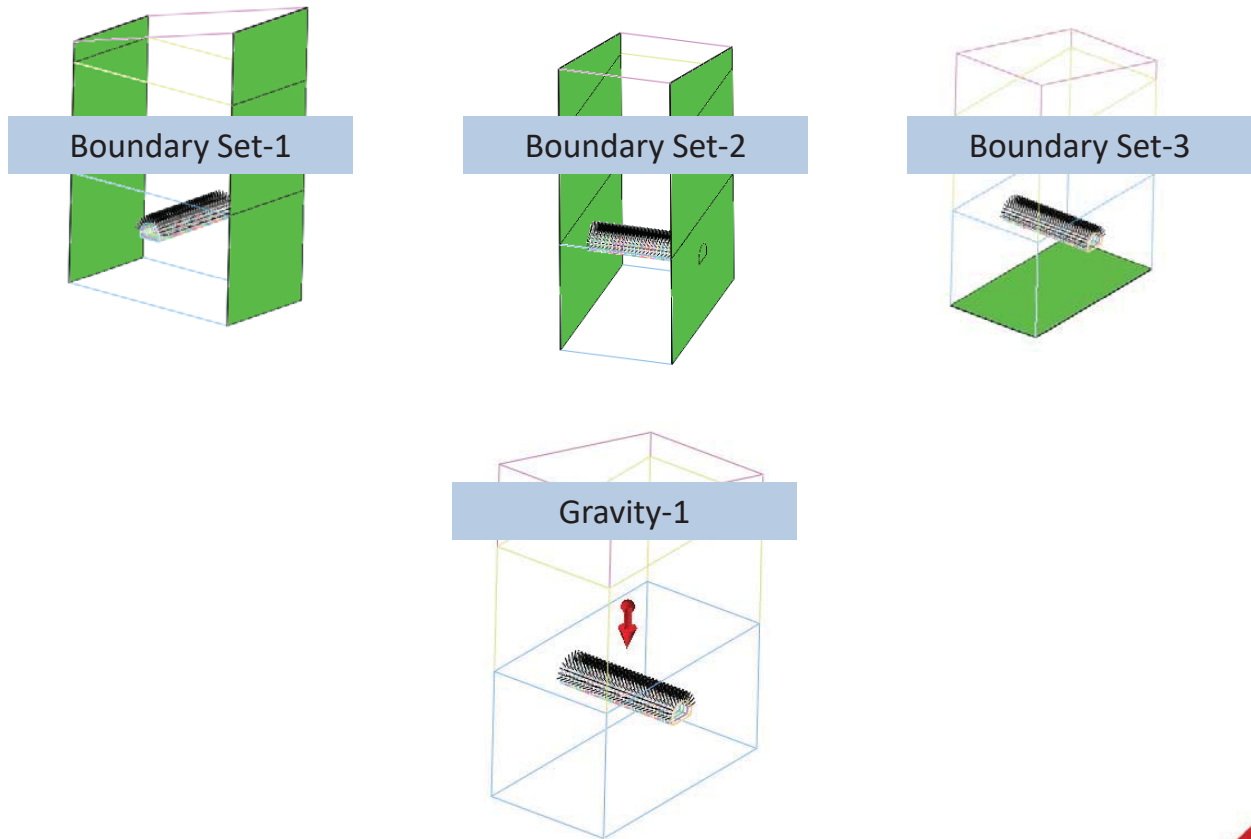
開挖施工階段規劃說明



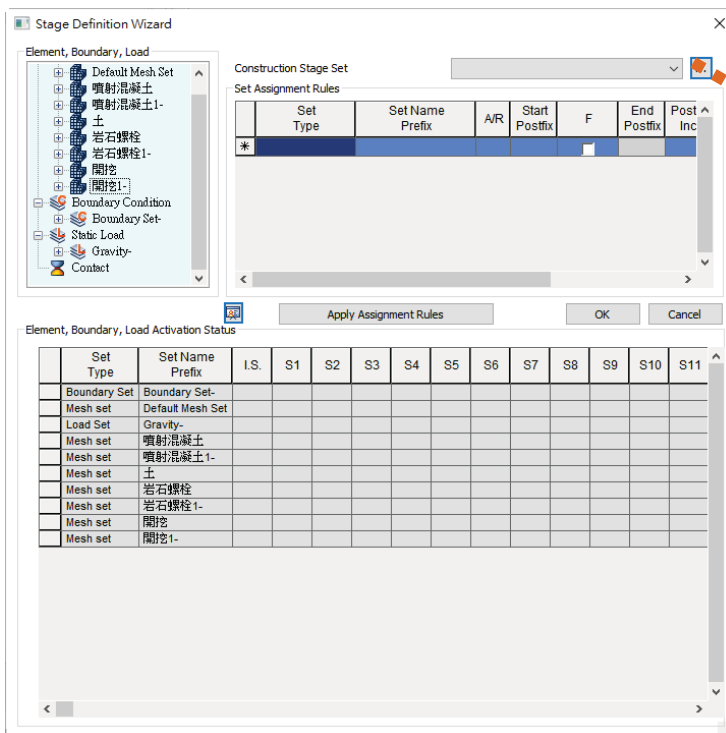
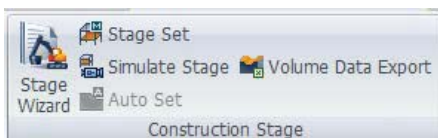
註:其它區域開挖採相同方式規劃



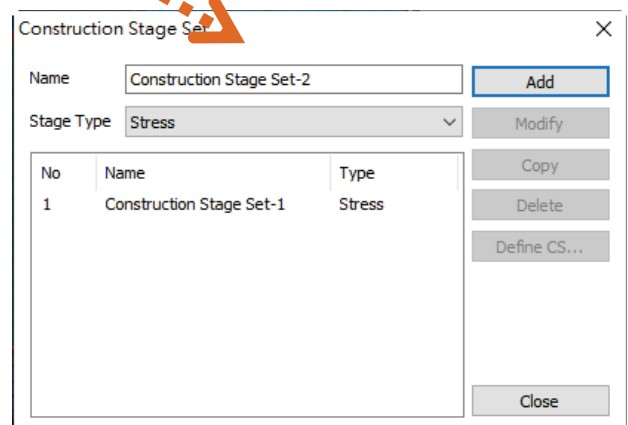
拘束&載荷條件說明



施工階段專用模組-1



新增施工階段



施工階段專用模組-2



大集合-起始尾碼

大集合-結束尾碼

大集合-間隔選取

Stage Definition Wizard

Element, Boundary, Load

Construction Stage Set: Construction Stage Set-1

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
▶	Boundary Set	Boundary Set-	A	1	✓	3	1	0	0
*									

Mesh set
Boundary Set
Load Set

A:新增
R:移除

F:範圍內全包含
(起始尾碼~結束尾碼)

