

CIVA UT Training

CIVA 2015 Training – UT

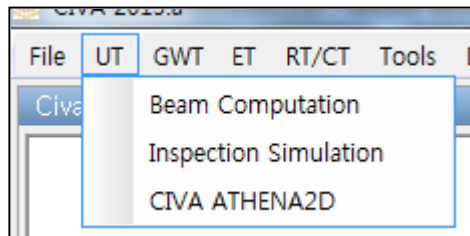


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e-mail : cae@jaewoo.com / Homepage : www.JAEWOO.com

- Beam Computation : 탐촉자를 이용한 시편에서의 초음파 계산
- Inspection Simulation : 결함 또는 시편에 대한 에코계산
- CIVA ATHENA2D : 유한요소 계산을 필요로 하는 복잡한 상호 작용과 시편에서의 에코 계산

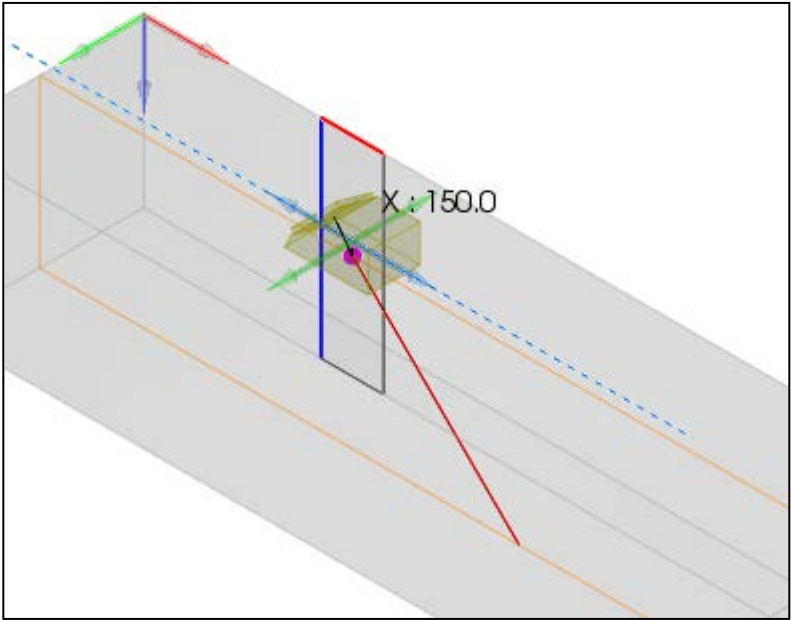


❖MENU 및 화면 안내

The screenshot shows the CIVA 2015.a software interface. The main window displays a 3D model of a beam computation. The interface includes a menu bar (File, UT, GWT, ET, RT/CT, Tools, Display, ?), a toolbar, and a panel on the left with 'Civa manager' and 'Scan explorer'. The main panel has a 'Model - Beam computation' tab and a toolbar with various icons. A context menu is open over the 3D model, showing 'Component', 'Scene', 'View', and 'Tools'. The bottom panel has tabs for 'Specimen', 'Probe', 'Inspection', 'Array settings', 'Simulation settings', and 'Run'. The 'Specimen' tab is active, showing 'Ray path display' and 'Ray' settings. The 'Beam' section shows 'Beam of rays' with 'Along X axis' and 'Along Y axis' set to 11. The 'Selection' section has 'Only one shot' and 'Only one sequence' options.

Annotations with red arrows point to the following elements:

- Inspection Simulation** and **CIVA ATHENA2D** (top right)
- 1 view**, **2 views**, **3 views**, **4 views** (middle right)
- 화면 정렬, 회전 및 치수 측정** (middle right)
- 화면 우클릭시 팝업 메뉴**
 - 거리 계산
 - 화면 이동 및 정렬 등(middle right)
- 작업 메뉴** (bottom right)



-화면에서의 마우스는

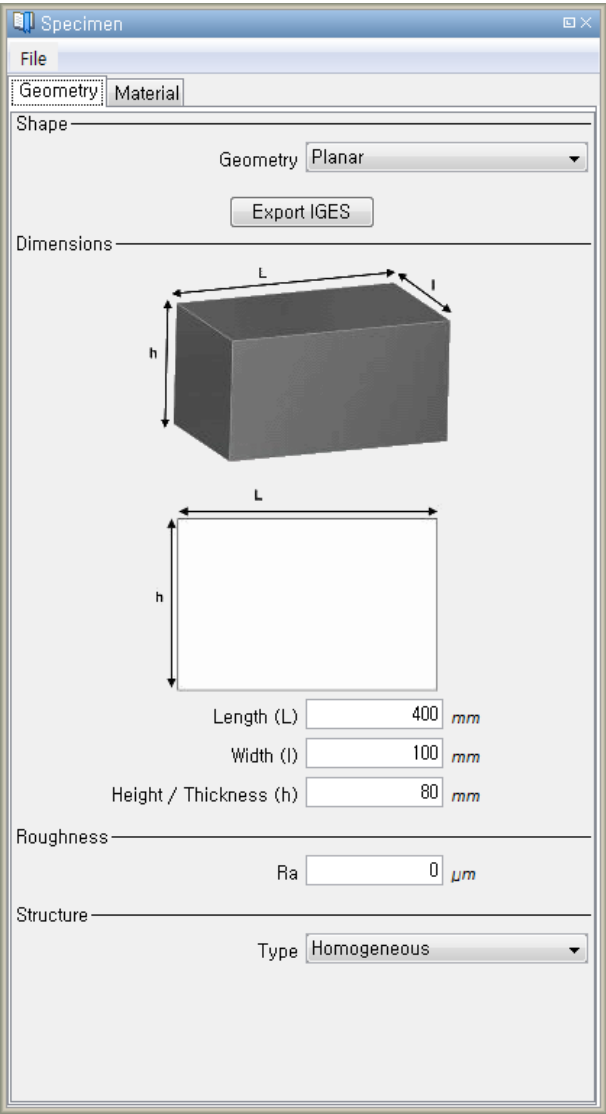
- 1. 좌 클릭 : 화면 이동
- 2. 우 클릭 : 화면 확대(아래), 축소(위)
- 3. 휠 버튼 클릭 : 회전

-Probe 및 Specimen 선택

Probe 및 Specimen을 마우스 좌버튼 더블 클릭시 활성화 되며 동시에 x,y,z 축의 화살표가 생성이 됩니다.

생성된 화살표를 이용하여 각 축을 따라 이동 시킬 수 있습니다.

이러한 방법으로 화면에 표현되는 형태의 위치를 변경할 수 있습니다.

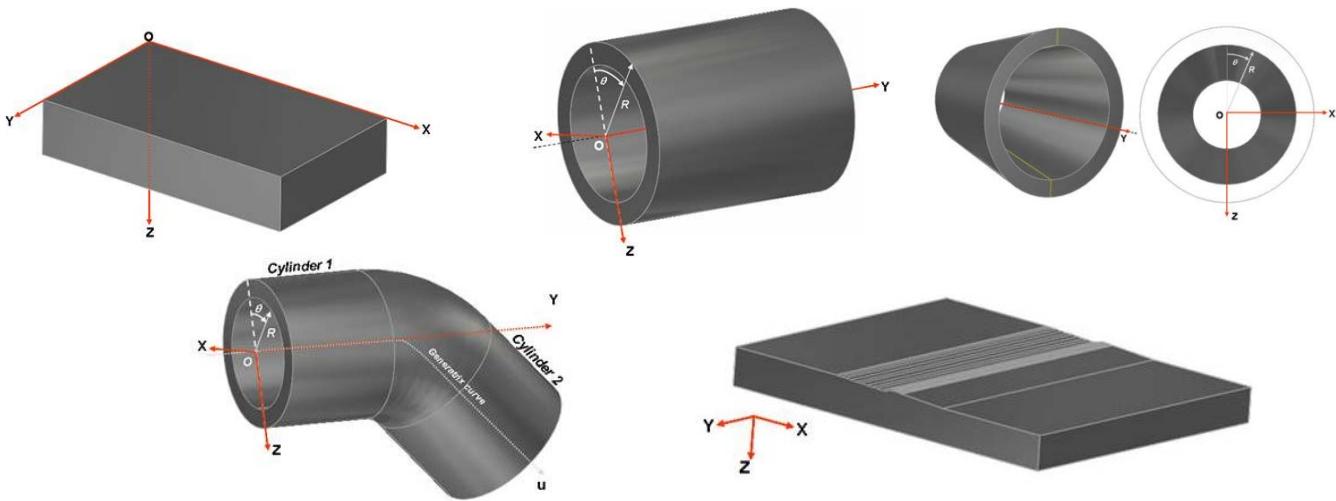


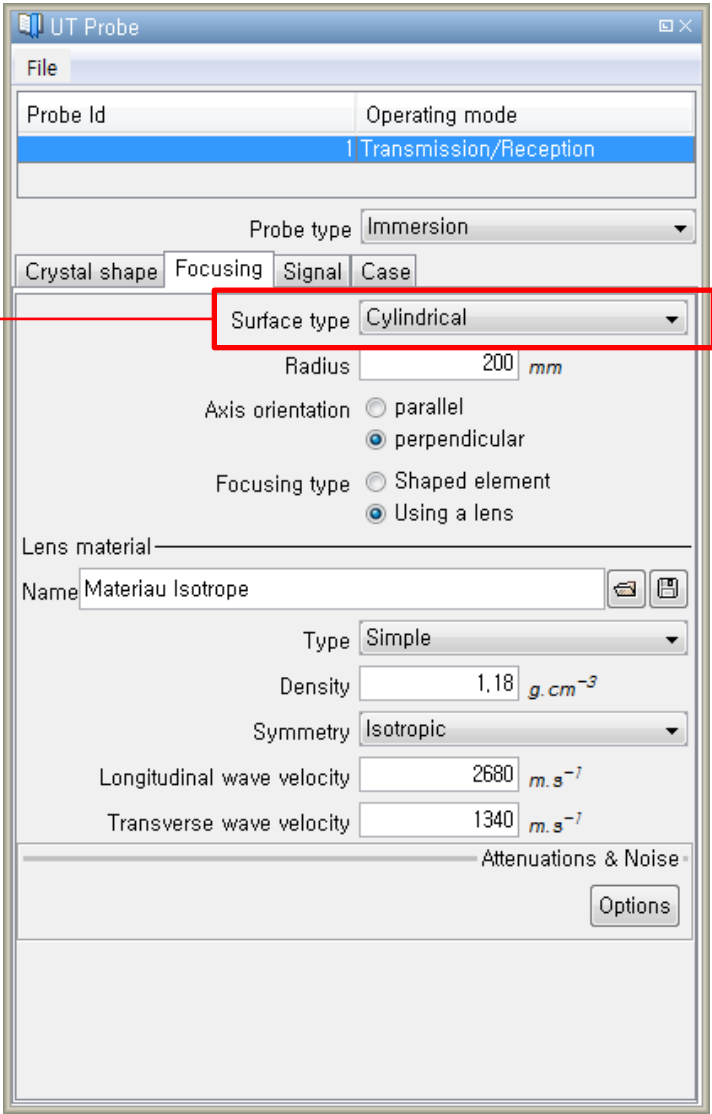
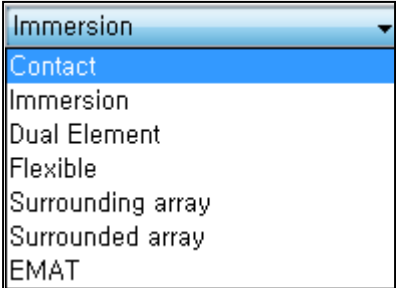
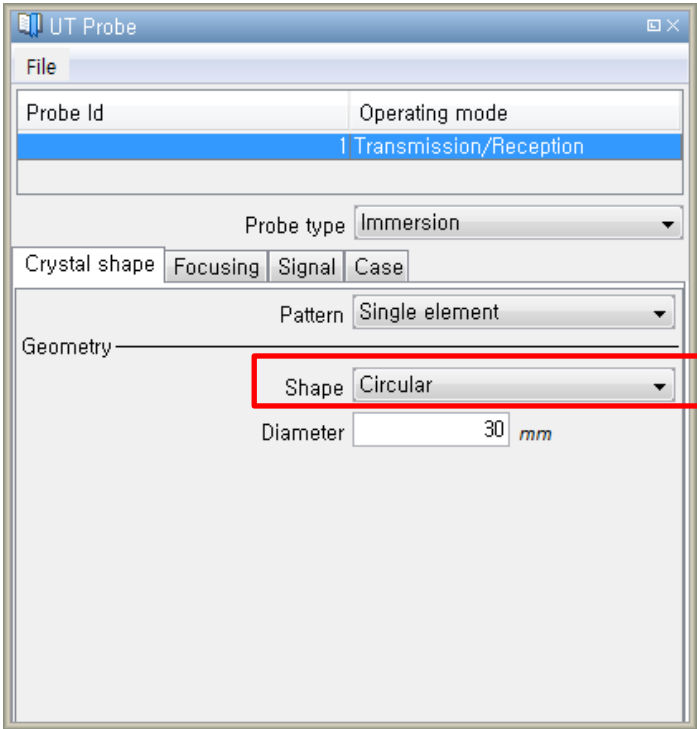
보유 형상 :

