

**Welcome to CST !**



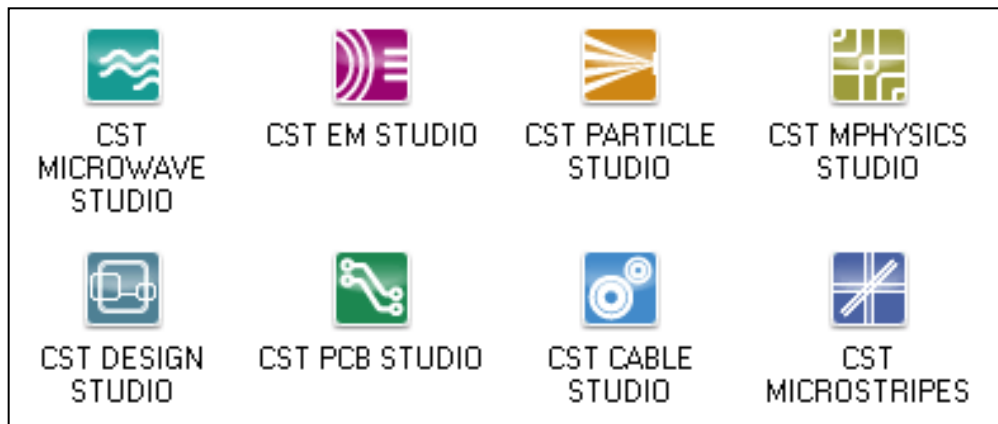
**CST STUDIO SUITE™  
Training Class**

**Core Module**



# About CST

- Founded in 1992
- 170 employees
- World-wide distribution network
- Focus on 3D EM simulation



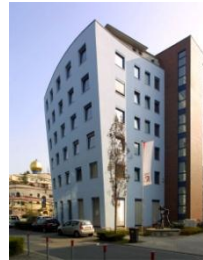
# CST Worldwide



CST West Coast



CST of America



CST Europe



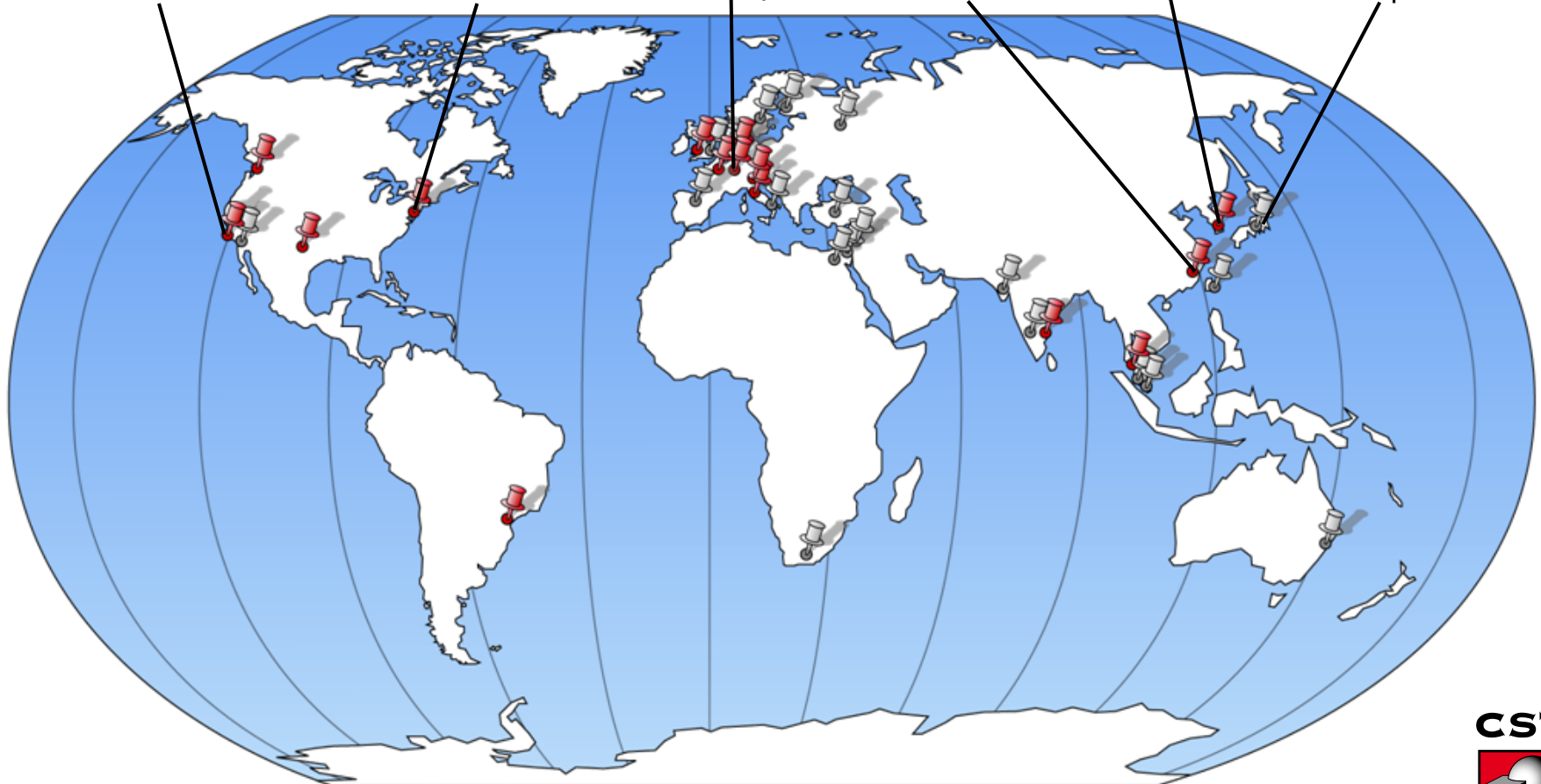
CST China



CST of Korea



AET Japan



# CST Products



**CST STUDIO SUITE™**

Common Easy-To-Use Pre- and Post-processing Engine



**CST MICROWAVE STUDIO®**

Our Flagship Product  
for RF Simulations



**CST CABLE STUDIO™**



**CST PCB STUDIO™**



**CST MICROSTRIPES™**

RF Simulations  
for Special  
Applications



**CST DESIGN STUDIO™**

Circuit Simulator  
Allows Coupling of 3D Models



**CST PARTICLE STUDIO®**

Interaction of EM Fields with  
Free Moving Charges



**CST MPHYSICS STUDIO™**

Thermal and Mechanical  
Effects of EM Fields



**CST EM STUDIO®**

Simulations of Static or  
Low-Frequency Fields

# Built-In Help Mechanisms

# Documentation

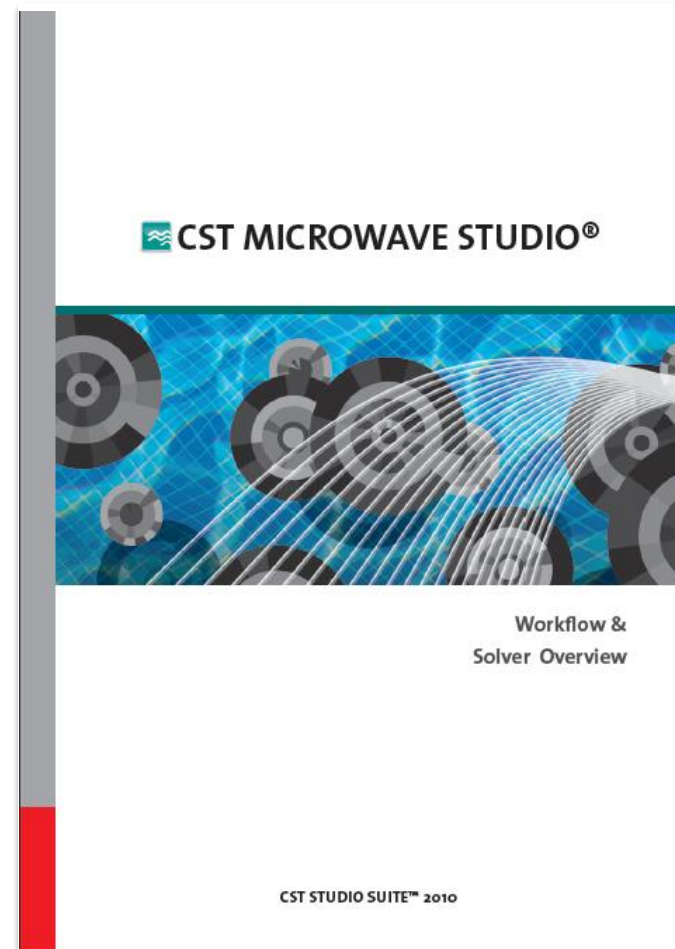
<CST\_INSTALLATION\_DIR>\Documentation\

- Folder: C:\Program Files (x86)\CST STUDIO SUITE 2010\Documentation
- CST CABLE STUDIO - Workflow.pdf
- CST DESIGN STUDIO - Workflow.pdf
- CST EM STUDIO - Workflow and Solver Overview.pdf
- CST MICROSTRIPES - Workflow and Solver Overview.pdf
- CST MICROWAVE STUDIO - Workflow and Solver Overview.pdf
- CST MPHYSICS STUDIO - Workflow and Solver Overview.pdf
- CST PARTICLE STUDIO - Workflow and Solver Overview.pdf
- CST PCB STUDIO - Workflow and Solver Overview.pdf
- CST STUDIO SUITE - Getting Started.pdf



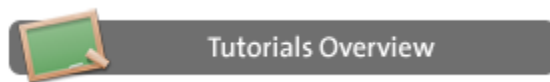
The introductory books are a good starting point to learn the workflow of the CST STUDIO SUITE™ products.