起始工況

邊界集合配合工況
增量施加

註1: (Name)-1 to (Name)-999 視為同一大集合,未加(-)不視作同一大集合

MIDAS 註2: I.S.=>Initial Stage=0 ,S1=>Stage1=1



施工階段-初始工況-邊界條件

Construction Stage Set: Construction Stage Set-1

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Boundary Set	Boundary Set-	A	1	✓	3	1	0	0
*									

初始工況,新增Boundary Set1~3

Element, Boundary, Load Activation Status

	Set Type	Set Name Prefix	I.S.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
	Boundary Set	Boundary Set-	A: 1to3											
	Mesh set	Default Mesh Set												
	Load Set	Gravity-												
	Mesh set	噴射混凝土												
	Mesh set	噴射混凝土1-												
	Mesh set	土												
	Mesh set	岩石螺栓												
	Mesh set	岩石螺栓1-												
	Mesh set	開挖												
	Mesh set	開挖1-												

註1: (Name)-1 to (Name)-999 視為同一大集合,未加(-)不視作同一大集合

MIDAS 註2: I.S.=>Initial Stage=0 ,S1=>Stage1=1



施工階段-初始工況-自重

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Load Set	Gravity-	A	1	☐		1	0	0
*					☐				

初始工況 ,新增Gravity-1

Element, Boundary, Load Activation Status

	Set Type	Set Name Prefix	I.S.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
	Boundary Set	Boundary Set-	A: 1to3											
	Mesh set	Default Mesh Set												
	Load Set	Gravity-	A: 1											
	Mesh set	噴射混凝土												
	Mesh set	噴射混凝土1-												
	Mesh set	土												
	Mesh set	岩石螺栓												
	Mesh set	岩石螺栓1-												
	Mesh set	開挖												
	Mesh set	開挖1-												

註1: (Name)-1 to (Name)-999 視為同一大集合,未加(-)不視作同一大集合



註2: I.S.=>Initial Stage=0 ,S1=>Stage1=1



施工階段-初始工況-網格集

Construction Stage Set

Construction Stage Set-1

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Mesh set	土	A	1	☒	3	1	0	0
	Mesh set	開挖	A	1	☒	1	1	0	0
	Mesh set	開挖1-	A	1	☒	29	1	0	0
*					☐				

初始工況 ,新增土壤層和開挖區域

Element, Boundary, Load Activation Status

	Set Type	Set Name Prefix	I.S.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
	Boundary Set	Boundary Set-	A: 1to3											
	Mesh set	Default Mesh Set												
	Load Set	Gravity-	A: 1											
	Mesh set	噴射混凝土												
	Mesh set	噴射混凝土1-												
	Mesh set	土	A: 1to3											
	Mesh set	岩石螺栓												
	Mesh set	岩石螺栓1-												
	Mesh set	開挖	A: 1											
	Mesh set	開挖1-	A: 1to29											

開挖1 和 開挖1-1=>不屬於同一大集合

註1: (Name)-1 to (Name)-999 視為同一大集合,未加(-)不視作同一大集合



註2: I.S.=>Initial Stage=0 ,S1=>Stage1=1



工況操作1

Construction Stage Set: Construction Stage Set-1

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Mesh set	開挖	R	1	☐	1	1	1	1
*					☐				

工況1

移除:開挖1

	Set Type	Set Name Prefix	I.S.	S1
	Boundary Set	Boundary Set-	A: 1to3	
	Mesh set	Default Mesh Set		
	Load Set	Gravity-	A: 1	
	Mesh set	噴射混凝土		
	Mesh set	噴射混凝土1-		
	Mesh set	土	A: 1to3	
	Mesh set	岩石螺栓		
	Mesh set	岩石螺栓1-		
	Mesh set	開挖	A: 1	R: 1
	Mesh set	開挖1-	A: 1to29	



Construction Stage Set: Construction Stage Set-1

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Mesh set	噴射混凝土	A	1	☐		1	2	0
	Mesh set	岩石螺栓	A	1	☐		1	2	0
*					☐				

工況2

新增:噴射混凝土1

新增:岩石螺栓1

	Set Type	Set Name Prefix	I.S.	S1	S2
	Boundary Set	Boundary Set-	A: 1to3		
	Mesh set	Default Mesh Set			
	Load Set	Gravity-	A: 1		
	Mesh set	噴射混凝土			A: 1
	Mesh set	噴射混凝土1-			
	Mesh set	土	A: 1to3		
	Mesh set	岩石螺栓			A: 1
	Mesh set	岩石螺栓1-			
	Mesh set	開挖	A: 1	R: 1	
	Mesh set	開挖1-	A: 1to29		



MIDAS



工況操作3

Set Assignment Rules

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Mesh set	開挖1-	R	1	☒	29	1	2	1
*					☐				

第2工況起

每一工況移除一個(開挖1-Number)

依序:開挖1-1~開挖1-29

	Set Type	Set Name Prefix	I.S.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30
	Boundary Set	Boundary Set-	A: 1to3																														
	Mesh set	Default Mesh Set																															
	Load Set	Gravity-	A: 1																														
	Mesh set	噴射混凝土			A: 1																												
	Mesh set	噴射混凝土1-																															
	Mesh set	土	A: 1to3																														
	Mesh set	岩石螺栓			A: 1																												
	Mesh set	岩石螺栓 1-																															
	Mesh set	開挖	A: 1	R: 1																													
	Mesh set	開挖1-	A: 1to29		R: 1	R: 2	R: 3	R: 4	R: 5	R: 6	R: 7	R: 8	R: 9	R: 10	R: 11	R: 12	R: 13	R: 14	R: 15	R: 16	R: 17	R: 18	R: 19	R: 20	R: 21	R: 22	R: 23	R: 24	R: 25	R: 26	R: 27	R: 28	R: 29

MIDAS



工况操作4

	Set Type	Set Name Prefix	A/R	Start Postfix	F	End Postfix	Postfix Inc.	Start Stage	Stage Inc.
	Mesh set	喷射混凝土 1-	A	1	☒	29	1	3	1
	Mesh set	岩石螺栓 1-	A	1	☒	29	1	3	1
*					☐				

第3工况起

每一工況新增(噴射混凝土1-Number+岩石螺栓1-Number)