- Planar
- Planar
- Cylinder
- Cone
- Sphere
- Elbow
- Nozzle
- 2D CAD
- 3D CAD
- Fastened plate
- Section transition
- Blade Groove
- Blade Root
- TWP
- Weld

보유 물성 :

- Fluid
- Simple
- Homogeneous multiple-ply composite
- Single ply composite
- Granular composite
- Coarse Grained
- Polycrystalline
- Fluid





❖Inspection settings

Inspection settings

Inspection Mode

Inspection systemSingle transducer

ConfigurationPositioningCoupling MediumBottom Medium

Inspection plane

Inspection plane

- Along X direction
- Along Y direction
- Oblique

Scanning direction

Inspection direction

- positive
- negative

Choice of impact point

Choice of impact point1

New specimen origin

X0 mm

Y0 mm

Z0 mm

Inspection settings

Inspection Mode

Inspection systemSingle transducer

ConfigurationPositioningCoupling MediumBottom Medium

Default positioning

New specimen origin

X0 mm

Y0 mm

Z0 mm

Choice of reference point

Choice of reference pointWedge center

Reference point coordinates

Offset X150 mm

Offset Y50 mm

Offset Z-6,074 mm

Reference point in the CIVA reference...

X150 mm

Y50 mm

Z-6,074 mm

Inspection settings

Inspection Mode

Inspection systemSingle transducer

ConfigurationPositioningCoupling MediumBottom Medium

NameMateriau Isotrope

TypeFluid

Density1 g.cm⁻³

Homogeneity typeHomogeneous

Primary wave velocity1483 m.s⁻¹

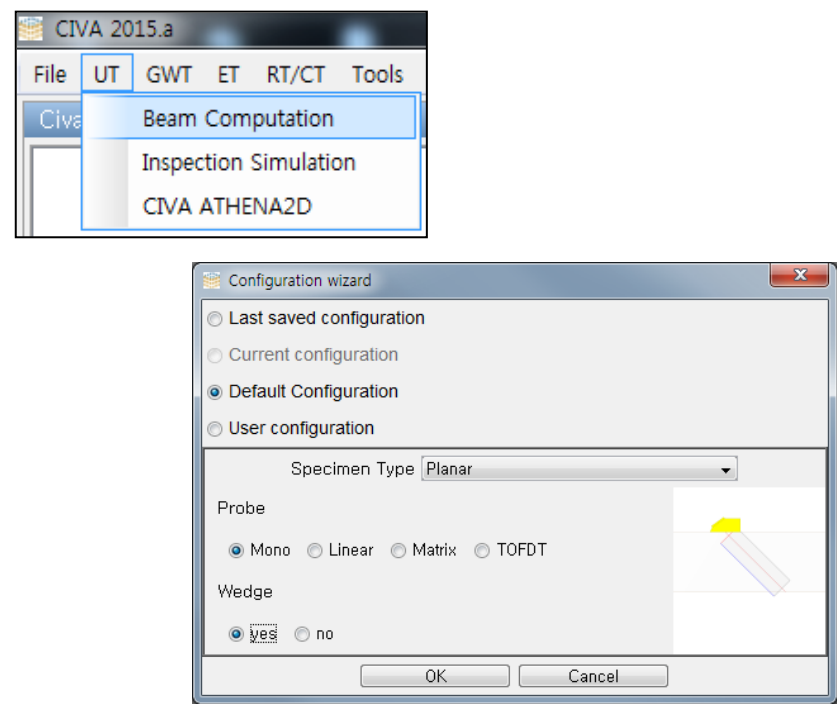
Attenuations & Noise

Options

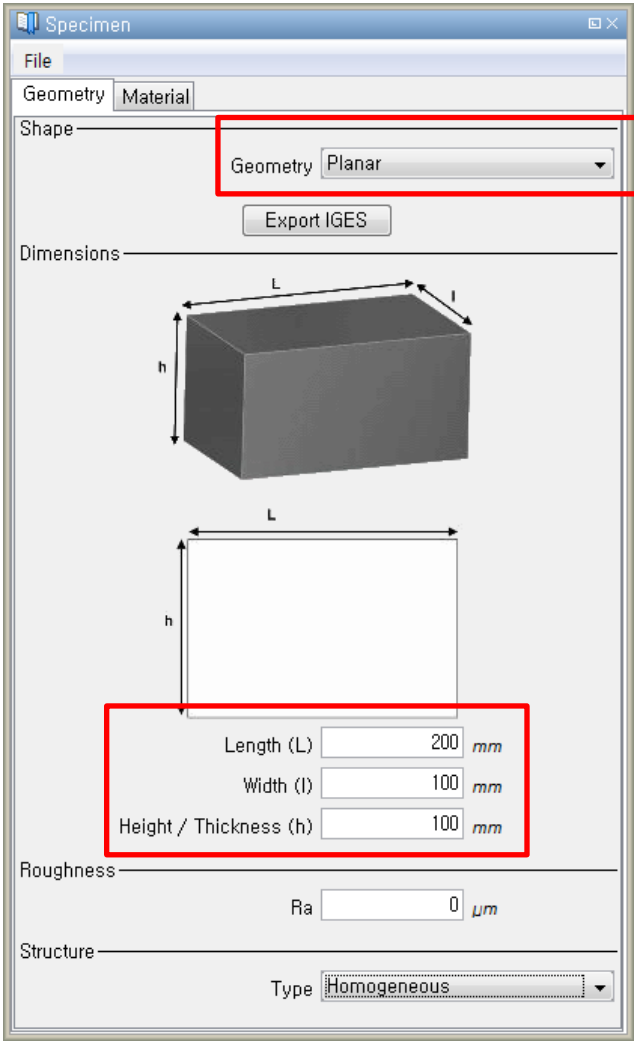
❖ Example 1 – Immersion Testing

- 1. L0 inspection with a non-focused transducer
- 2. L0 inspection with a spherically focused transducer
- 3. L60 inspection

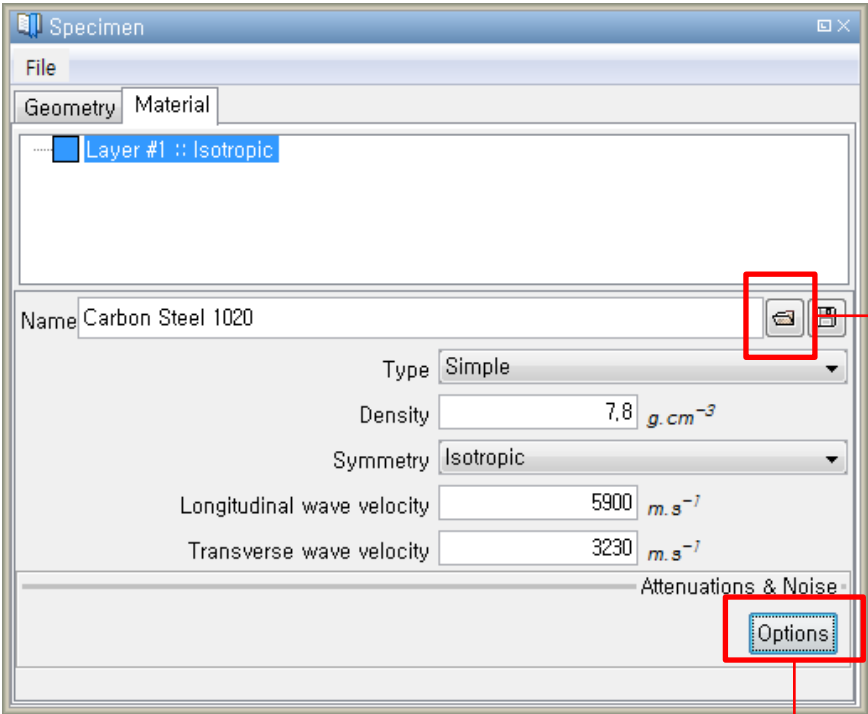
- Beam computation 모듈 활성화



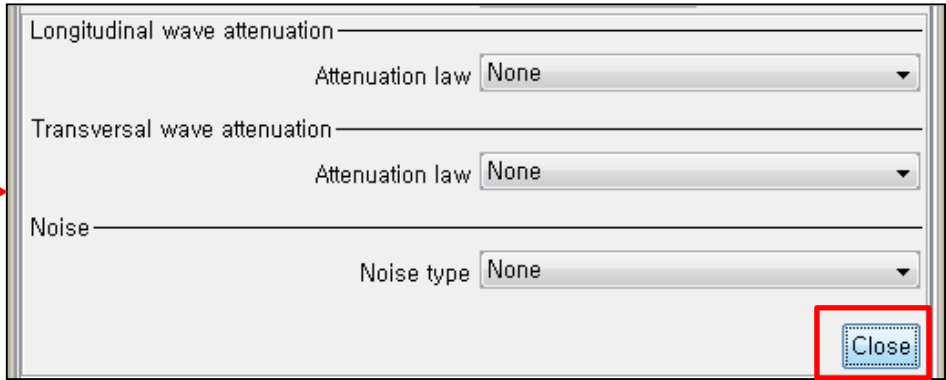
- 시편 - 형상 선정 및 치수 입력



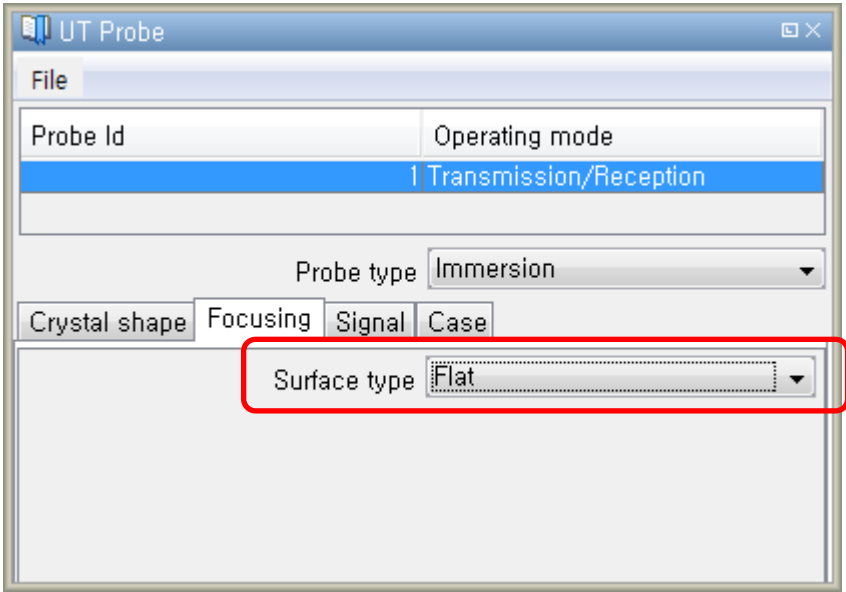
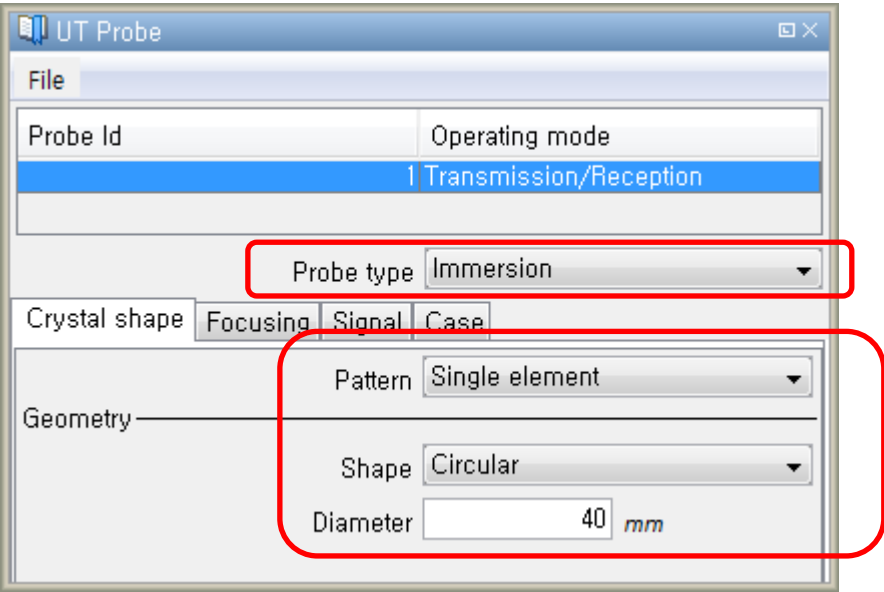
■ 시편 - 물성 입력



Material DB에 들어가는 버튼입니다.
클릭하여 Isotropic 폴더에 Steel을 선택합니다.