All books are available as pdf documents in the "Documentation" subfolder of your CST installation.



# Tutorials

Step-by-Step tutorials are available for CST MICROWAVE STUDIO® and CST EM STUDIO®.



 <p>CST MICROWAVE STUDIO®</p>	<a href="#">CST MICROWAVE STUDIO® Tutorial Overview</a>
 <p>CST EM STUDIO®</p>	<a href="#">CST EM STUDIO® Tutorial Overview</a>



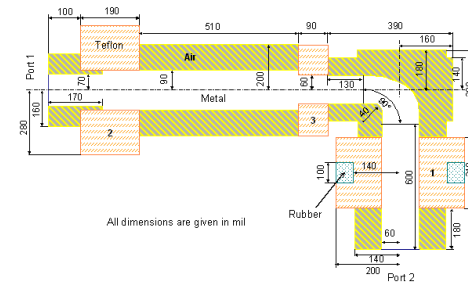
## Geometric Construction

### Introduction and Model Dimensions

In this tutorial you learn how to simulate coaxial structures. As a typical example for a coaxial structure you will analyze a 90 degree coaxial connector. The following explanations on how to model and analyze this device can also be applied to other devices containing coaxial components.

CST MICROWAVE STUDIO® provides a wide variety of different solvers and results. This tutorial, however, concentrates on S-parameters. The results will be obtained by two alternative techniques. One simulation will be performed in time domain on a hexahedral mesh and the other in frequency domain on a tetrahedral mesh.

We strongly suggest that you carefully read through the CST STUDIO SUITE™ *Getting Started* and CST MICROWAVE STUDIO® *Workflow and Solver Overview* manual before starting this tutorial.














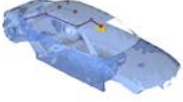

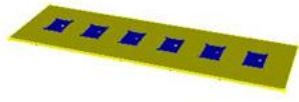


The structure shown above consists of several coaxial sections. The inner conductor of the connector is made from perfect electrically conducting material and is embedded in vacuum. This structure is mounted at three locations with Teflon rings. One of these fixtures additionally contains a rubber ring.


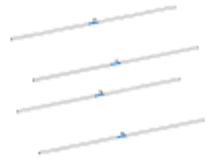
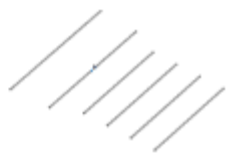
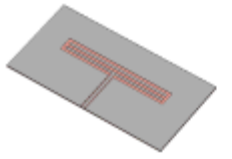
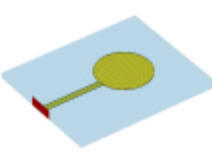
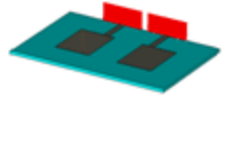


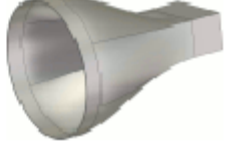
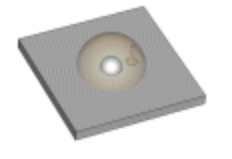
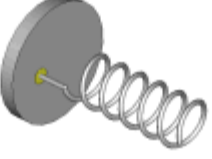

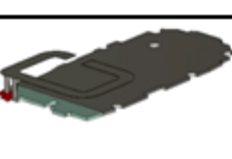


# Examples Overview

Many pre-calculated examples are available.

 CST MICROWAVE STUDIO®	
 CST EM STUDIO®	
 CST PARTICLE STUDIO®	
 CST MPHYSICS STUDIO™	
 CST DESIGN STUDIO™	
 CST PCB STUDIO™	
 CST CABLE STUDIO™	
 CST MICROSTRIPES™	



Antenna Calculation Examples



# Online Help (I)

The screenshot shows a Windows Internet Explorer browser window displaying the CST STUDIO SUITE Help documentation. The browser's address bar shows the file path: `file:///C:/Program%20Files%20(x86)/CST%20STUDIO%20SUITE%202010/Online%20Help/cst_studio_suite_h...`. The page title is "CST STUDIO SUITE Help".

The main content area features a large heading "CST STUDIO SUITE™" and a sub-heading "Welcome to CST STUDIO SUITE™ Help". Below this, it lists the software tools included: CST MICROWAVE STUDIO®, CST EM STUDIO®, CST PARTICLE STUDIO®, CST DESIGN STUDIO™, CST CABLE STUDIO™, CST MPHYSICS STUDIO™, CST PCB STUDIO™, and CST MICROSTRIPES™.

A welcome message states: "Welcome to the CST STUDIO SUITE™ help documentation. It contains everything you need to know when starting with CST's software tools and provides answers to common questions. To use the CST help documentation most efficiently you should setup an online Support Account first, as explained in the Quick Help Link below. Afterwards the login data should be entered under *Help* ⇄ *Online Support*..."

Another message says: "If you want to start using one of the modules, go to one of the Tutorials or watch one of our Getting Started Videos. You can also use the navigation tree on the left to get specific information about the tools."

The "Quick Help Links" section includes six buttons with icons: "Global Search" (binoculars), "Getting Started Video" (video camera), "How to Create a Support Account" (life vest), "Tutorials Overview" (greenboard), "Spotlight: CST STUDIO SUITE™ 2010" (warning sign), and "Examples Overview" (document with stars).

The "Special Online Help" section lists three links: [How to Use the Help System?](#), [CST STUDIO SUITE Overview](#), and [CST User Forum](#).

The "Related & Special Topics" section lists three links: [EDA-Links](#), [Distributed Computing Overview](#), and [Bending Sheet Feature](#).

At the bottom, a note says: "If this help documentation does not answer your specific questions, feel free to contact the CST Support team at [info@cst.com](mailto:info@cst.com)."