依序:噴射混凝土1-1~噴射混凝土1-29

依序:岩石螺栓1-1~岩石螺栓1-29

Set Name	Prefix	I.S.	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31
Boundary Set- Default Mesh Set	A: 1to3																																
Gravily- 填粉混凝土	A: 1			A: 1																													
填粉混凝土-1				A: 1	A: 1	A: 2	A: 3	A: 4	A: 5	A: 6	A: 7	A: 8	A: 9	A: 10	A: 11	A: 12	A: 13	A: 14	A: 15	A: 16	A: 17	A: 18	A: 19	A: 20	A: 21	A: 22	A: 23	A: 24	A: 25	A: 26	A: 27	A: 28	A: 29
岩石鑽梭	A: 1to3			A: 1																													
岩石鑽梭-1				A: 1	A: 1	A: 2	A: 3	A: 4	A: 5	A: 6	A: 7	A: 8	A: 9	A: 10	A: 11	A: 12	A: 13	A: 14	A: 15	A: 16	A: 17	A: 18	A: 19	A: 20	A: 21	A: 22	A: 23	A: 24	A: 25	A: 26	A: 27	A: 28	A: 29
開挖	A: 1	R: 1																															
開挖1-	A: 1to29		R: 1	R: 2	R: 3	R: 4	R: 5	R: 6	R: 7	R: 8	R: 9	R: 10	R: 11	R: 12	R: 13	R: 14	R: 15	R: 16	R: 17	R: 18	R: 19	R: 20	R: 21	R: 22	R: 23	R: 24	R: 25	R: 26	R: 27	R: 28	R: 29		



施工階段分析



Add/Modify Analysis Case

Analysis Case Setting

Title: 施工階段分析

Description:

Solution Type: Construction Stage

Construction Stage Set: Construction Stage Set-1

Analysis Case Model

All Sets << >> Active Sets

Initial Stage

☒ Initial Stage for Stress Analysis 1:I.S.

☒ Apply K0 Condition

☐ Cut-Off Negative Effective Pressure

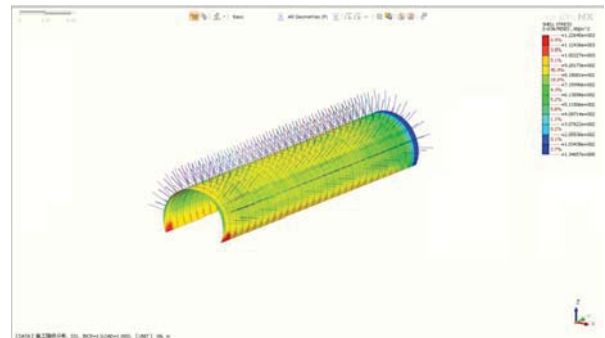
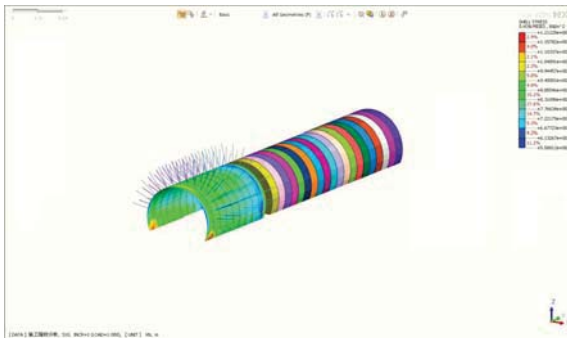
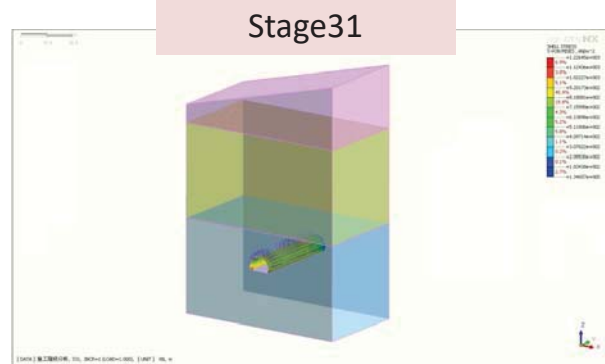
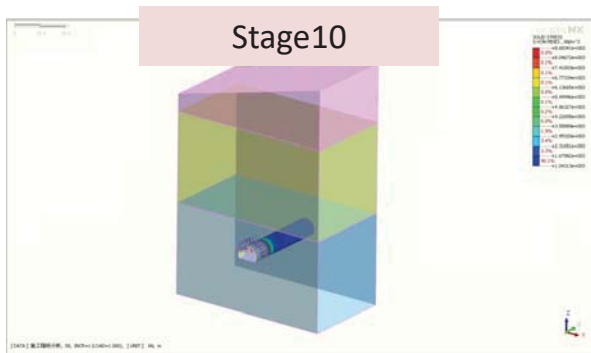
☐ Solve Each Load Set Independently

Sorting: Name

OK Cancel Apply

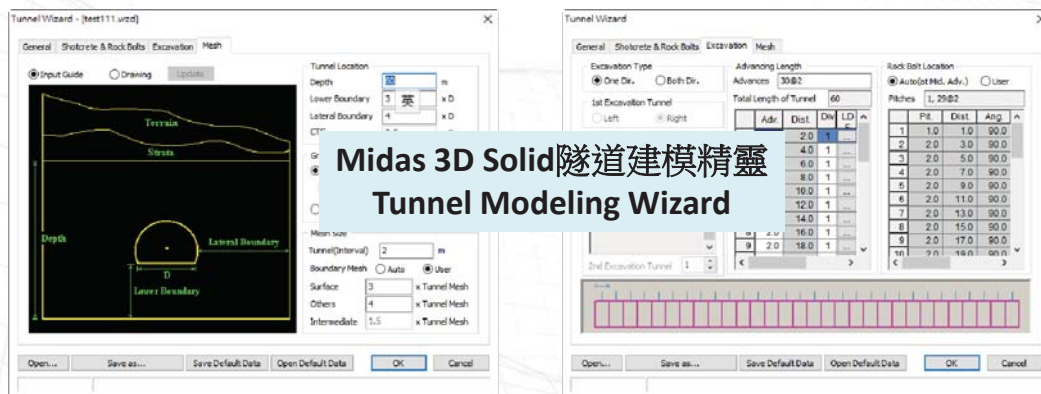


施工階段分析結果-Shell Stress



GTS NX
Geo-Technical analysis System New eXperience

GTS_隧道開挖及推進教學6



台灣邁達斯

隧道建模精靈

Step1. 隧道外觀尺寸建立

Step2. 噴射混凝土&岩栓定義

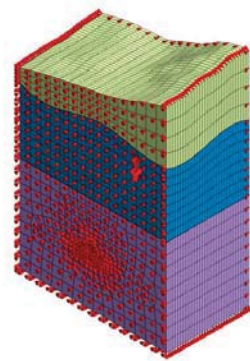
Step3. 開挖&施工順序定義

Pit	Dist	Ang
1	1.0	90.0
2	2.0	90.0
3	2.0	90.0
4	2.0	90.0
5	2.0	90.0
6	2.0	110.0
7	2.0	130.0
8	2.0	150.0
9	2.0	170.0
10	2.0	180.0