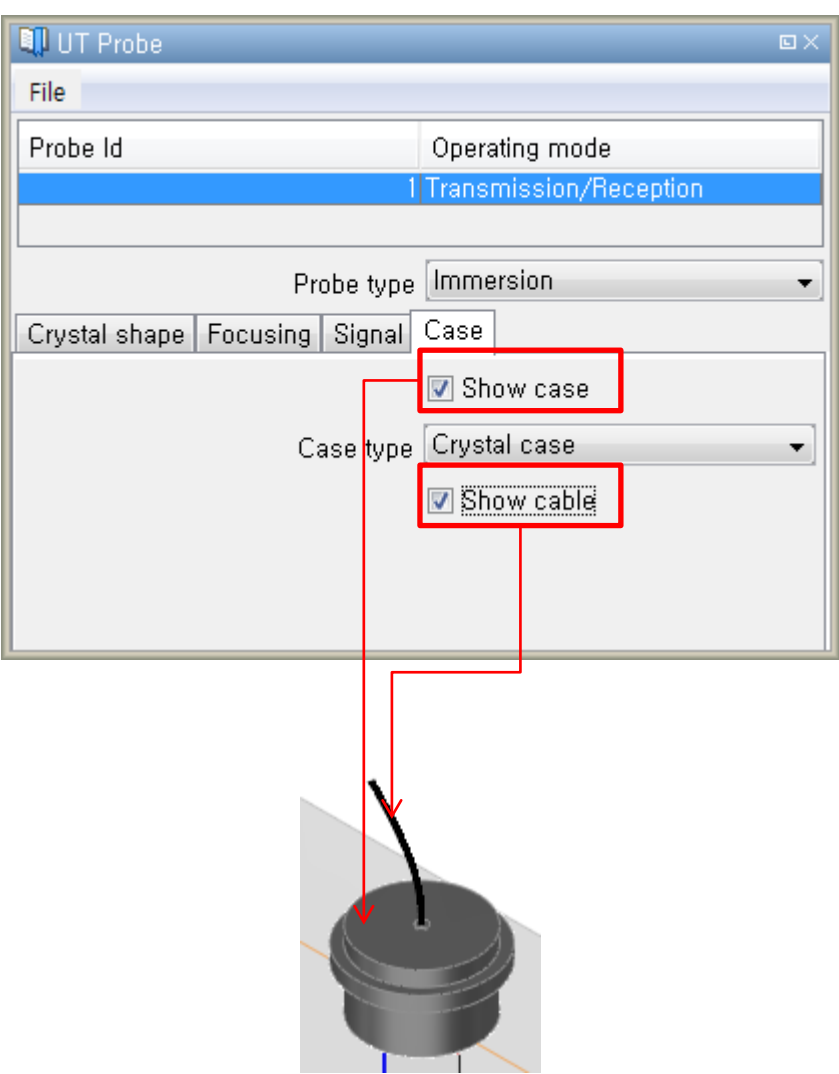
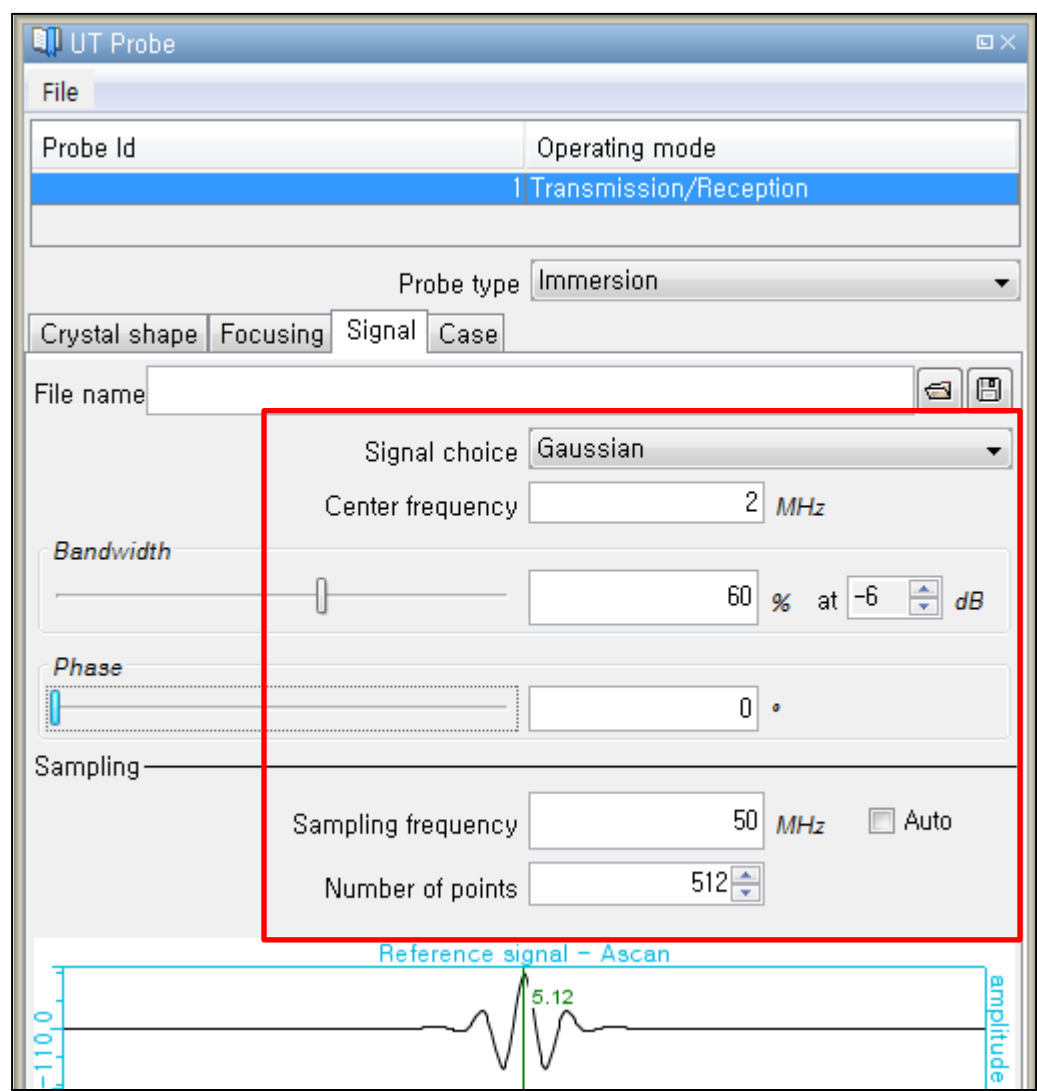


Probe 수정



Focusing – Flat은 Non-focused probe를 의미합니다.

❖Probe 수정(2/2)



❖Inspection 설정(1/2)