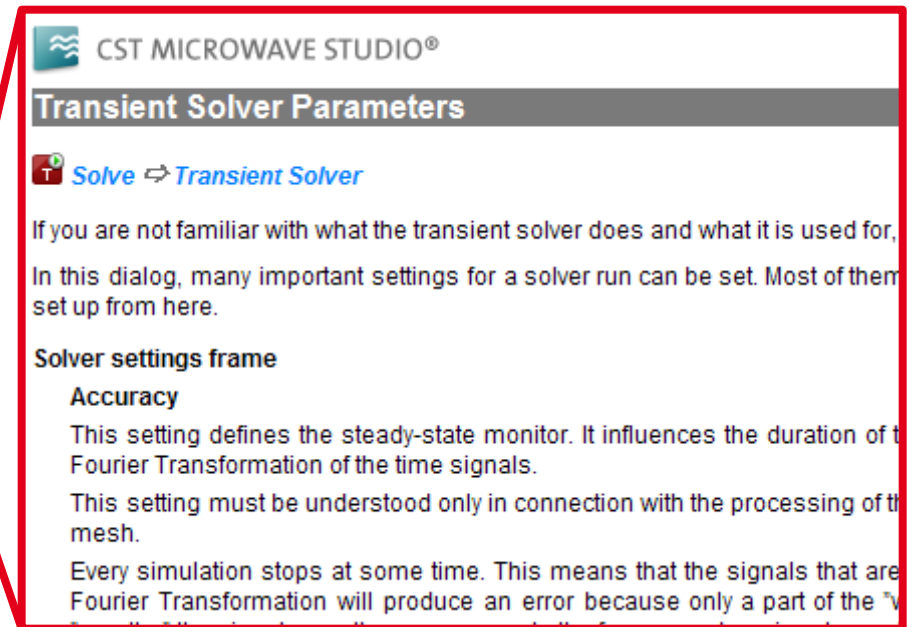
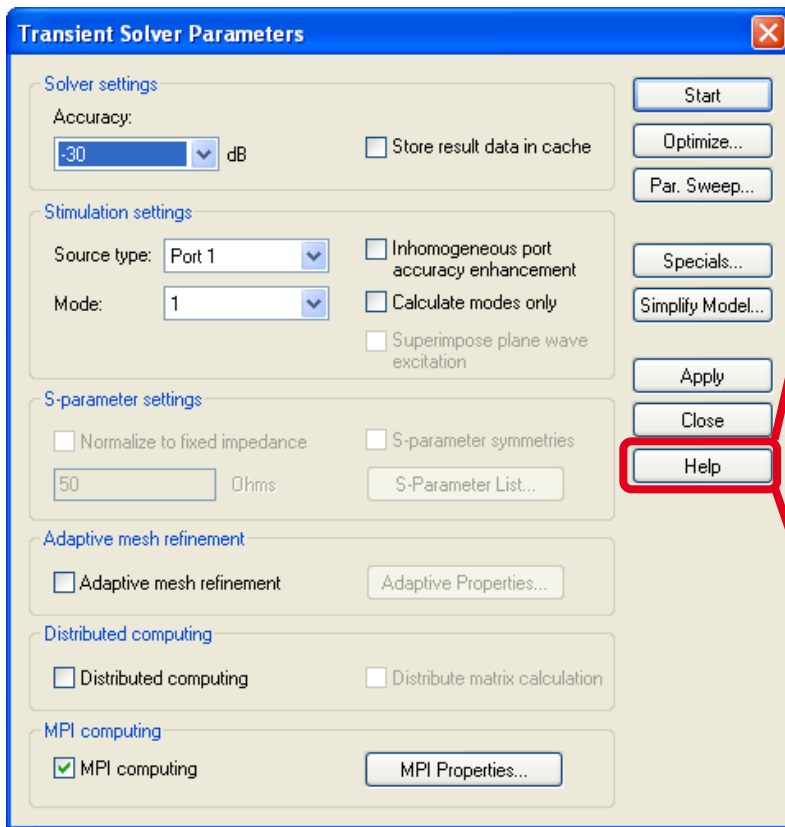
The left sidebar contains a navigation tree with categories like "Getting Started", "General Features", "Components of a Design", "Examples", and "Advanced Topics".



# Online Help (II)

- Links to Online Help -

- In almost all dialogs there is a link to the online help documents which provides you with extensive help for all settings.



Linked page of the online help

Transient solver main dialog

# CST Webpage

The screenshot shows the CST Computer Simulation Technology website. The browser window title is "3D EM Field Simulation - CST Computer Simulation Technology - Windows Internet Explorer". The address bar shows "http://cst.com/". The website header features the CST logo and navigation links: "Applications", "Products", "Showroom", "Events", "Support", and "Corporate". A search bar is located on the right side of the header. The main content area is titled "Complete Technology for 3D Electromagnetic Simulation". It includes a sidebar on the left with the text "Advanced Technology It's in our Genes CST STUDIO SUITE 2010" and a large image of a ram's head. The main text describes the company's simulation capabilities and lists several key areas: "Microwave & RF", "Signal Integrity / EDA", "EMC / EMI", "Charged Particle Dynamics", and "Low Frequency". A "REGISTER NOW" button is visible on the right side, along with a "Whats new?" section containing several news items. The footer of the browser window shows "Done" and "Internet" with a 100% zoom level.

3D EM Field Simulation - CST Computer Simulation Technology - Windows Internet Explorer

http://cst.com/

File Edit View Favorites Tools Help

3D EM Field Simulation - CST Computer Simulation Tec...

CST COMPUTER SIMULATION TECHNOLOGY

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Applications Products Showroom Events Support Corporate

Search

**Advanced Technology**  
It's in our Genes  
CST STUDIO SUITE 2010

**Complete Technology for  
3D Electromagnetic Simulation**

Choose Complete Technology for your electromagnetic simulation needs. Profit from our broad range of solver technology in an intuitive interface.

Find the solution best fitted for your problem in your market area:

**Microwave & RF**  
Passive microwave & RF component design...

**Signal Integrity / EDA**  
Signal Integrity is an ever increasing concern...

**EMC / EMI**  
Electromagnetic Compatibility and Electromagnetic Interference...

**Charged Particle Dynamics**  
Dynamics of free moving charged particles in electromagnetic fields...

**Low Frequency**  
Structures which are very small in comparison to a wavelength...

[www.cst.com](http://www.cst.com)

**EUROPEAN UGM 2010**

**REGISTER NOW**

**Whats new?**

CST University Publication Award 2009: Winners Announced  
[more...](#)

CST Previews New Tool for Multi-Physics Simulation at EuMW 2009  
[more...](#)

Efficient sensitivity analysis methods introduced in CST MICROWAVE STUDIO 2010  
[more...](#)

CST Previews Major Product Release at EuMW 2009  
[more...](#)

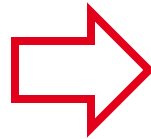
Selex assesses lightning protection systems for Radar with CST MICROWAVE STUDIO  
[more...](#)

Done Internet 100%



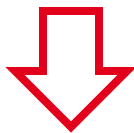
# CST Support Site

## Tutorial Videos



### Videos - CST MICROWAVE STUDIO®

- CST MICROWAVE STUDIO® - Getting Started (Part 1)
- CST MICROWAVE STUDIO® - Getting Started (Part 2)
- Talk related to CST MWS - AGILENT ADS co-simulation (CMOS VCSEL driver)
- Why to choose f\_min above f\_cutoff for Time Domain simulations?
- RCS Calculation of a PEC Sphere with Integral Equation solver
- Signal Integrity example - Co-Simulation of a simple Differential Via Pair



<b>My Account</b>
<b>Download</b>
<b>FAQ</b>
▶ CST MWS
CST EMS
CST PS
CST DS
CST MICROSTRIPES
MAFIA
Submit FAQ
<b>Application Notes</b>
<b>Support Videos</b>
<b>CST User Forum</b>
<b>Search</b>
<b>Sitemap</b>
<b>UGM</b>

### CST MWS FAQs

Search for

General	General	Hardware	License	Operating System
Pre-Processing	CAD Import/Export	Modelling	Materials	Meshing
	Ports	Boundaries	Monitors	
Solver	MWS-T	MWS-F	MWS-R	MWS-E
Post-Processing	Export	Postprocessing	SPICE	Visualisation
	Farfields / RCS	Q-Factor / Losses	Eye-Diagram / TDR	SAR
	Result Templates			
Co-Simulation	Co-Simulation	ADS/AWR	DS	Thermal
Automation	JobControl	Sweep/Optimisation	VBA/OLE	Distributed Computing


## FAQ Section



# CST User Forum

## CST User Forum

### Forum: CST STUDIO SUITE™

	Thread	Last Post	Replies	Views
	Welcome by Moderator	by Moderator 24 Nov 2006 15:32	0	428
	import problem from ADS by @aks	by @aks 29 Dec 2009 10:08	0	1
	Reference Installation directory on CST DC Main Control in Linux by brecht	by Elgi 21 Dec 2009 22:32	1	19
	CST MWS crashing and freezing menus by johnny	by johnny 14 Dec 2009 10:18	3	56
	Import anistropic voxel model by juliano	by juliano 13 Dec 2009 16:01	0	7
	Scan angle in Frequency domain by maxclark153	by maxclark153 11 Dec 2009 16:07	0	9
	"strange face in conductor body" error by alvaro_diaz	by alvaro_diaz 7 Dec 2009 19:52	0	12
	CST SP7 update for Main Controller on Linux by brecht	by Frank_S 4 Dec 2009 16:38	3	34
	windows 7 64 bit by shochst	by Frank_S 30 Nov 2009 16:00	1	55
	analysis of dielectric panel by banker1	by Moderator 25 Nov 2009 13:25	1	26

Ask your questions. Answers are provided by other users or CST engineers.

# CST Customer Support

## CST Malaysia

Phone: **+60 (3) 7731 5595**

Fax: +60 (3) 7722 5595

Email: [info@sea.cst.com](mailto:info@sea.cst.com)

Support available from  
9am - 5pm

# CST Training Courses

- The training courses for CST STUDIO SUITE™ provide you with the knowledge needed for an efficient start with the software.
- Currently the following trainings are offered on a regular basis. All upcoming courses are announced on the CST webpage.