Step4. 地層模型定義

Step5. 自動生成模型&施工階段定義

Set Name	Profile	Start	End
Set 1	1.0	0.0	1.0
Set 2	2.0	1.0	2.0
Set 3	3.0	2.0	3.0
Set 4	4.0	3.0	4.0
Set 5	5.0	4.0	5.0
Set 6	6.0	5.0	6.0
Set 7	7.0	6.0	7.0
Set 8	8.0	7.0	8.0
Set 9	9.0	8.0	9.0
Set 10	10.0	9.0	10.0



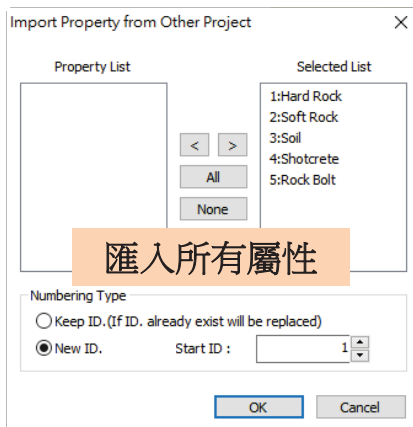
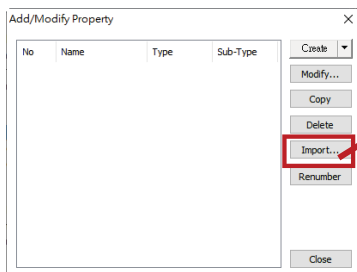
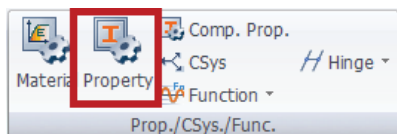
新增3D操作



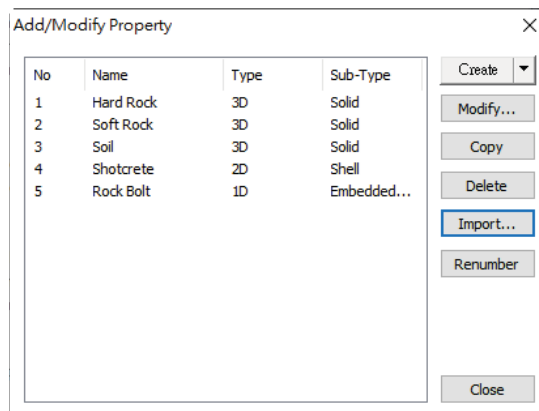
匯入材料&屬性

匯入屬性同時自動匯入材料性質

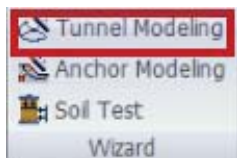
選擇檔案



匯入所有屬性



MIDAS

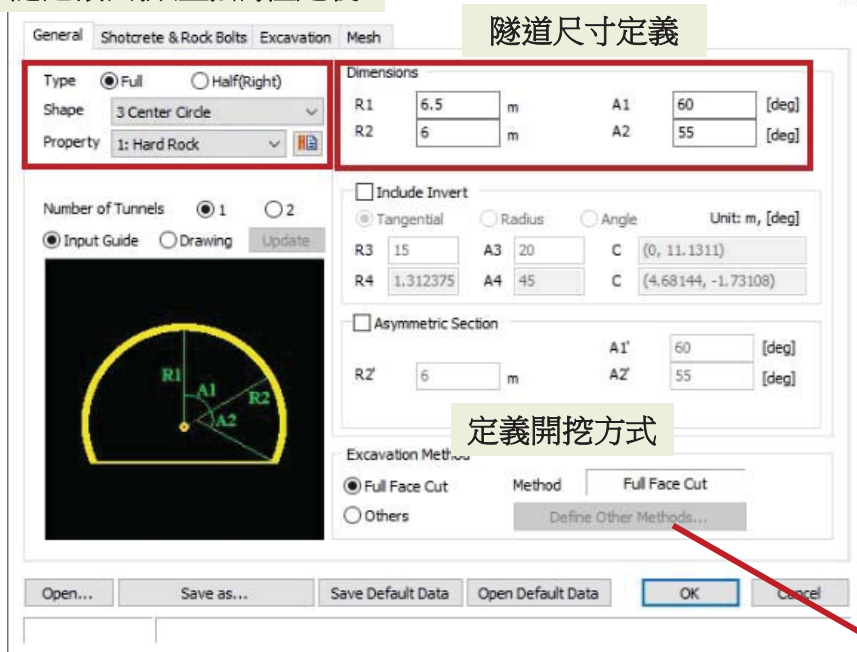


隧道建模精靈

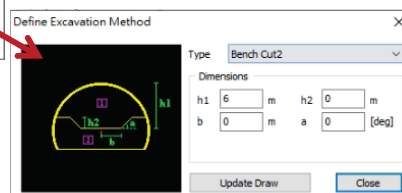
Step1 隧道外觀尺寸建立

隧道截面(類型)/屬性定義

隧道尺寸定義



定義開挖方式



MIDAS



隧道建模精靈

Step2噴射混凝土&岩栓定義

噴射混凝土屬性定義 (厚度由屬性輸入)

岩栓屬性定義

岩栓尺寸&安裝位置定義

MIDAS



隧道建模精靈

Step3.開挖&施工順序定義

**每次開挖2m/開挖30次
30@2**

預設單方向開挖

岩栓施加位置會自動計算 (安裝在開挖中間)

Adv.	Dist.	Div.	LD
1	2.0	1	1
2	2.0	1	1
3	2.0	1	1
4	2.0	1	1
5	2.0	1	1
6	2.0	1	1
7	2.0	1	1
8	2.0	1	1
9	2.0	1	1
10	2.0	1	1

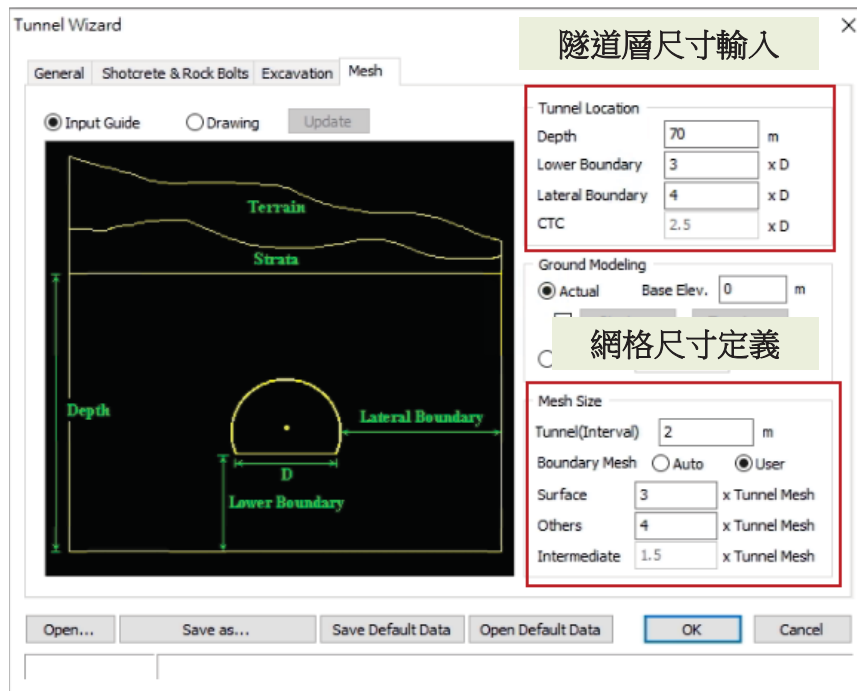
Pit.	Dist.	Ang.
1	1.0	90.0
2	2.0	90.0
3	3.0	90.0
4	4.0	90.0
5	5.0	90.0
6	6.0	90.0
7	7.0	90.0
8	8.0	90.0
9	9.0	90.0
10	10.0	90.0