Inspection settings

Inspection Mode

Inspection system: Single transducer

Configuration | Positioning | Coupling Medium | Bottom Medium

Inspection plane

Inspection plane: ☒ Along X direction
☐ Along Y direction
☐ Oblique

Scanning direction

Inspection direction: ☒ positive
☐ negative

Choice of impact point

Choice of impact point: 1

New specimen origin

X: 0 mm
Y: 0 mm
Z: 0 mm

Inspection settings

Inspection Mode

Inspection system Single transducer

Configuration Positioning Coupling Medium Bottom Medium

Default positioning

New specimen origin

X 0 mm

Y 0 mm

Z 0 mm

Positioning Mode

Positioning Mode ☒ Impact point ☐ Crystal center

Impact point Crystal Centre

Offset X 50 mm

Offset Y 50 mm

Offset Z 0 mm

Offset X 50 mm

Offset Y 50 mm

Offset Z -50 mm

Impact parameters

Incidence 0 deg

Refraction 0 deg

Deflection 0 deg

Rotation 0 deg

Water path

Water path 50 mm

Wave type

Wave type ☒ Longitudinal ☐ Transverse

Inspection settings

Inspection Mode

Inspection system Single transducer

Configuration Positioning Coupling Medium Bottom Medium

Name Water

Type Fluid

Density 1 g.cm⁻³

Homogeneity type Homogeneous

Primary wave velocity 1483 m.s⁻¹

Primary wave attenuation

Attenuation law None

Close

Inspection settings

Inspection Mode

Inspection system Single transducer

Configuration Positioning Coupling Medium Bottom Medium

Name Air

Type Fluid

Density 0.001 g.cm⁻³

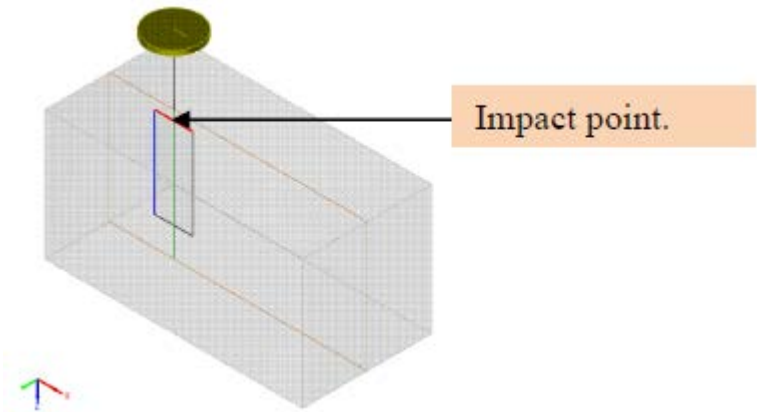
Homogeneity type Homogeneous

Primary wave velocity 330 m.s⁻¹

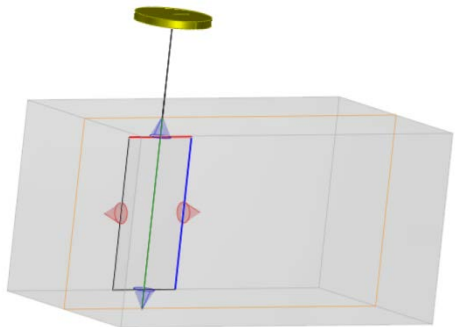
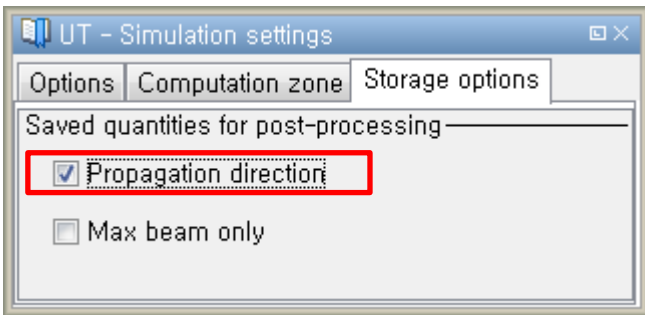
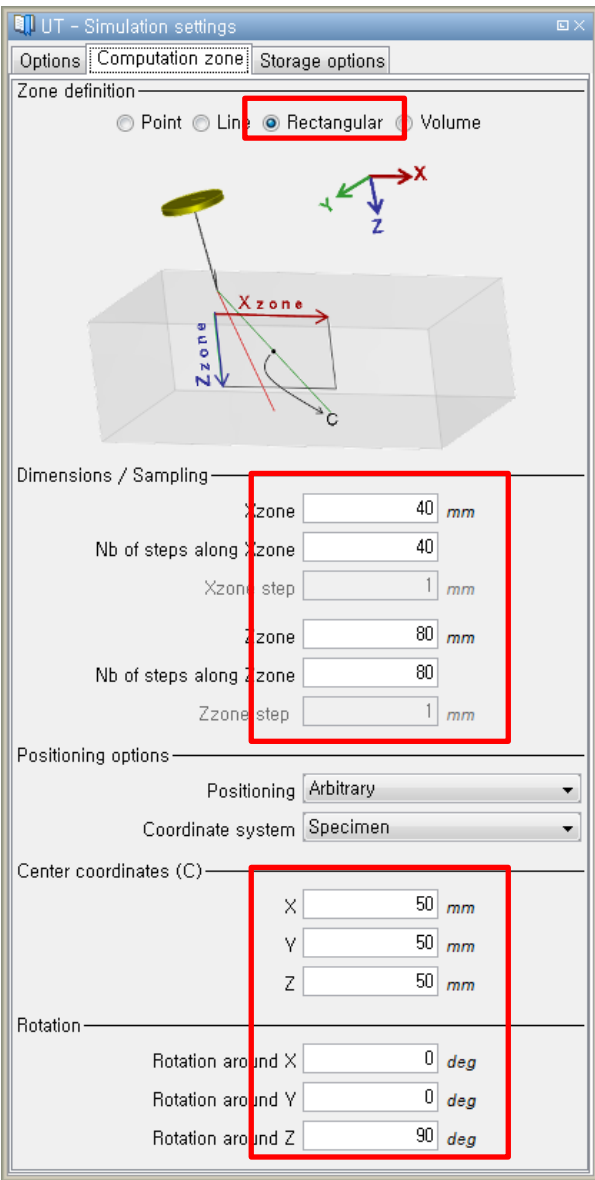
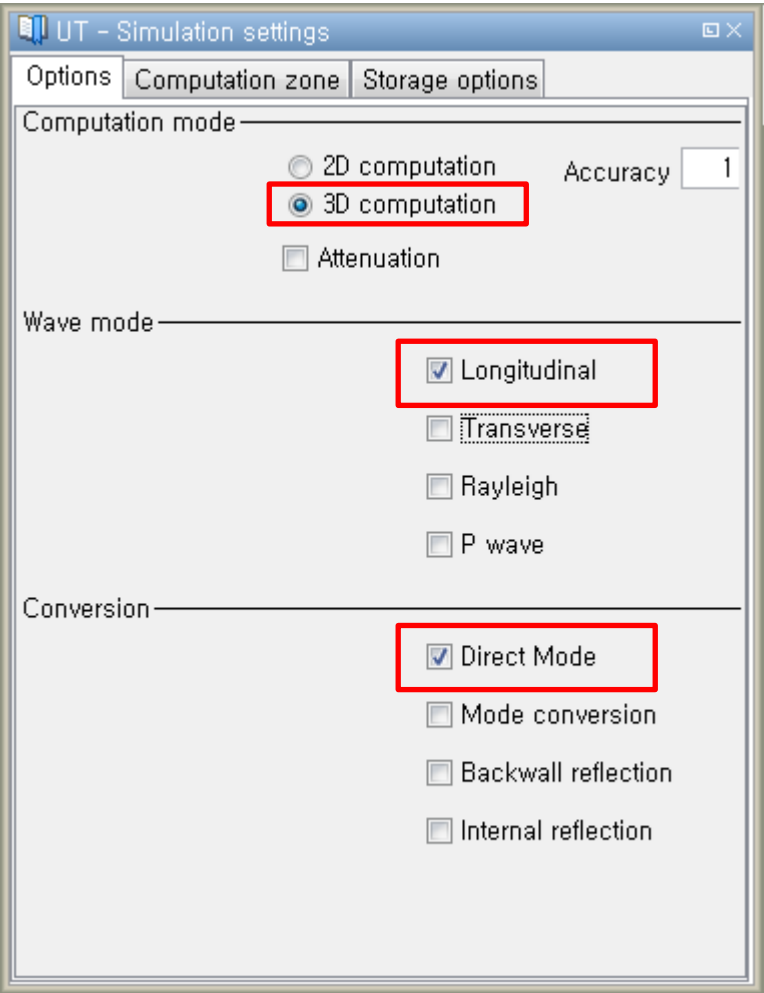
Primary wave attenuation

Attenuation law None

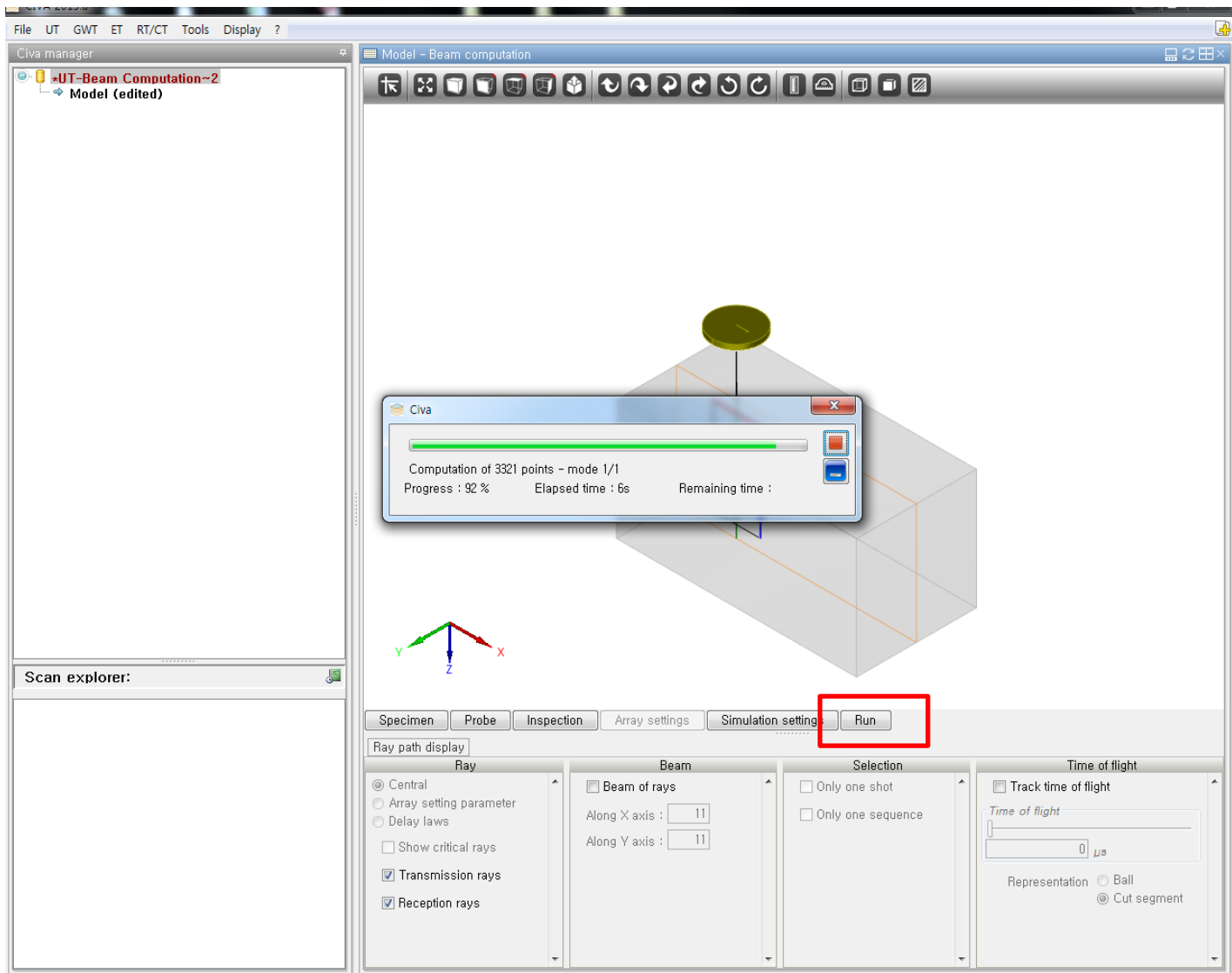
Close

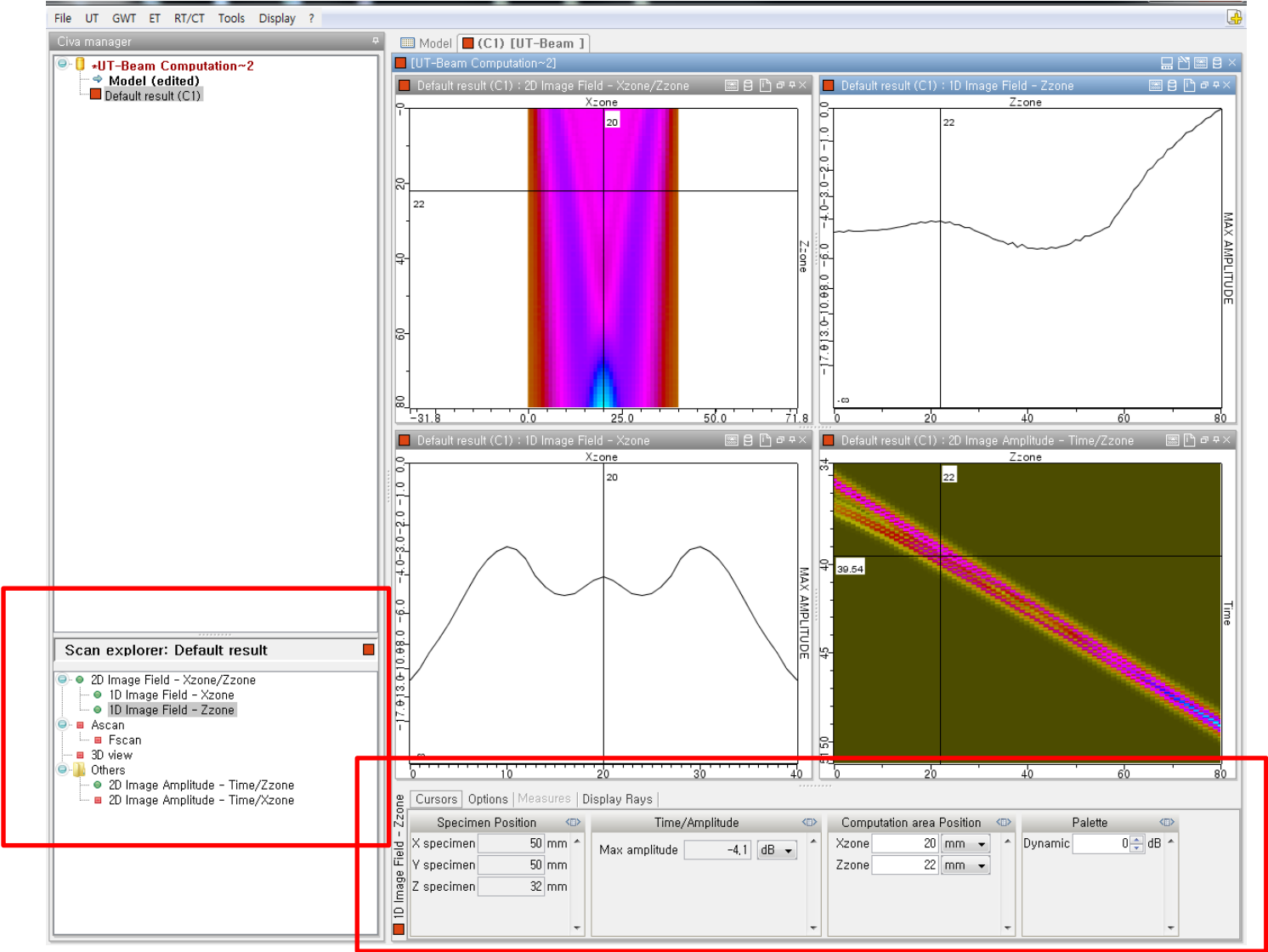


❖Simulation setting



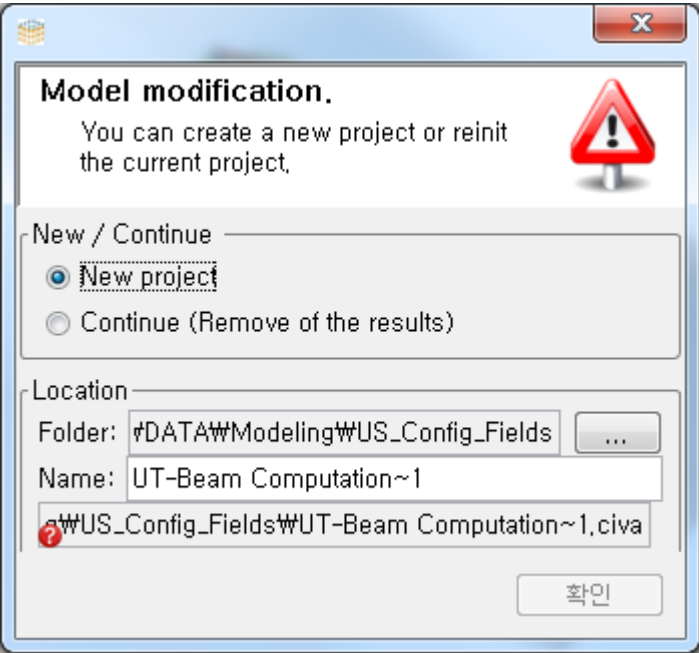
❖ Solving 진행(Run)