CST STUDIO SUITE™

**MW & Antenna Training**

2 full days

**EMC / SI / PI Training**

2 full days

**Performance Training**

1 full day



CST PARTICLE STUDIO®

**Charged Particle  
Dynamics Training**

1 full day



CST EM STUDIO®

**LF Applications Training**

1 full day



CST MICROSTRIPES™

**CST MICROSTRIPES™  
Training**

1-2 full day(s)



CST CABLE STUDIO™



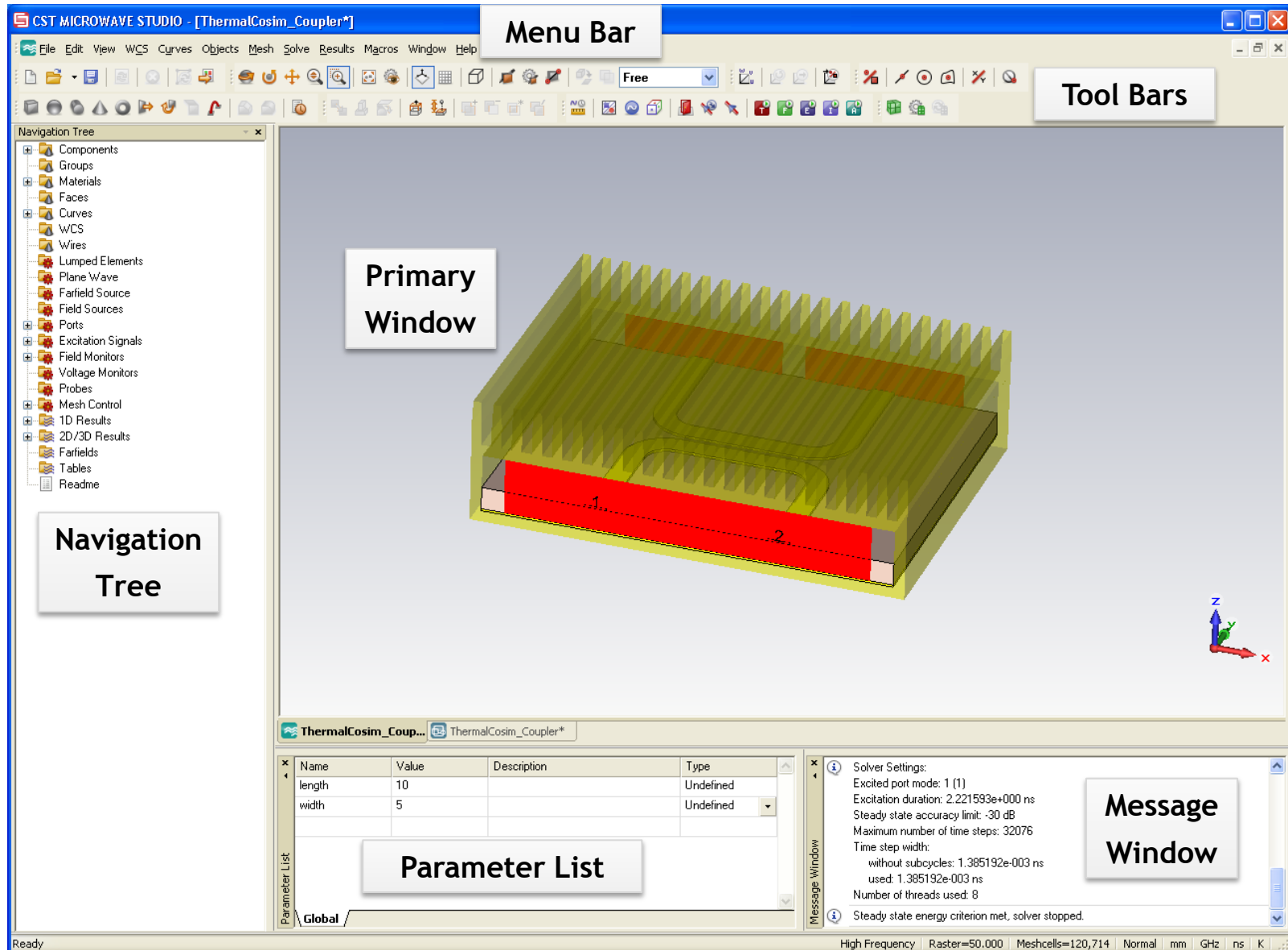
CST PCB STUDIO™

**Training on Demand**

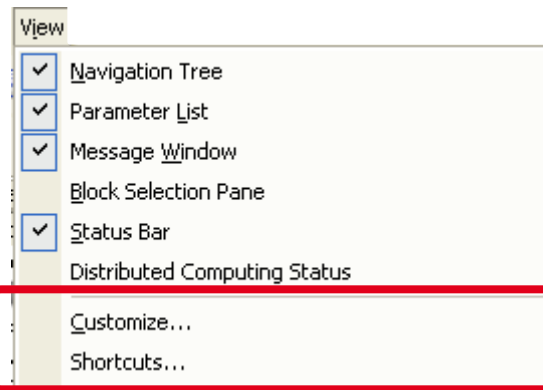


# Basic and Advanced Modeling

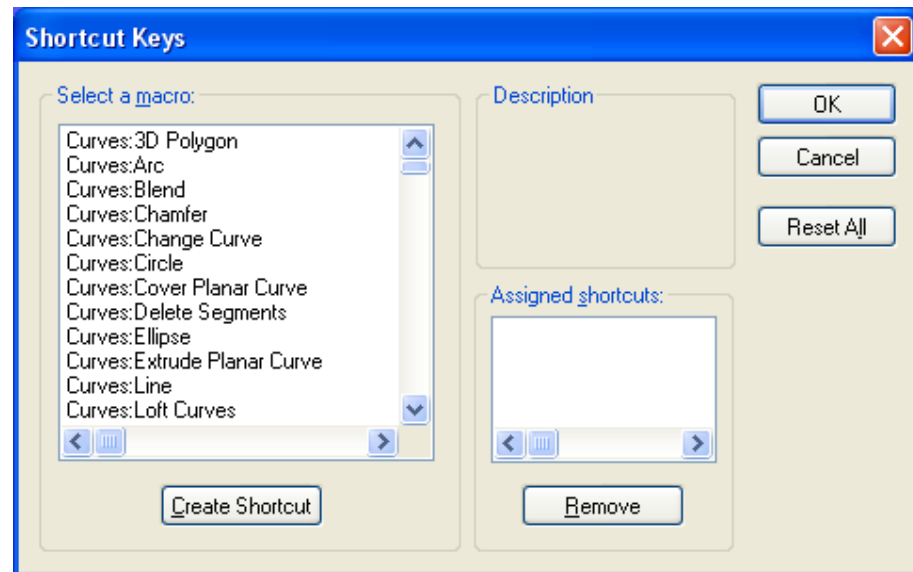
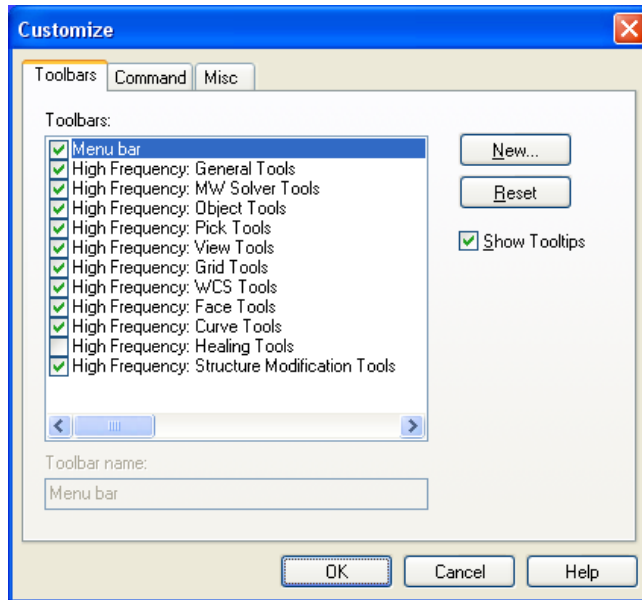
# Common User Interface



# Customize Your Environment




E.g., define a shortcut key to call your favorite macro.



# View Options



- “Rectangle zoom”  allows to zoom in a rectangular domain.
- Change the view by dragging the mouse while pressing the left button and a key.
  - **ctrl** - rotation
  - **shift** - in-plane rotation
  - **ctrl+shift** - panning
- Some other useful options are:
  - **spacebar** - reset view to structure,
  - **ctrl+f** - reset view,
  - **shift+spacebar** - zoom into selected shape,
  - **mouse wheel** - dynamic zoom to mouse pointer.