MIDAS



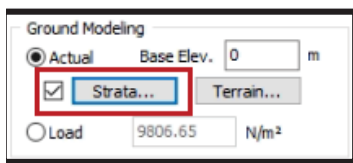
隧道建模精靈

Step4.地層模型定義-1

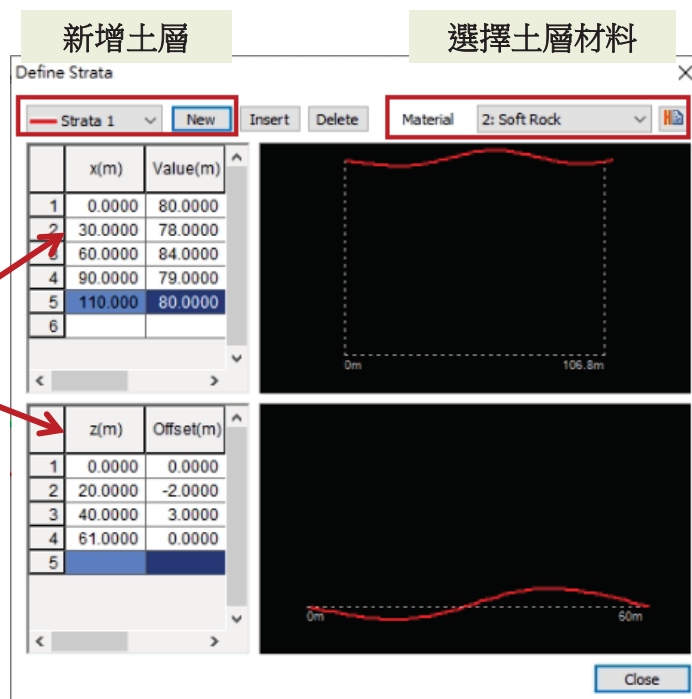


隧道建模精靈

Step4.地層模型定義-2

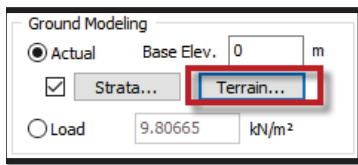


輸入土層外形尺寸



隧道建模精靈

Step4.地層模型定義-3



872 Wizard Elevation.Dat - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明

11 11

英

89.7	93.2	96	98.5	101	103	106
90.2	93.6	96	98.5	101	103	106
90.6	94	96	98.5	101	103	106
91	94	97.5	100	101	103	106
91	94	97.5	100	101	103	109
91	94	97.5	100	101	103	109
92	94	97.5	100	101	103	109
93	95	98.5	100	101	103	109
93.5	96	99	100	101	103.7	109
94	97	99	100	101	103.7	110
94	97	99	100	101	103.7	110

第 1 列, 第 1 行 100%

開啓地表節點特徵
(相對空間位置)

Define Terrain(Grid Face - Elevation Data)

Size 10 X 10 Update Size Material 3: Soil

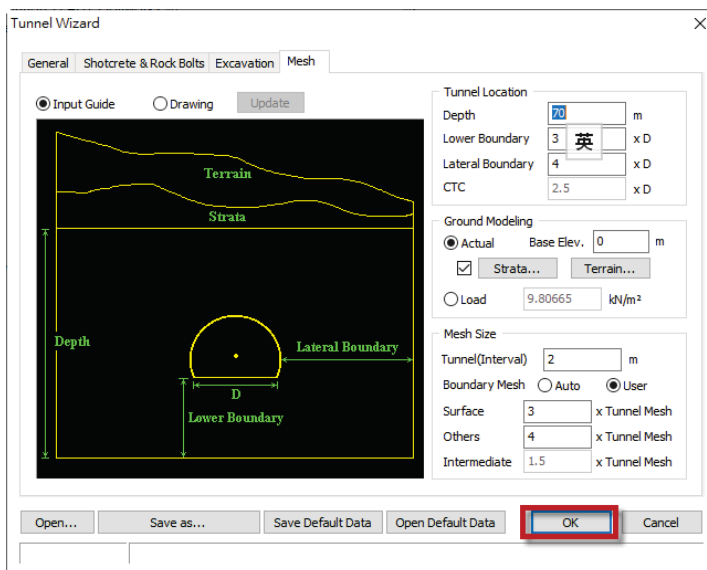
	1	2	3	4	5	6	7	8	9
1	89.7	93.2	96	98.5	101	103	106	110	115
2	90.2	93.6	96	98.5	101	103	106	110	115
3	90.6	94	96	98.5	101	103	106	110	115
4	91	94	97.5	100	101	103	106	111.5	116
5	91	94	97.5	100	101	103	106.5	113	118
6	91	94	97.5	100	101	103	109	113	118
7	92	94	97.5	100	101	103	109	116	119
8	93	95	98.5	100	101	103	109	116	121
9	93.5	96	99	100	101	103.7	109.8	116	122
10	94	97	99	100	101	106	110.5	117.4	122