❖ Example – Immersion Testing

- 1. L0 inspection with a non-focused transducer
- 2. L0 inspection with a spherically focused transducer
- 3. L60 inspection

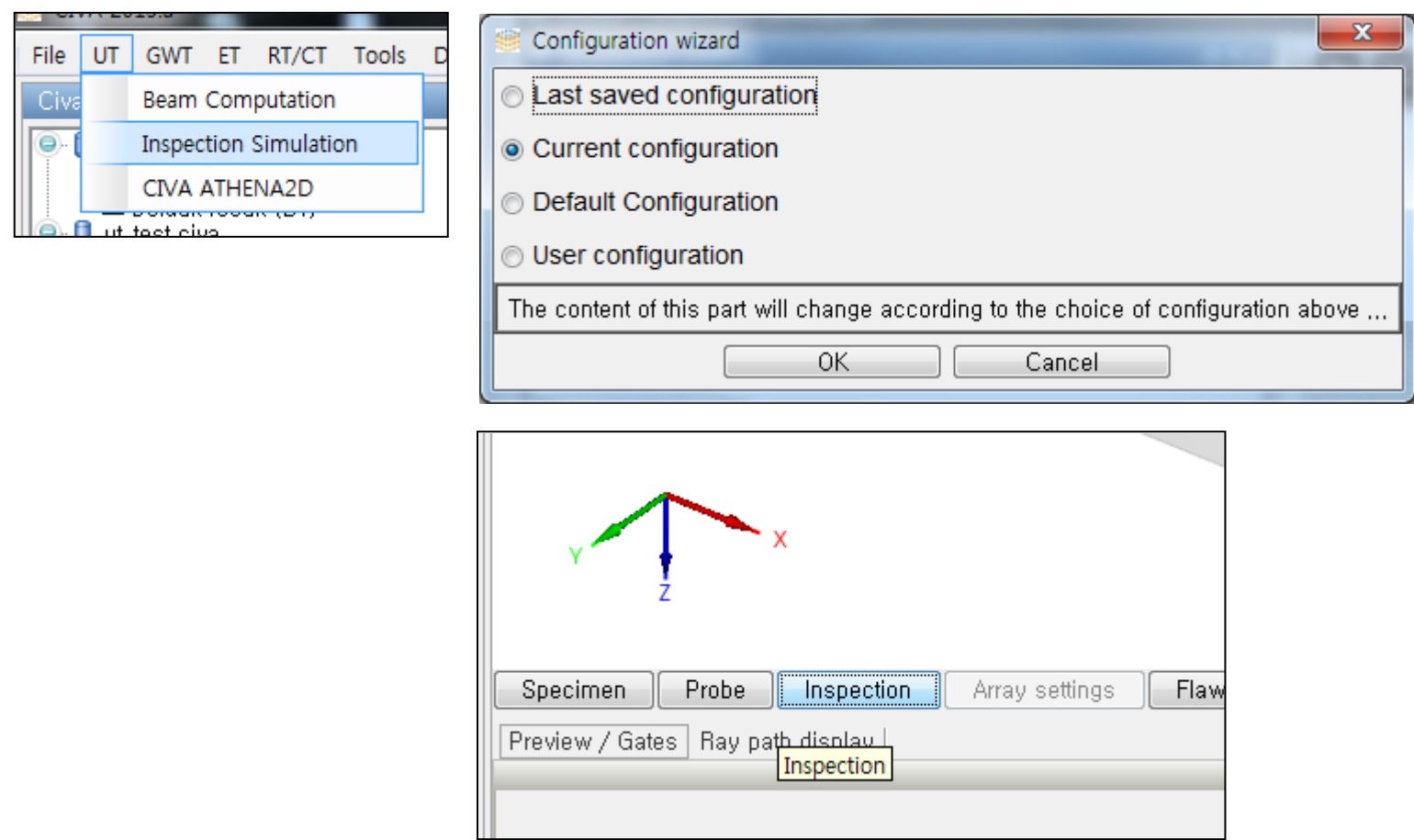


해석이 완료된 상태에서 입력 조건 등을 변경하게 되면 왼쪽과 같은 창이 나오면서, 파일 저장을 물어봅니다.

- 1.새로운 이름으로 저장
- 2.해석 결과 삭제 후 변경된 조건으로 해석

위의 두 가지 선택사항이 제공됩니다.

❖Inspection simulation으로 변경 및 Flaw 생성



계산이 완료된 후 UT – Inspection Simulation을 선택하면 Configuration wizard가 활성화 된다.

Model - Inspection Simulation

Flaws list

File

id	Flaws list
1	Side drilled Hole n° 1
2	Side drilled Hole n° 2

Geometry

Positioning

Geometry

Side drilled hole

Diameter

2

mm

Length

15

mm

Geometry

Positioning

Positioning options

Positioning

length along X axis

Positioning Mode

☒ Defect centre

☐ From surface/bottom

Positioning

X

60

mm

Y

50

mm

Z

70

mm

Orientation

Tilt

0

deg

Skew

90

deg

Rotation

0

deg

Flaws list

File

id	Flaws list
1	Side drilled Hole n° 1
2	Side drilled Hole n° 2

Geometry

Positioning

Positioning options

Positioning

length along X axis

Positioning Mode

☒ Defect centre

☐ From surface/bottom

Positioning

X

35

mm

Y

50

mm

Z

40

mm

Orientation

Tilt

0

deg

Skew

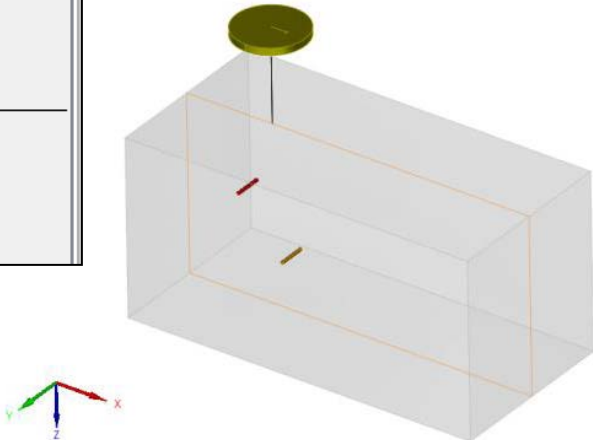
90

deg

Rotation

0

deg



❖Inspection 설정(1/2)

Inspection settings

Inspection Mode

Inspection system Single transducer

Coupling Medium Bottom Medium Scanning

Configuration Positioning

Inspection plane

Inspection plane ☒ Along X direction
☐ Along Y direction
☐ Oblique

Scanning direction

Inspection direction ☒ positive
☐ negative

Choice of impact point

Choice of impact point 1

New specimen origin

X 0 mm
Y 0 mm
Z 0 mm

Inspection settings

Inspection Mode

Inspection system Single transducer

Coupling Medium Bottom Medium Scanning

Configuration Positioning

Default positioning

New specimen origin

X 0 mm
Y 0 mm
Z 0 mm

Positioning Mode

Positioning Mode ☒ Impact point
☐ Crystal center

Impact point

Offset X 25 mm
Offset Y 50 mm
Offset Z 0 mm

Impact parameters

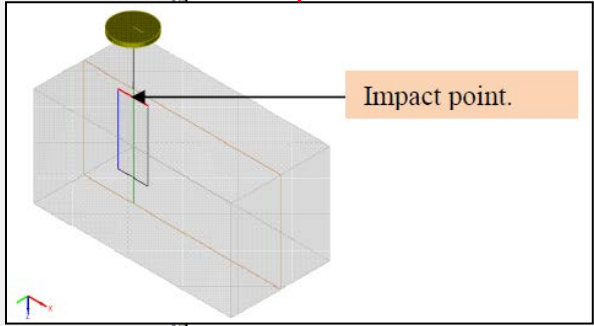
Incidence 0 deg
Refraction 0 deg
Deflection 0 deg
Rotation 0 deg

Water path

Water path 50 mm

Wave type

Wave type ☒ Longitudinal
☐ Transverse



Inspection settings

Inspection Mode

Inspection systemSingle transducer

Configuration

Positioning

Coupling Medium

Bottom Medium

Scanning

Translation along X (mm)

Direction of scanningTracking along axis

Step1 mm/deg

Number of steps50

Translation along Y (mm)

Step0 mm/deg

Number of steps0

Choice of scanning modes

Increment/Scanning reversednoyes

Increment skiprastercomb

Visualization of probe's positions

1mm/deg의 step
value로 50회 진행

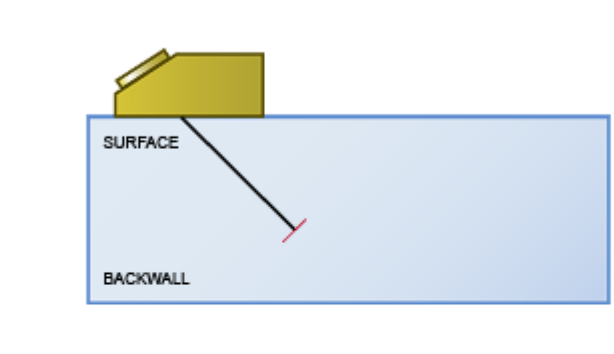
❖Simulation setting 변경

UT - Simulation settings

InitializationInteractionsGatesOptionsCalibration

Computation configuration

ControlDirect



SURFACE

BACKWALL

The "Direct" type computes contributions from :

- flaws, with no skips on the specimen,
- direct skips from selected surfaces of the specimen,

Involved modes

☒ Longitudinal wave

☐ Transversal wave

☐ Account for mode conversion

UT - Simulation settings

InitializationInteractionsGatesOptionsCalibration

Switch to "Advanced definition"

SpecimenFlawsSensitivity zoneModes

Specimen echoes

☐ Front

☐ Bottom

☐ Sides

UT - Simulation settings

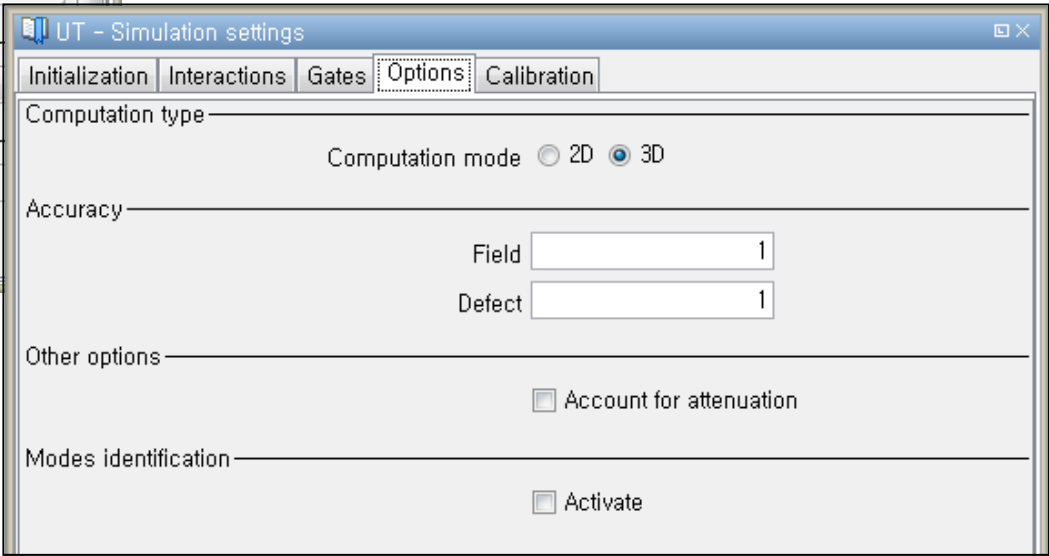
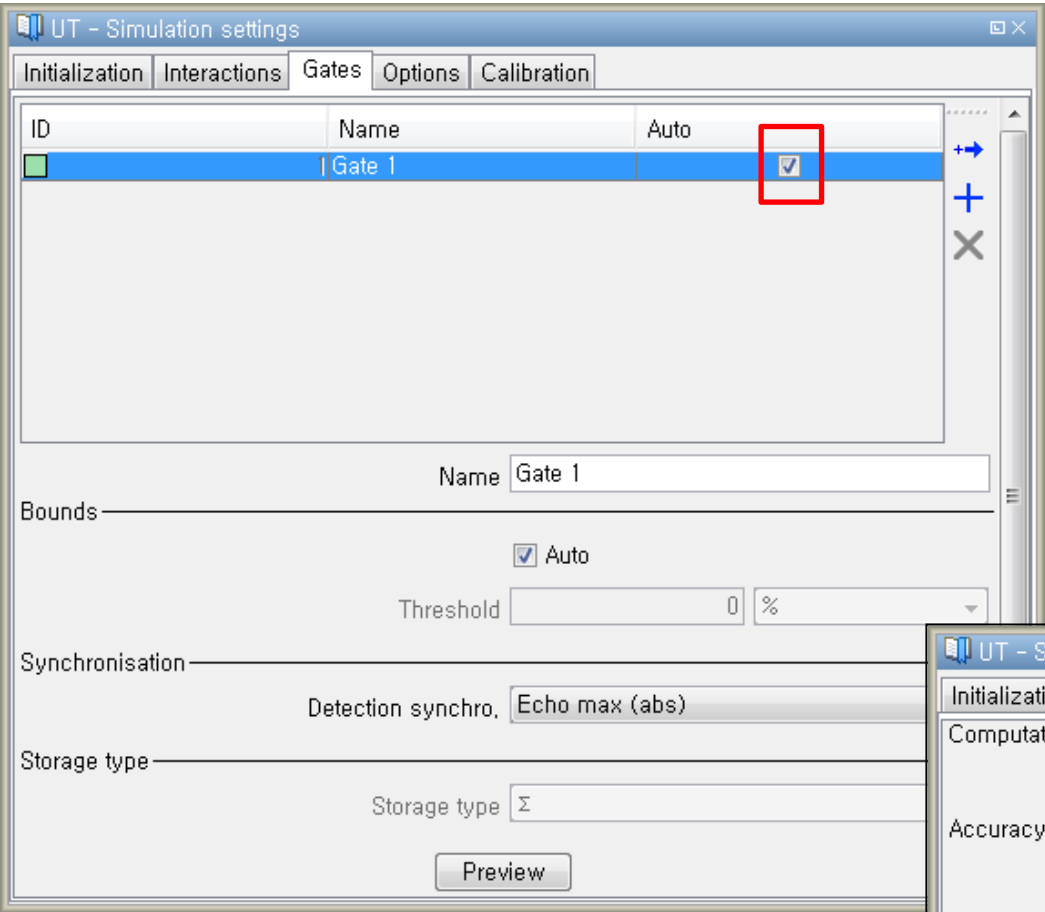
InitializationInteractionsGatesOptionsCalibration