# Primitives



Cylinder 


Cone 

Torus 

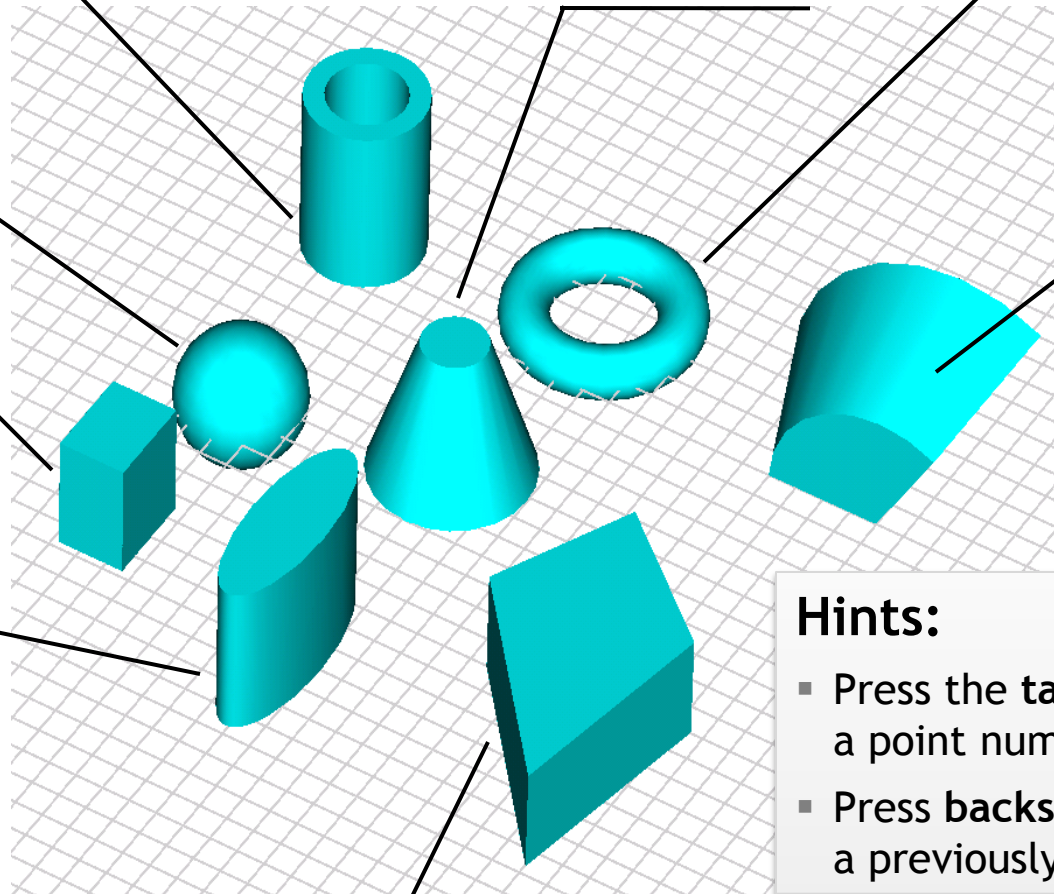
Sphere 

Rotation 

Brick 

Elliptical  
Cylinder 

Extrusion 

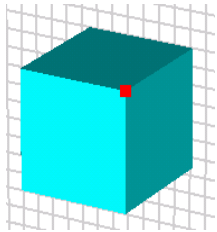


## Hints:

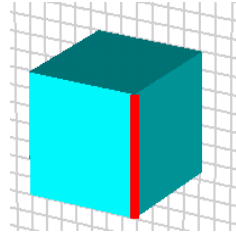
- Press the **tab-key** to enter a point numerically.
- Press **backspace** to delete a previously picked point.

# Picks

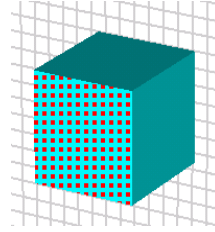
Pick a point, an edge, or a face in the structure.



Picked Point



Picked Edge

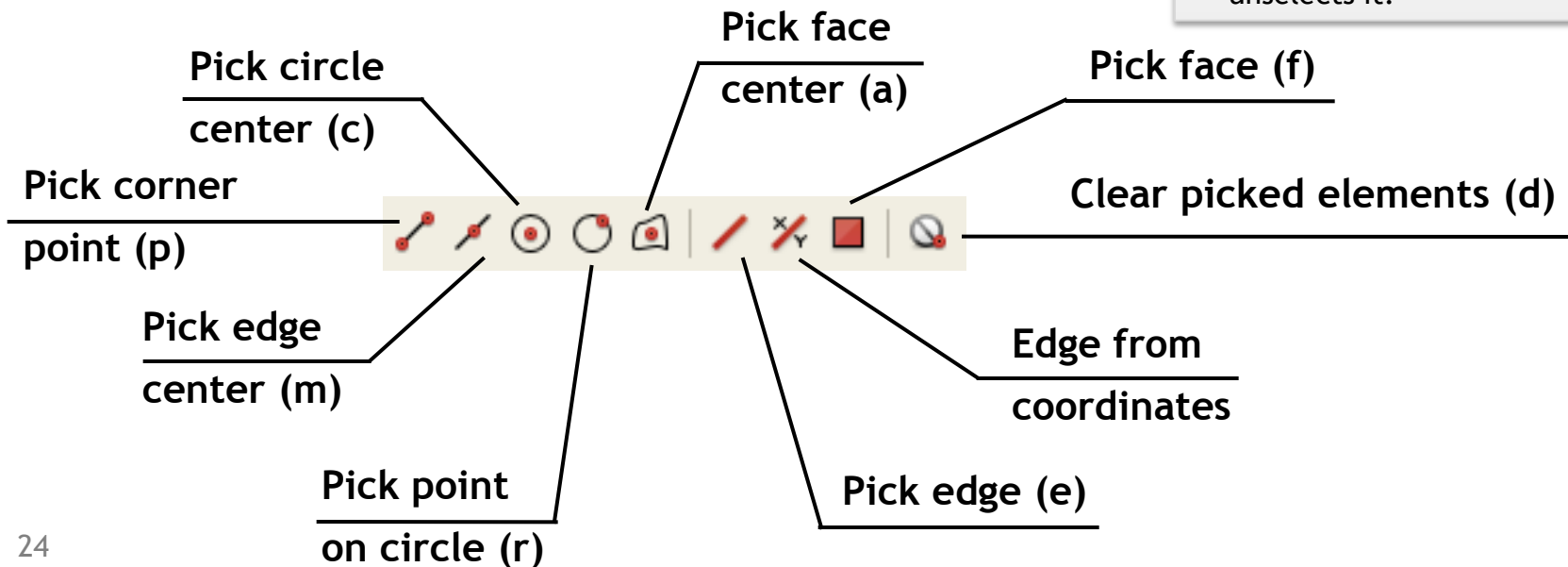


Picked Face

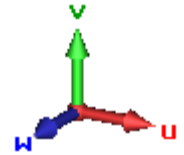
	Pick Point, Edge or Face	s
	Pick Point	p
	Pick Edge Midpoint	m
	Pick Face Center	a
	Pick Point on Circle	r
	Pick Circle Center	c
	Pick Point on Face	o
	Pick Edge	e
	Pick Face	f



## Hints:

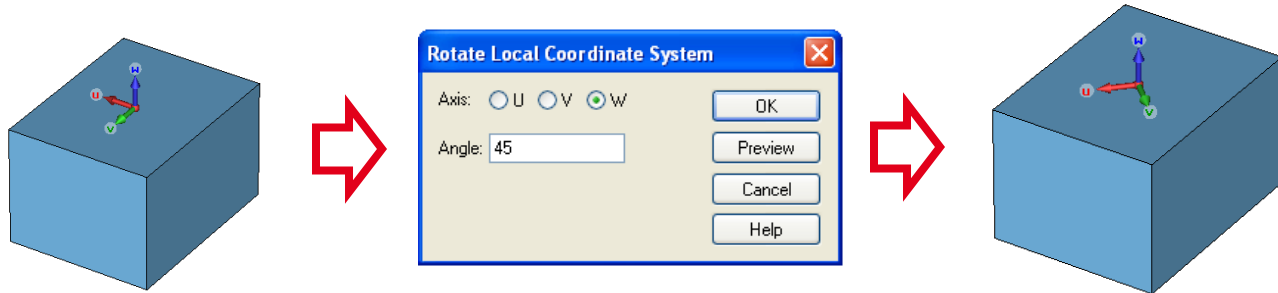
- Press "s" to activate all pick tools.
- To pick a point by given coordinates, press "p" and the tab-key.
- 2<sup>nd</sup> time picking an element unselects it.