Open... Save as... Close

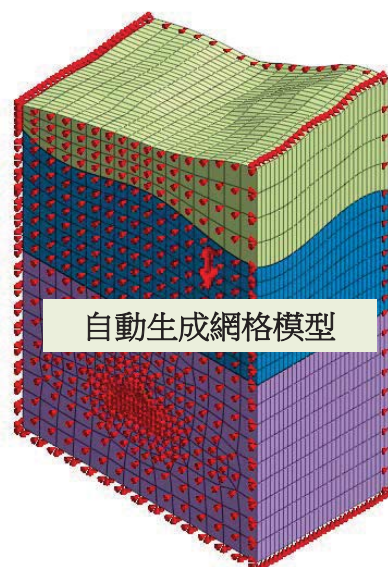


隧道建模精靈

Step5.自動生成模型&施工階段定義-1



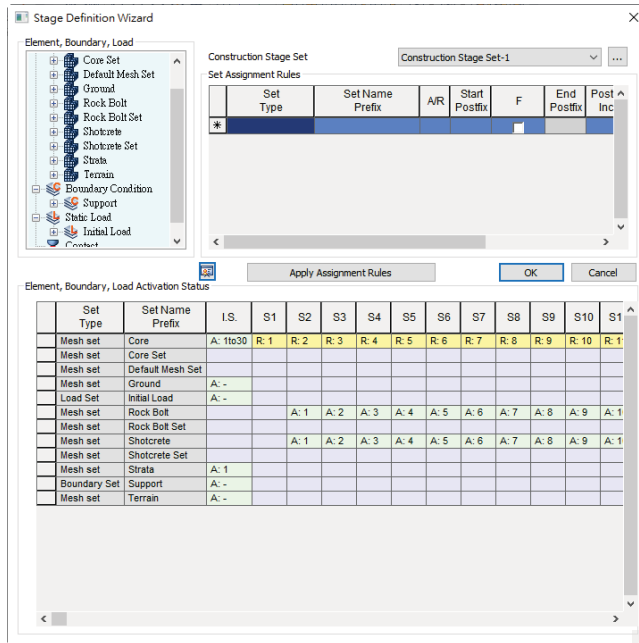
執行ok



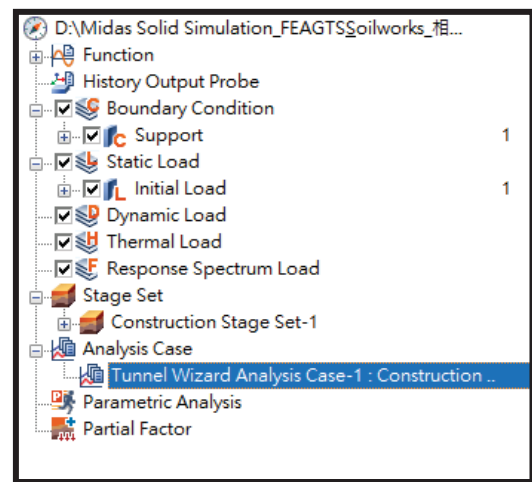
隧道建模精靈

Step5.自動生成模型&施工階段定義-2

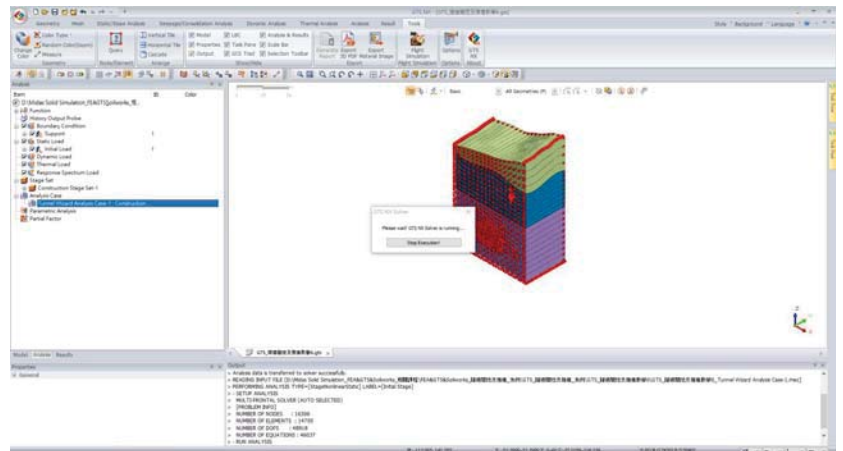
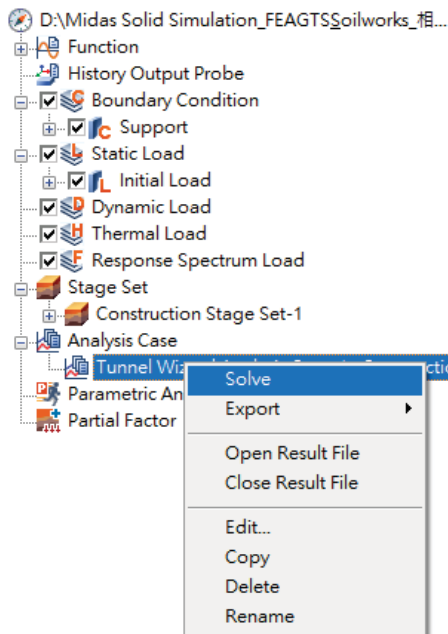
自動規劃施工階段