Switch to "Advanced definition"

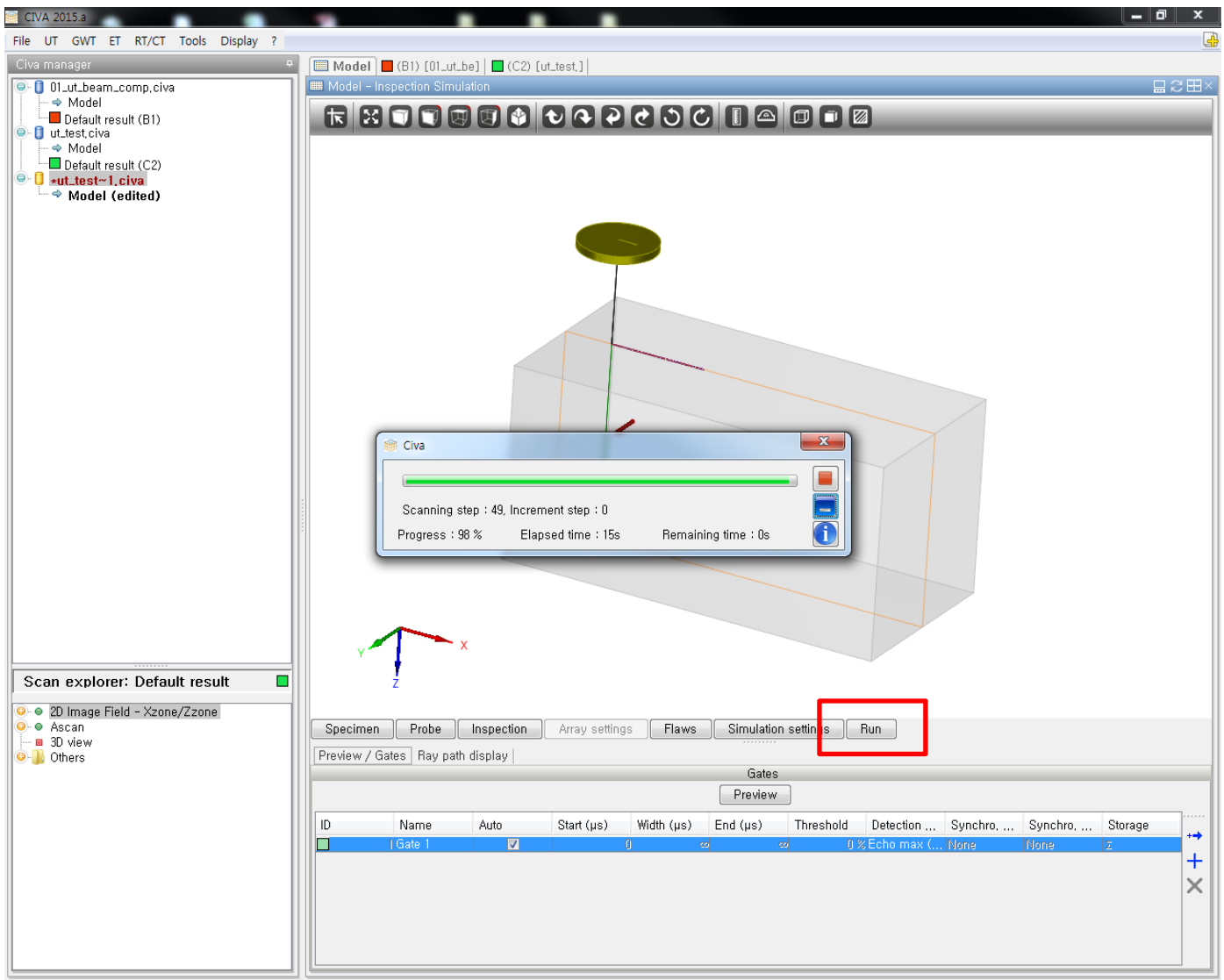
SpecimenFlawsSensitivity zoneModes

Activated	Name	Model
<input checked="" type="checkbox"/>	Side drilled Hole n° 1	SOV
<input checked="" type="checkbox"/>	Side drilled Hole n° 2	SOV

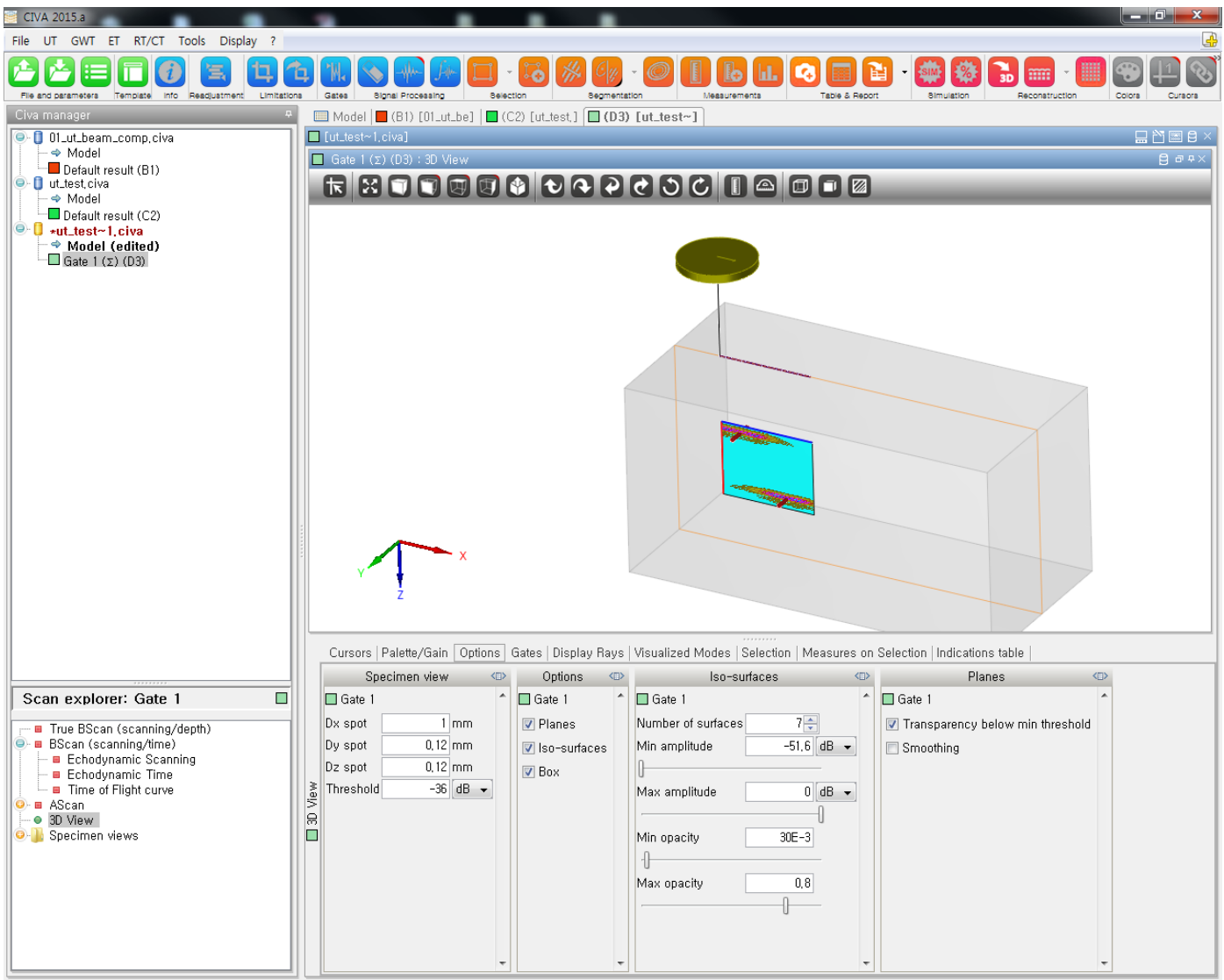
❖Simulation settings



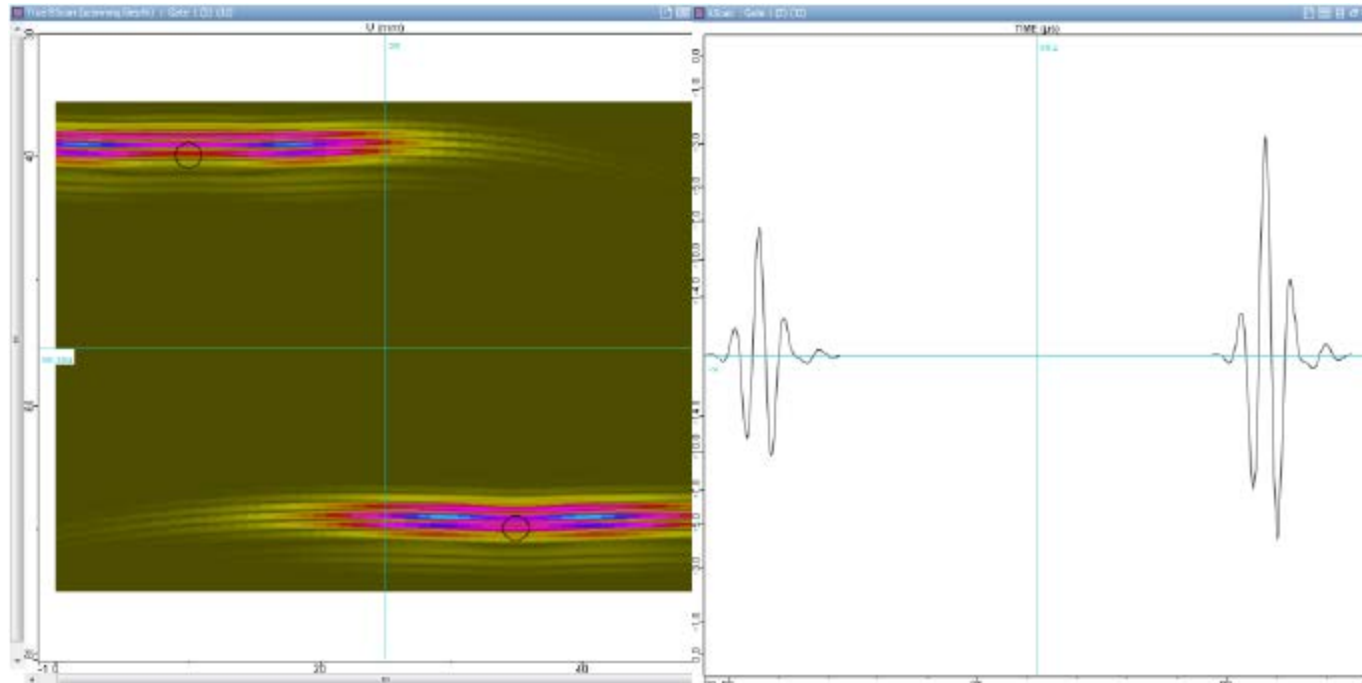
❖해석 진행(Run)