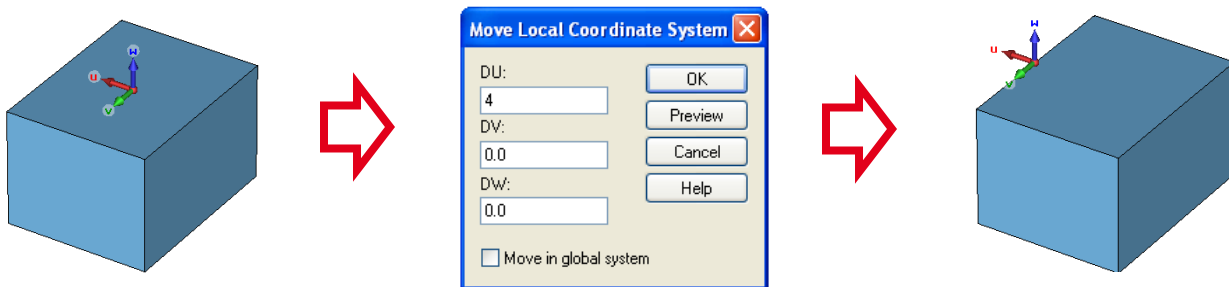
# Working Coordinate System



- The working coordinate system (WCS) allows the use of context dependent coordinates.
- Use  to switch on/off the WCS.
- Use  to rotate the WCS.

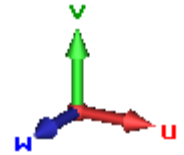


- Use  to move the WCS.



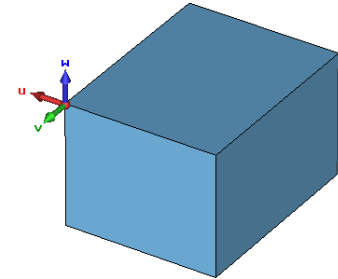
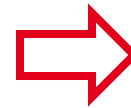
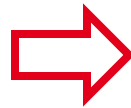
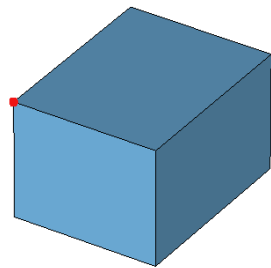


# Working Coordinate System

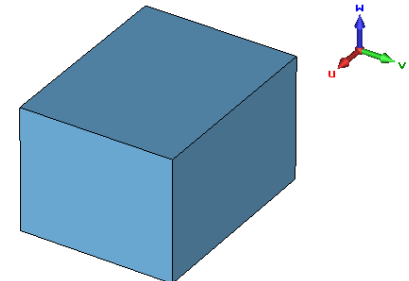
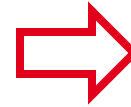
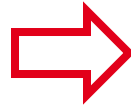
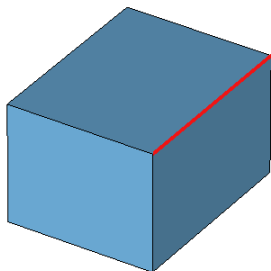


- The WCS can be aligned, e.g., with a point, an edge, or a face.

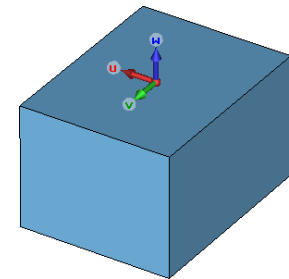
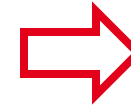
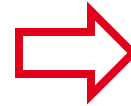
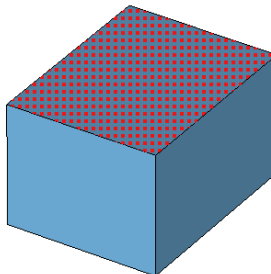
Align the WCS  
with a point



Align the WCS  
with an edge



Align the WCS  
with a face

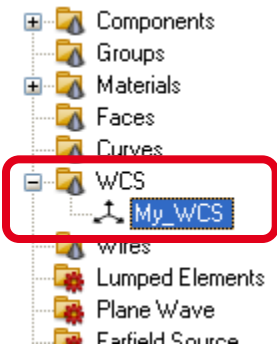
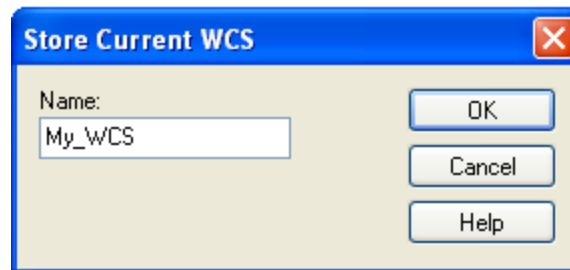
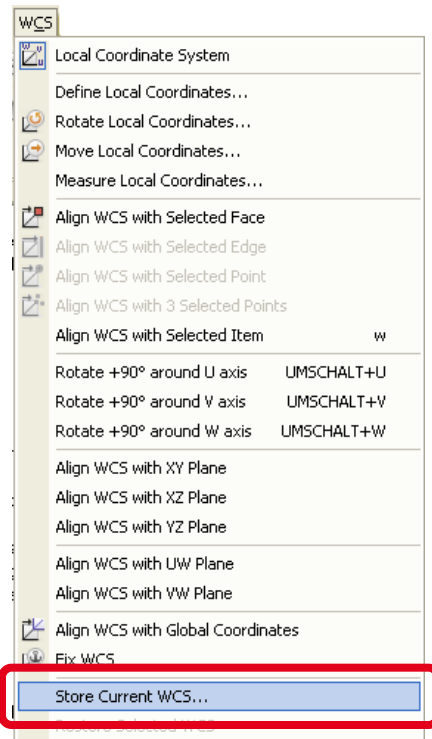


Press “w” to align the WCS with the currently selected object.

# Working Coordinate System



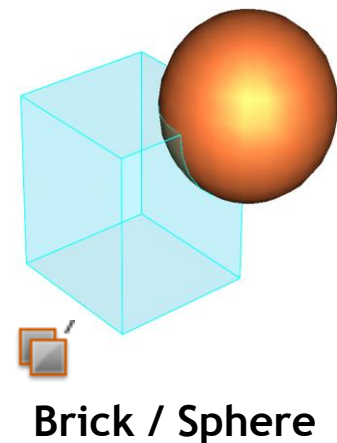
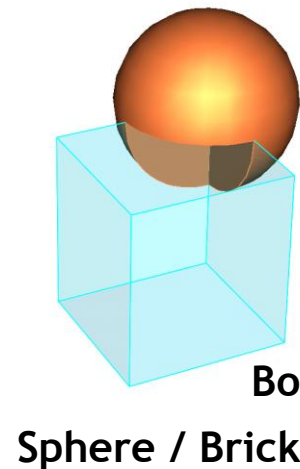
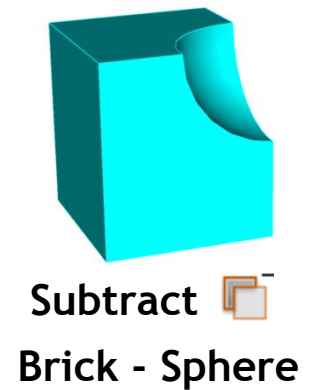
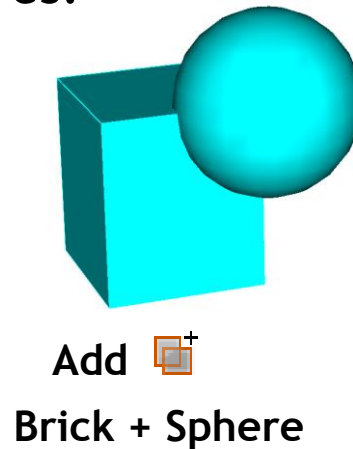
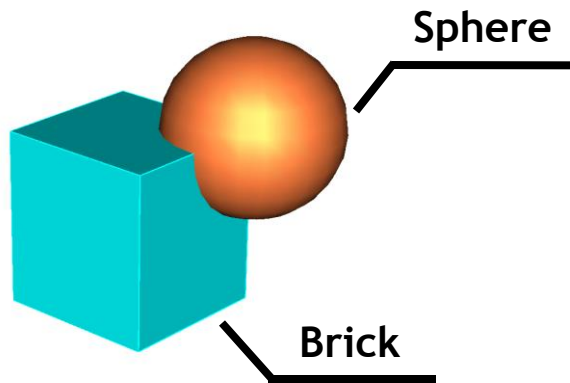
- The position of a WCS can be stored for later use.