自動施加邊界條件和分析設定



施工階段分析

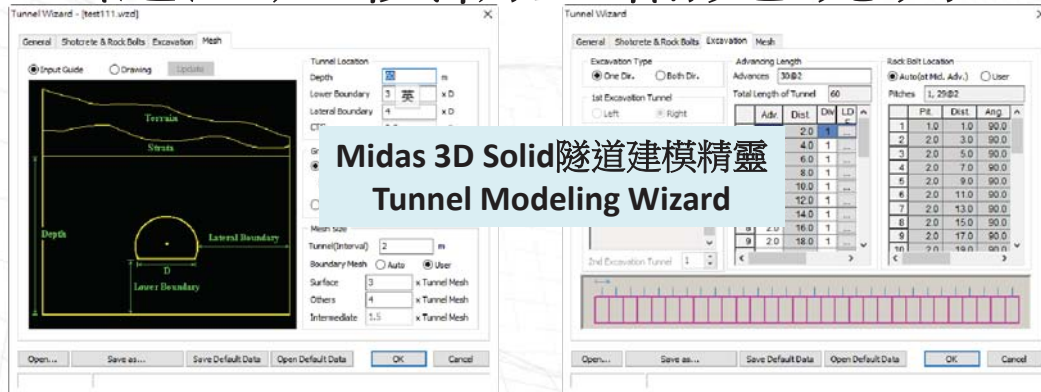


執行分析



GTS_隧道開挖及推進教學6

隧道建模精靈補充說明



台灣邁達斯

MIDAS

地層模型-1

Tunnel Location

Depth: 70 m

Lower Boundary: 3 x D

Lateral Boundary: 4 x D

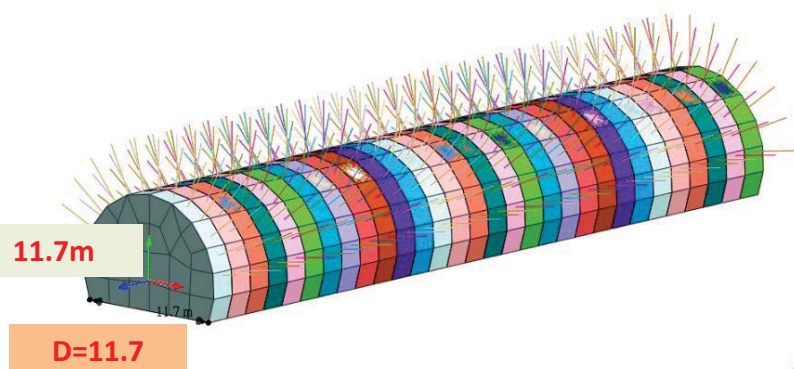
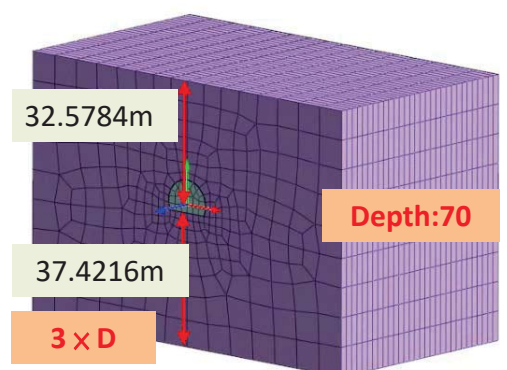
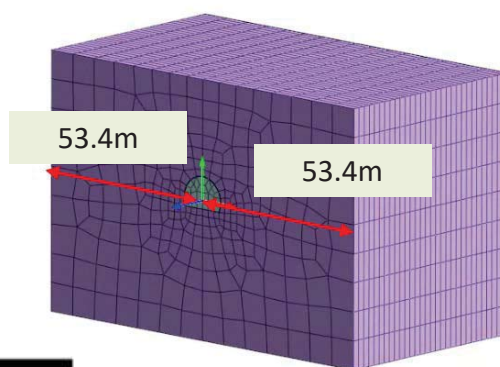
CTC: 2.5 x D

Ground Modeling

☒ Actual Base Elev.: 0 m

☐ Strata... ☐ Terrain...

☐ Load 9806.65 N/m²



MIDAS



地層模型-2

Mesh Size

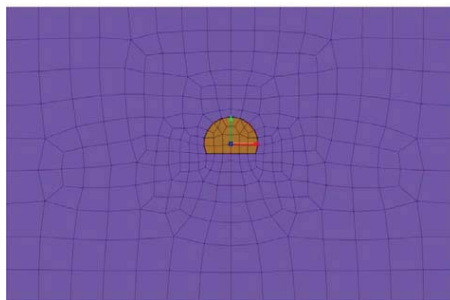
Tunnel(Interval) m

Boundary Mesh ☐ Auto ☒ User

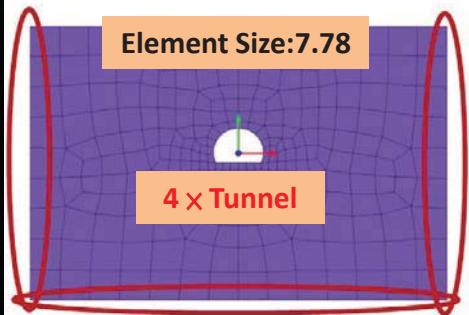
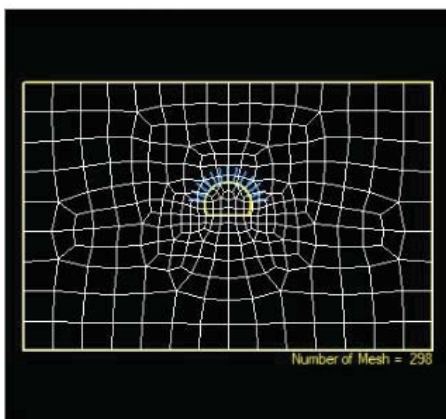
Surface x Tunnel Mesh

Others x Tunnel Mesh

Intermediate x Tunnel Mesh



Element Size:2(表面)



MIDAS



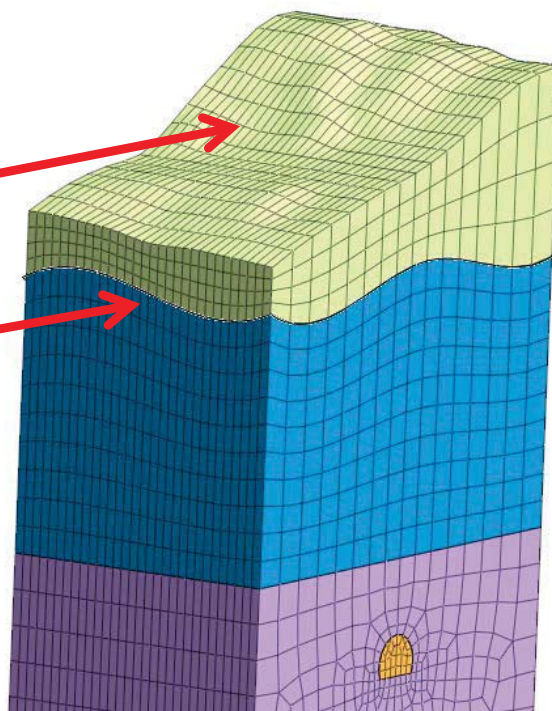
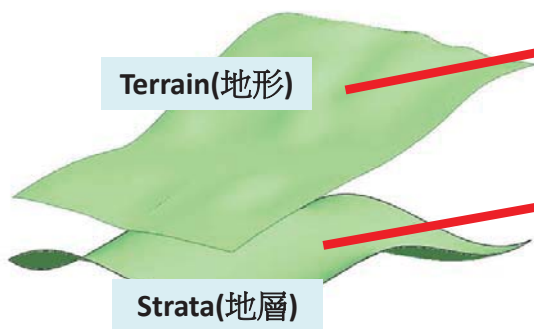
地層模型-3

Ground Modeling

☒ Actual Base Elev. m

☒ Strata... ☐ Terrain...

☐ Load N/m²



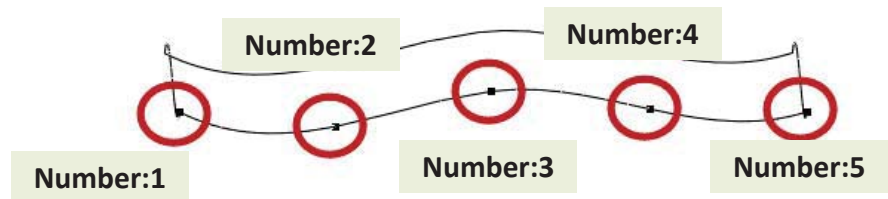
MIDAS



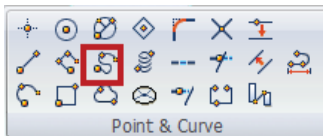
Strata(地層)定義說明-1

X方向點位(局部座標)

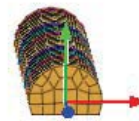
	x(m)	Value(m)
1	0.0000	80.0000
2	30.0000	78.0000
3	60.0000	84.0000
4	90.0000	79.0000
5	110.000	80.0000
6		