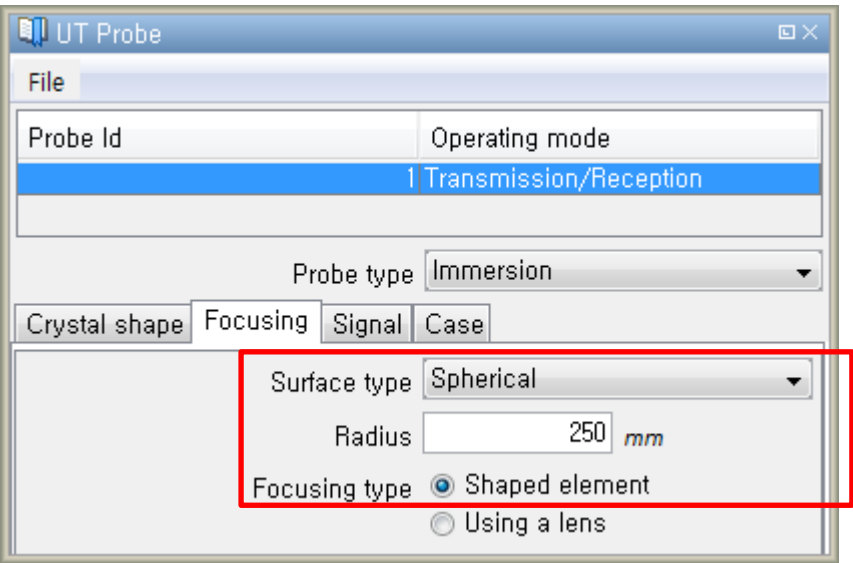
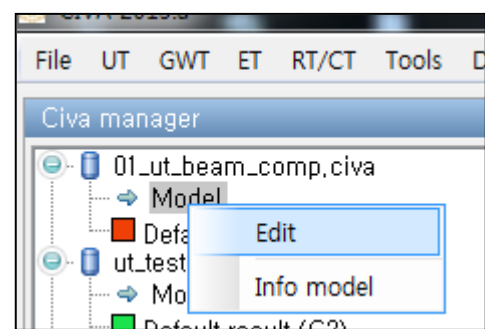
❖결과 확인(1/2)



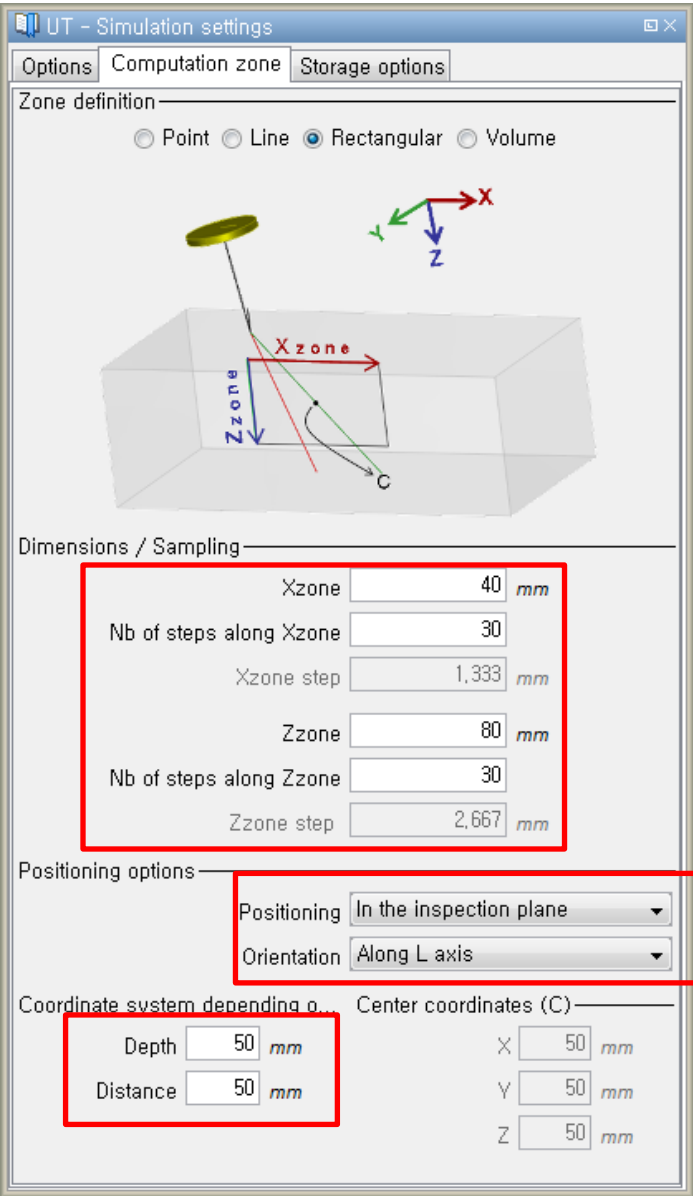
- B-scan, A-Scan 형상



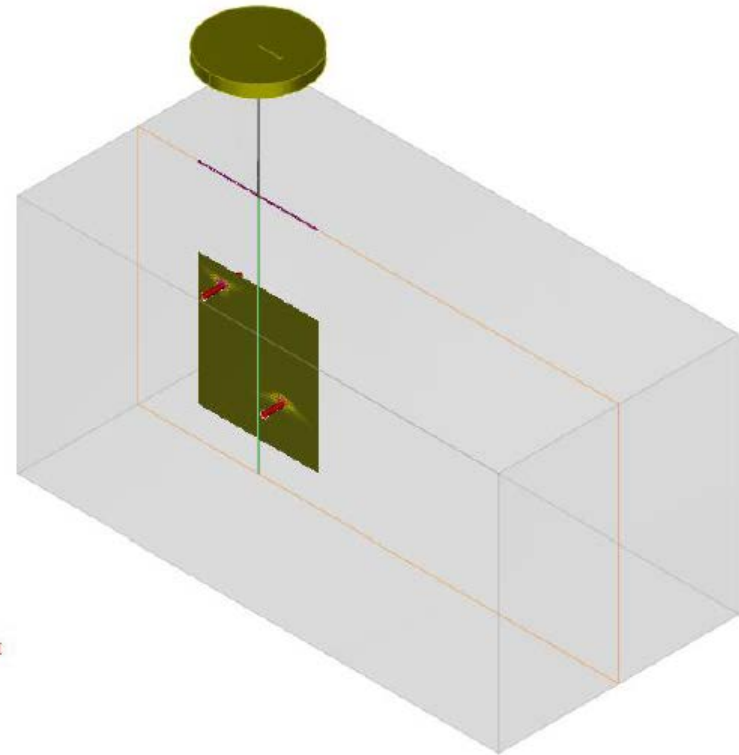
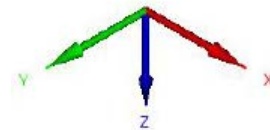
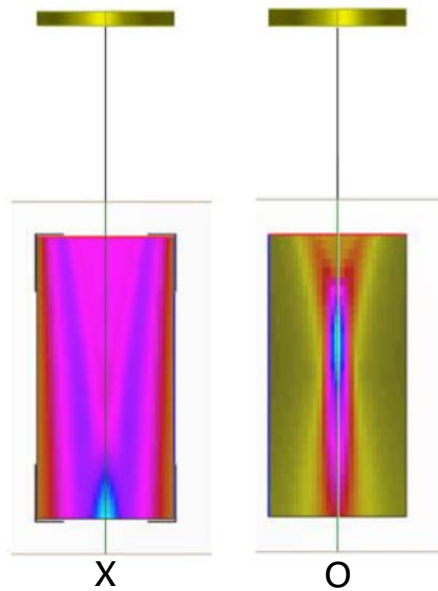
❖Inspection with a focused transducer



❖Simulation Settings



- Focusing surface 여부에 따른 결과 차이

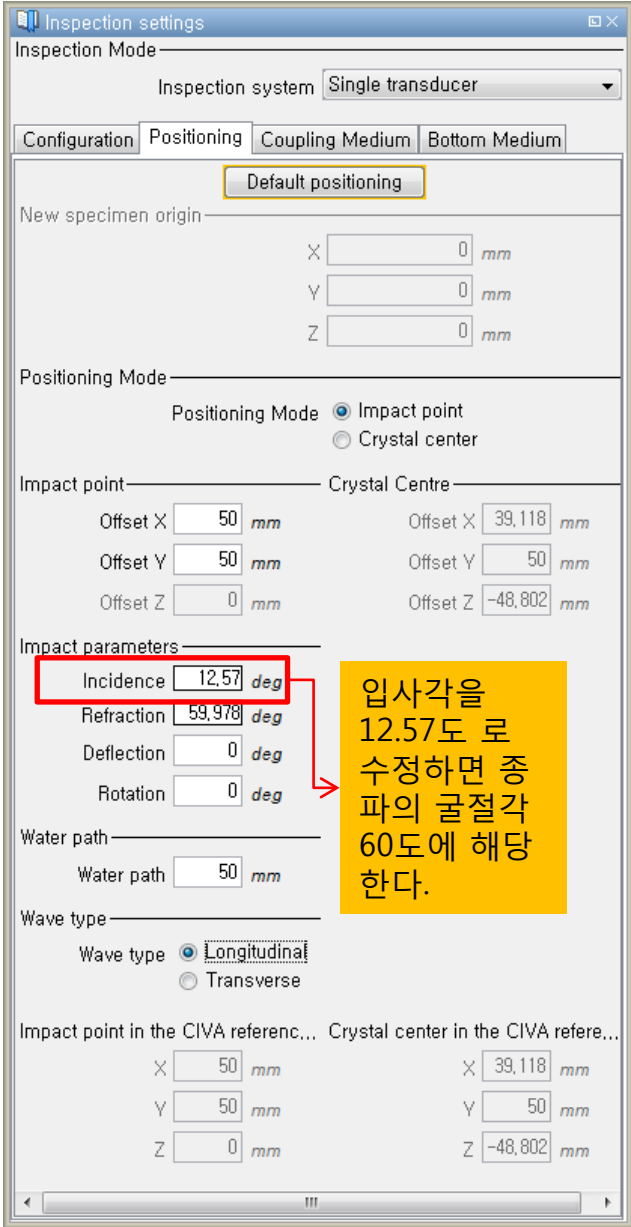
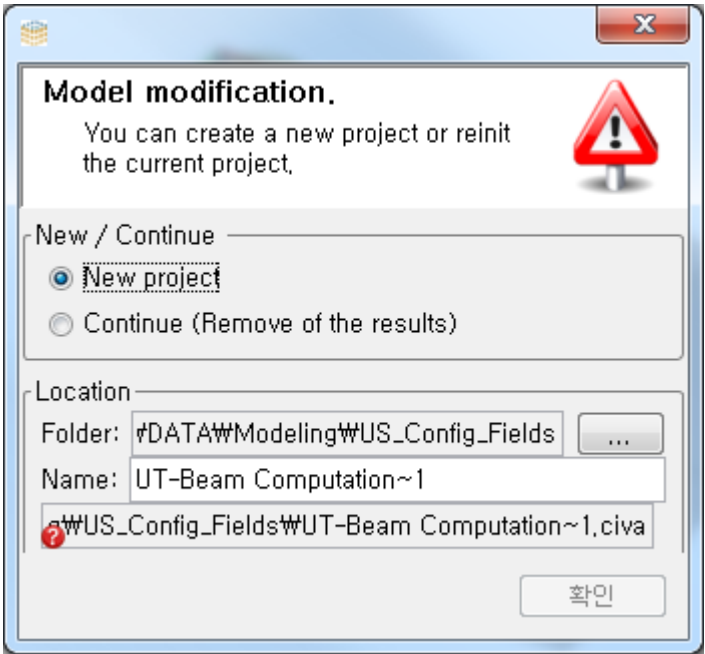
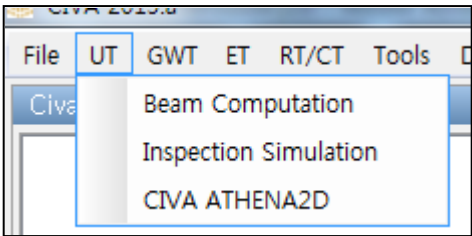