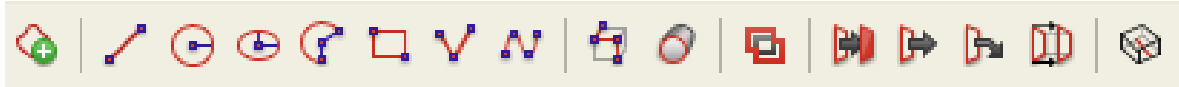
# Boolean Operations



- Boolean operations can be applied to two or more shapes to create more complex structures.



# Curve Modeling Tools - Overview (I)

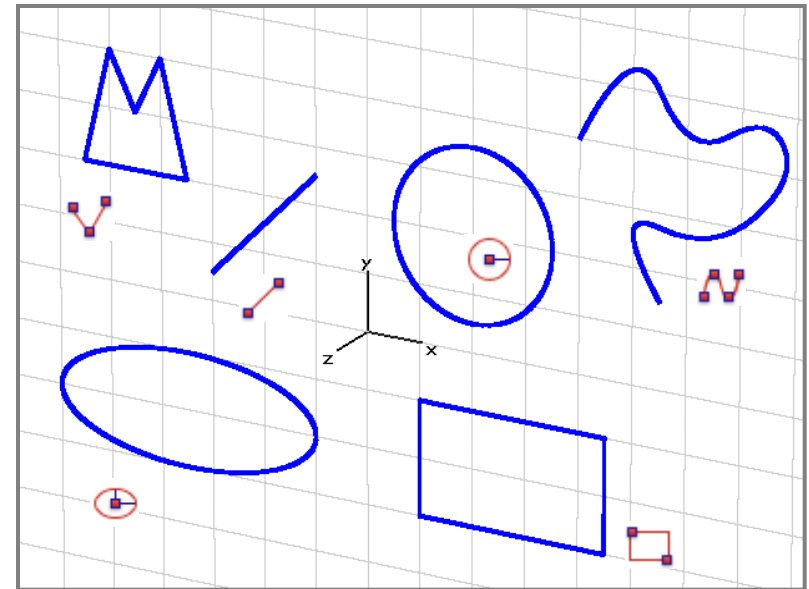


- Curves can be used for
  - structure generation,
  - thin wire generation,
  - integration path in post-processing,
  - healing CAD data.

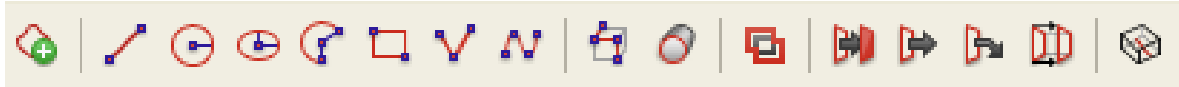


Basic Curves  
Generation

 Create new curve

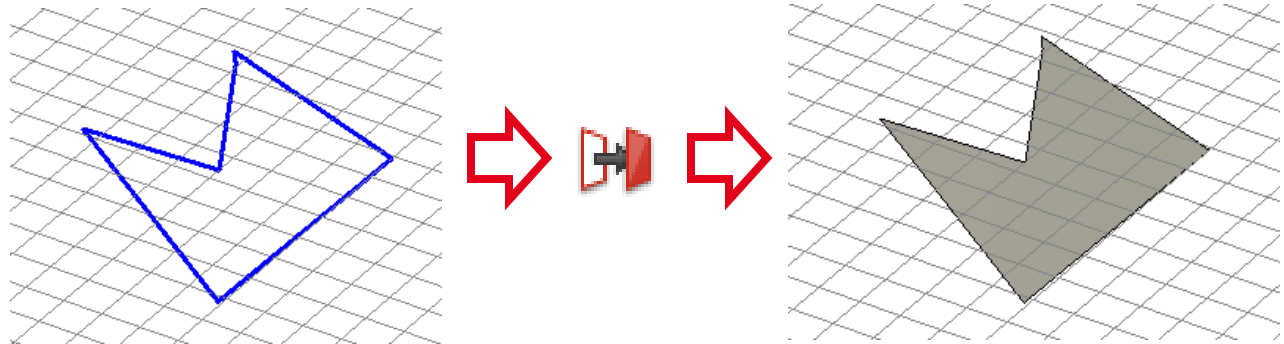


# Curve Modeling Tools - Overview (II)

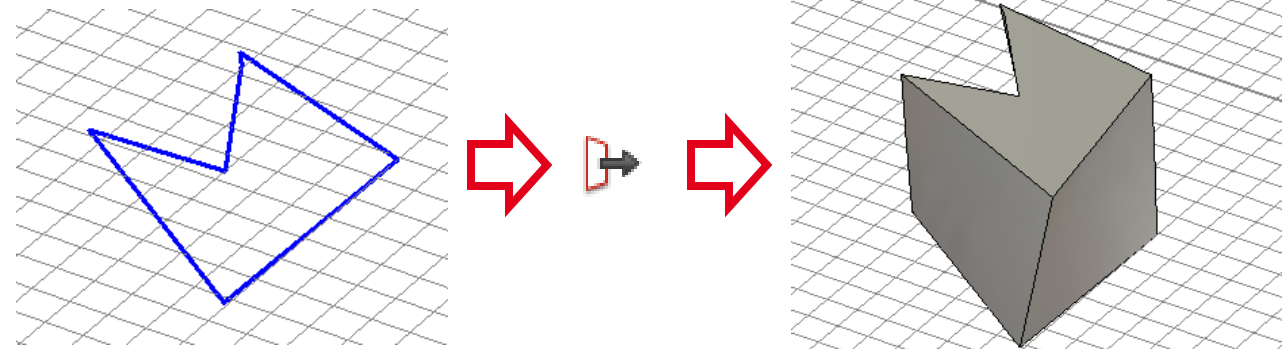


- Solids can be created from curves.