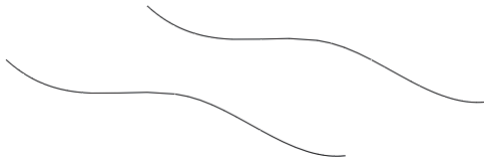
自動使用B-Spline連線成曲線特徵



自動偏移曲線特徵



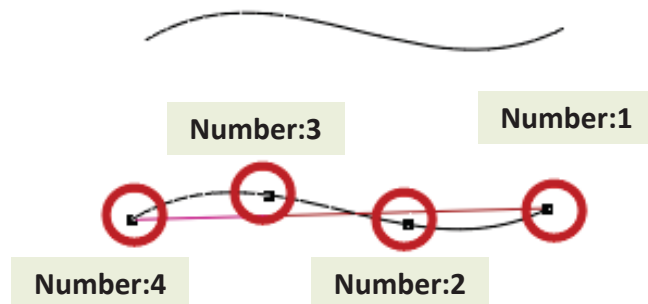
局部座標



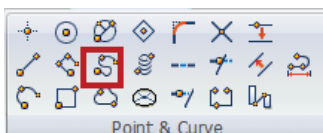
Strata(地層)定義說明-2

Z方向點位(局部座標)

	z(m)	Offset(m)
1	0.0000	0.0000
2	20.0000	-2.0000
3	40.0000	3.0000
4	61.0000	0.0000
5		



自動使用B-Spline連線成曲線特徵



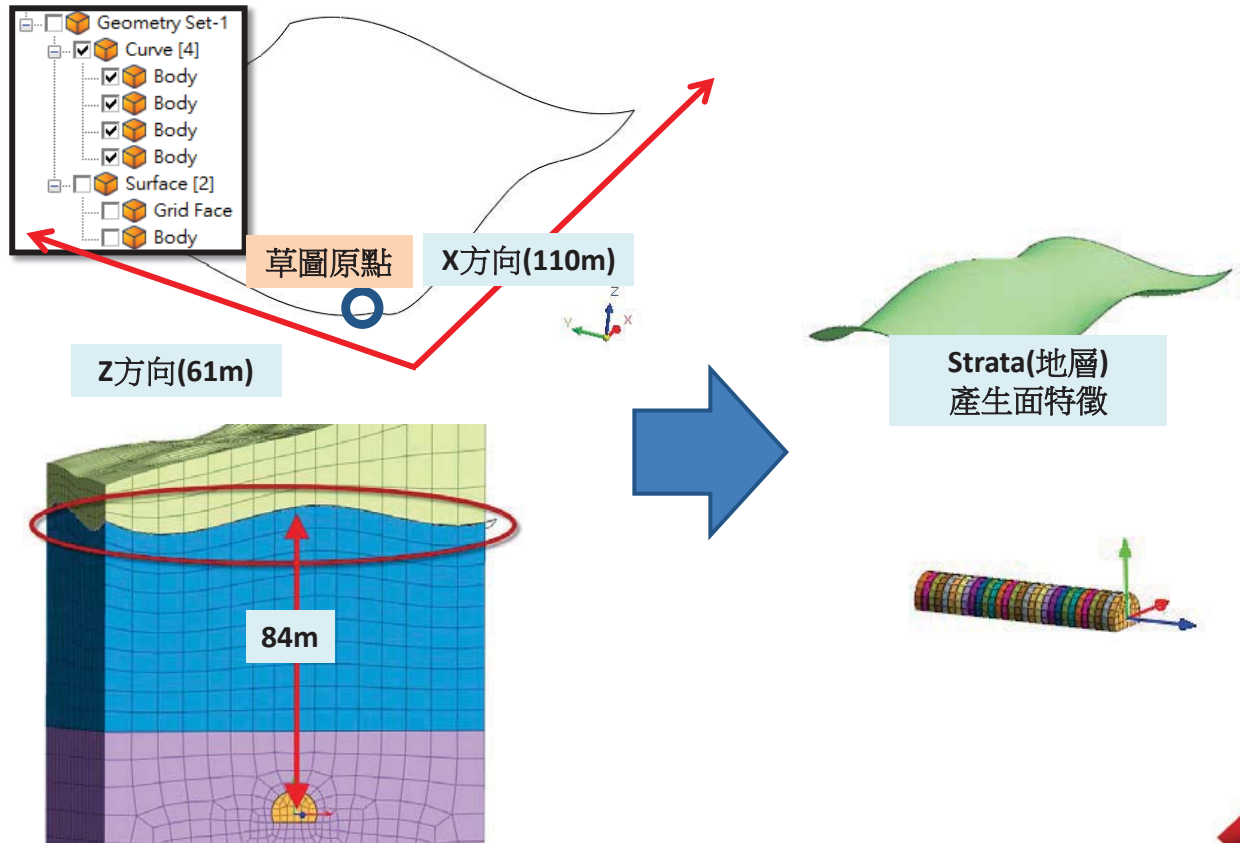
自動偏移曲線特徵



局部座標



Strata(地層)定義說明-3



MIDAS



Terrain(地形)定義-1

Define Terrain(Grid Face - Elevation Data)

Size: 10 X 10 Update Size Material: 3: Soil

	1	2	3	4	5	6	7	8	9
1	89.7	93.2	96	98.5	101	103	106	110	115
2	90.2	93.6	96	98.5	101	103	106	110	115
3	90.6	94	96	98.5	101	103	106	110	115
4	91	94	97.5	100	101	103	106	111.5	116
5	91	94	97.5	100	101	103	106.5	113	118
6	91	94	97.5	100	101	103	109	113	118
7	92	94	97.5	100	101	103	109	116	119
8	93	95	98.5	100	101	103	109	116	121
9	93.5	96	99	100	101	103.7	109.8	116	122
10	94	97	99	100	101	106	110.5	117.4	122

使用空間相對座標輸入

812 Wizard Elevation Dat - 記事本

10 10

可以使用記事本編輯座標點位

89.7	93.2	96	98.5	101	103	106	110	115	118	119
90.2	93.6	96	98.5	101	103	106	110	115	118	119
90.6	94	96	98.5	101	103	106	110	115	118	119
91	94	97.5	100	101	103	106	111.5	116.5	119.5	120.5
91	94	97.5	100	101	103	106.5	113	118	121	120.5
91	94	97.5	100	101	103	109	113	118	121	122
92	94	97.5	100	101	103	109	116	119.5	121.5	122
93	95	98.5	100	101	103	109	116	121	124	122
93.5	96	99	100	101	103.7	109.8	116	122.4	124	122
94	97	99	100	101	106	110.5	117.4	122.4	124	122
94	97	99	100	101	106	112	117.4	122.4	124	122

Close

MIDAS