❖ Example – Immersion Testing

- 1. L0 inspection with a non-focused transducer
- 2. L0 inspection with a spherically focused transducer
- 3. L60 inspection

❖L60도 해석 준비 및 Inspection 설정

- Beam Computation 모드
- Create a new file 및 save 파일
- Inspection setting – Positioning 선택



❖Simulation 설정(해석 영역 선정)

UT - Simulation settings

OptionsComputation zoneStorage options

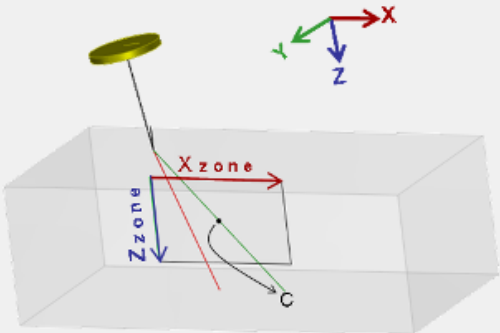
Zone definition

☐ Point

☐ Line

☒ Rectangular

☐ Volume



Dimensions / Sampling

Xzone

40

mm

Nb of steps along Xzone

30

Xzone step

1,333

mm

Zzone

80

mm

Nb of steps along Zzone

30

Zzone step

2,667

mm

Positioning options

Positioning

In the inspection plane

Orientation

Along L axis

Coordinate system depending o...Center coordinates (C)

Depth

25,017

mm

X

93,292

mm

Distance

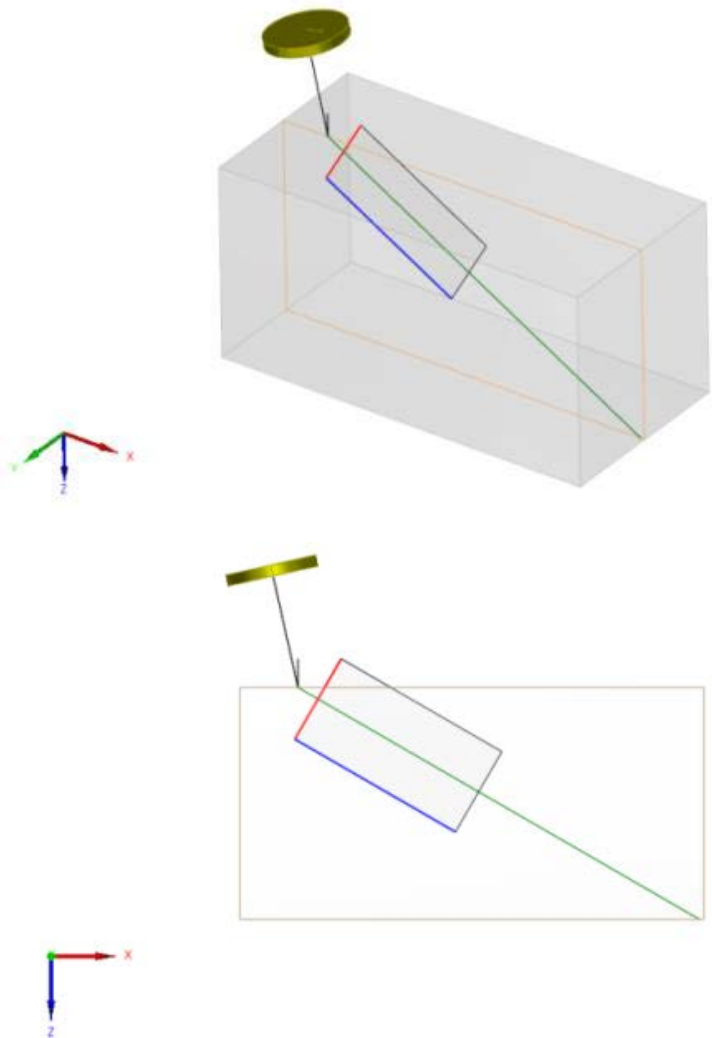
50

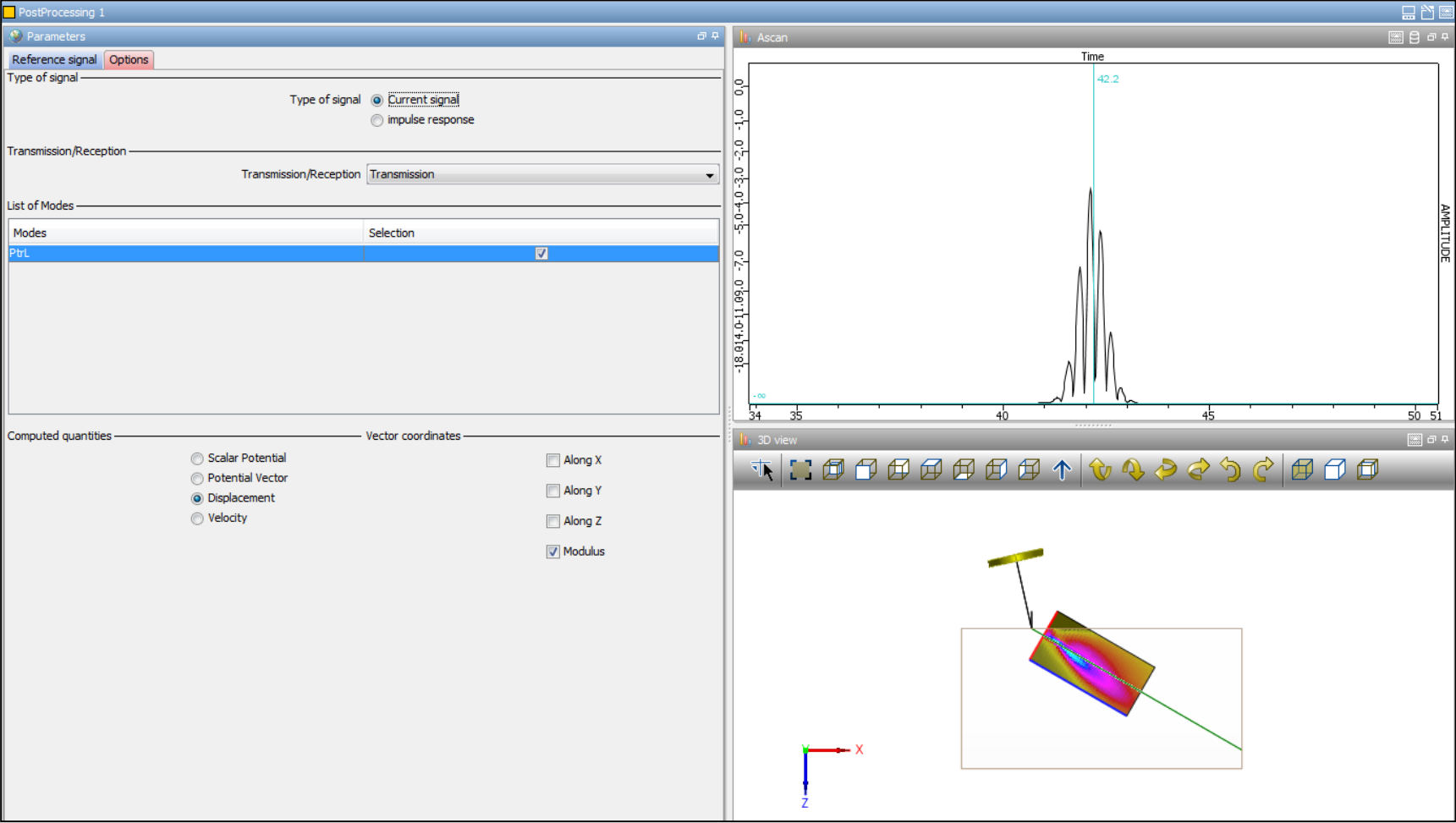
mm

Y

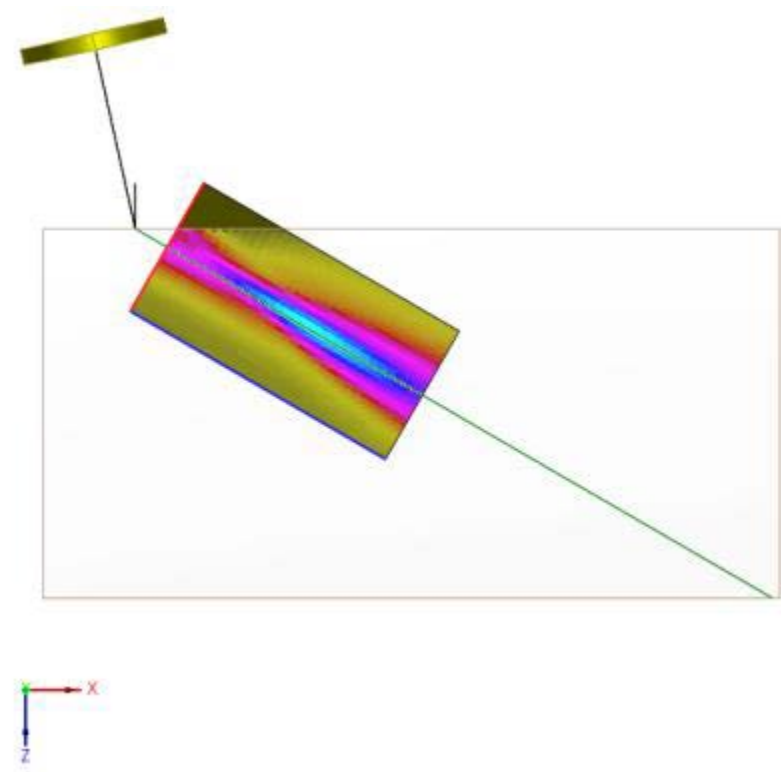
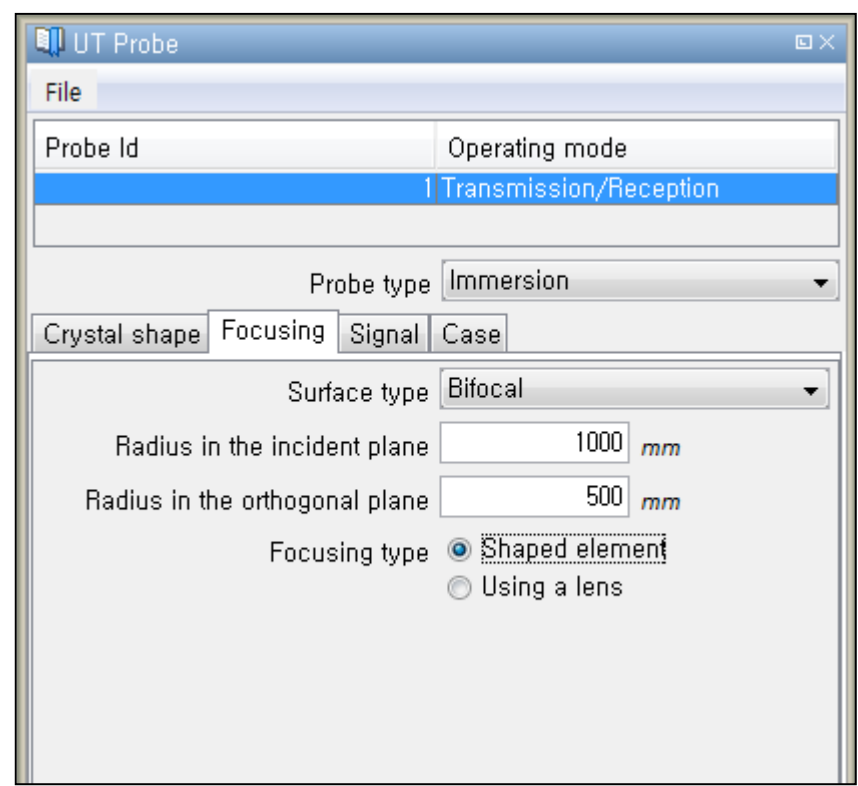
50

mm





❖Bifocal 계산 설정 및 결과



Thank You !

대한민국 전기 · 기계

해석설계컨설팅대표회사

WWW.JAEWOO.COM

TEL.82.2.515.2600(代) / FAX.82.2.515.3051

cae@jaewoo.com