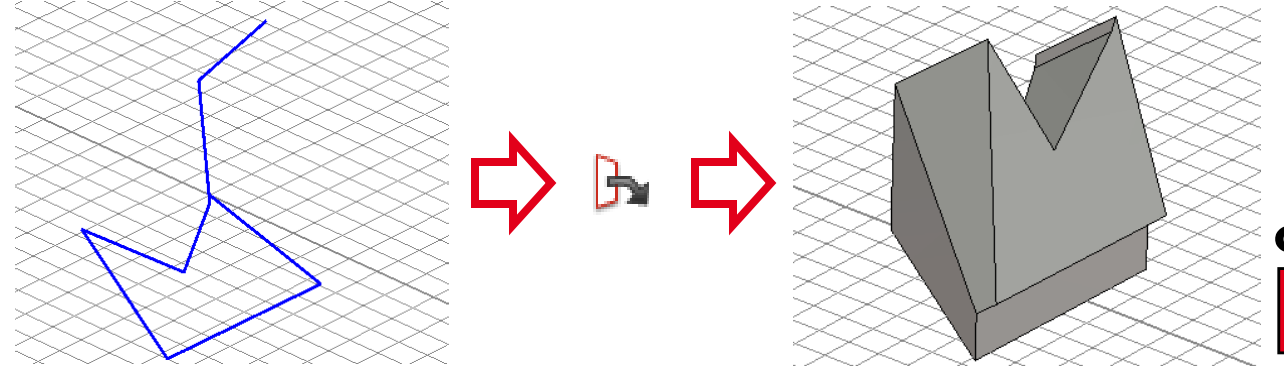
Creation of a Sheet from a Planar Curve



Extrusion of a Planar Curve

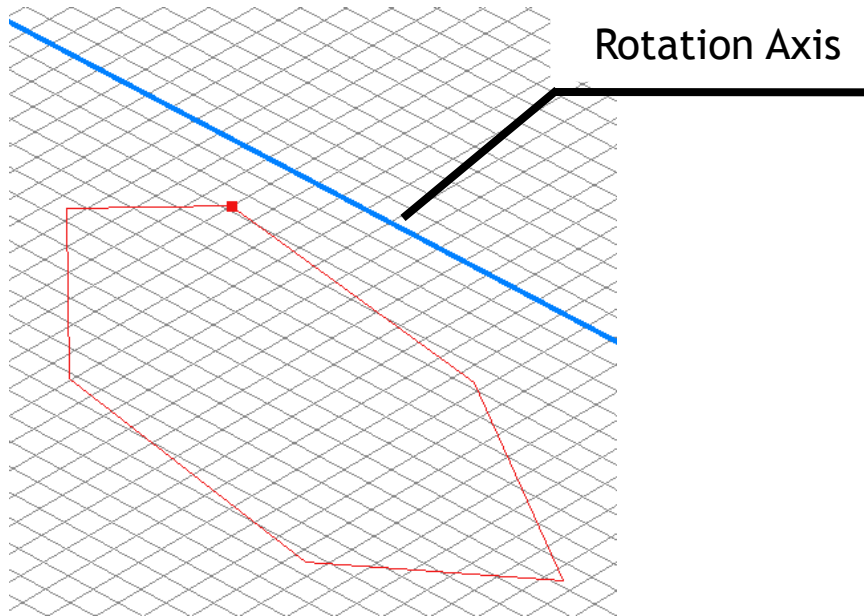


Sweep Curve



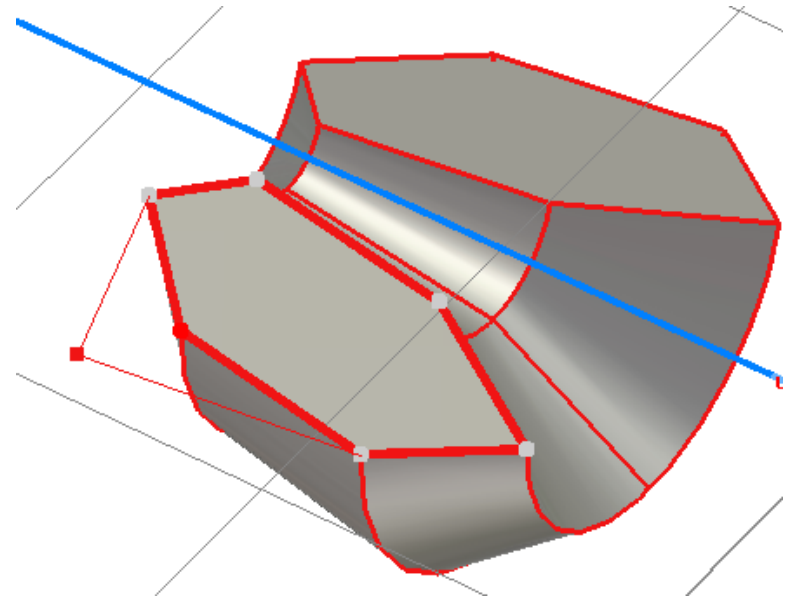


# Rotation of Profile



Draw the profile.

Press backspace to delete the last selected point.



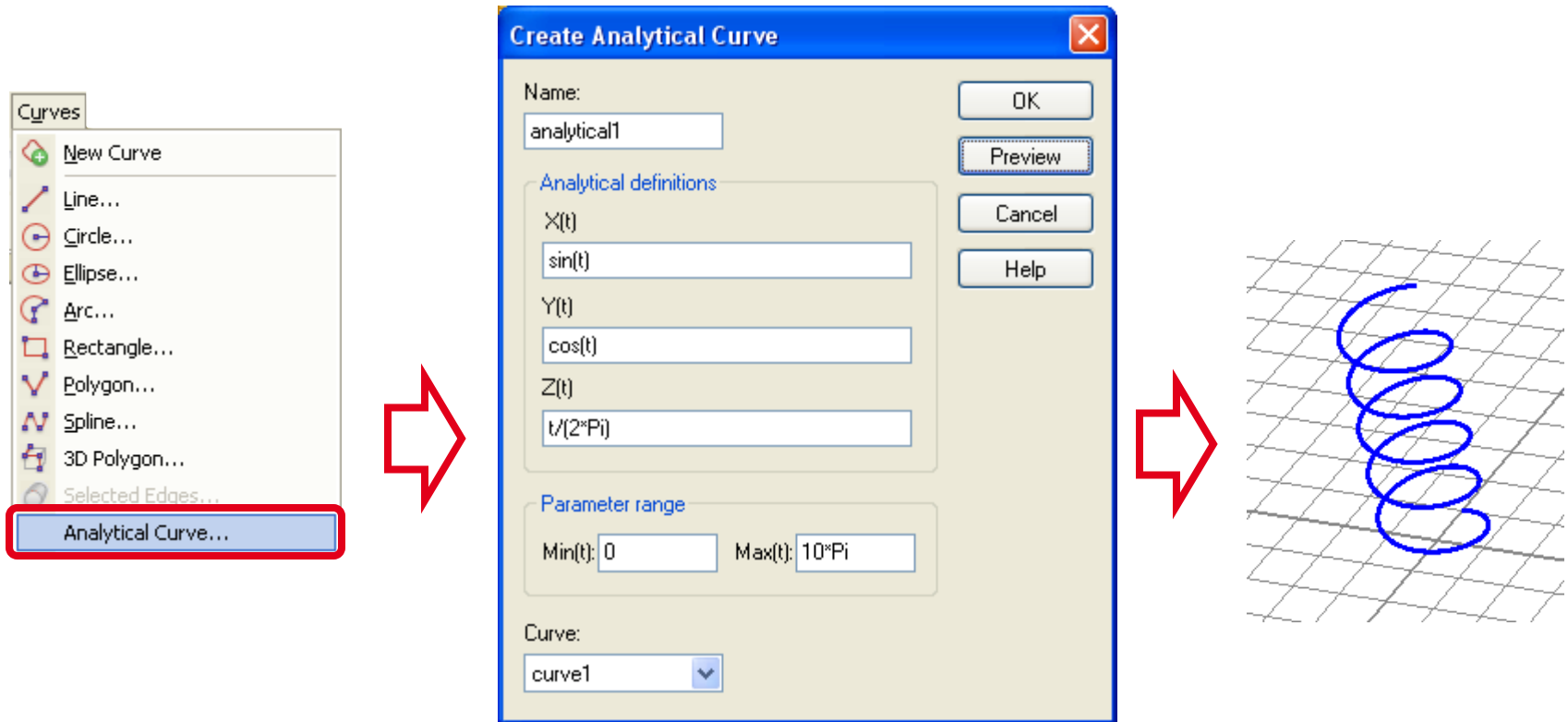
Specify rotation angle, material properties, etc.

Double click on any corner point to change its position.



# Analytical Modeling (I)

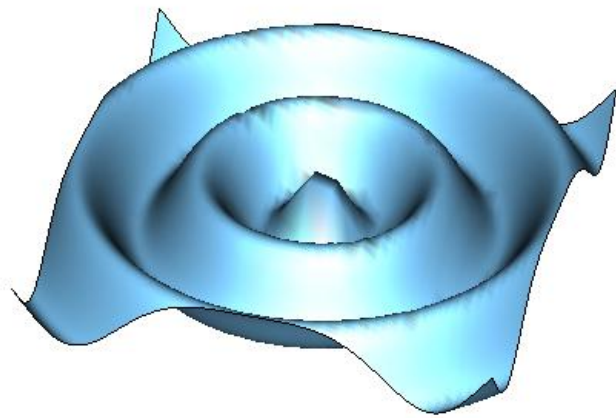
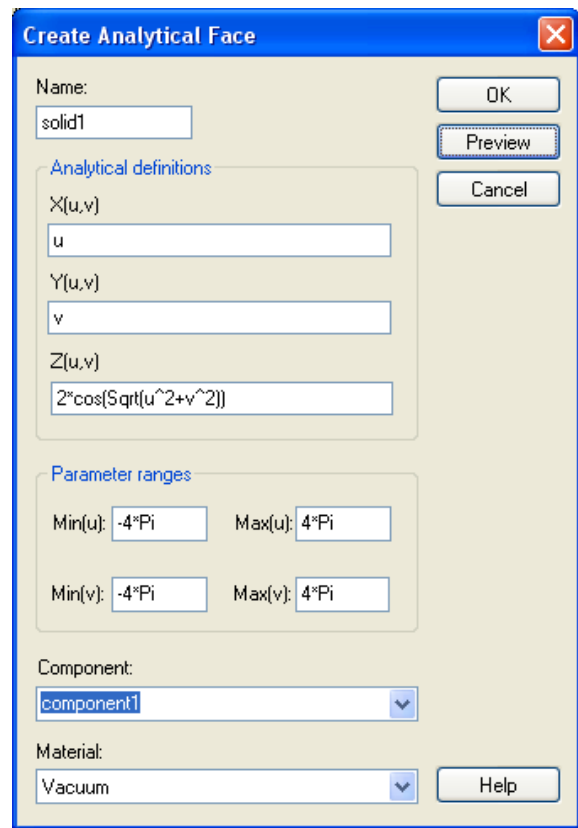
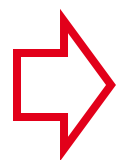
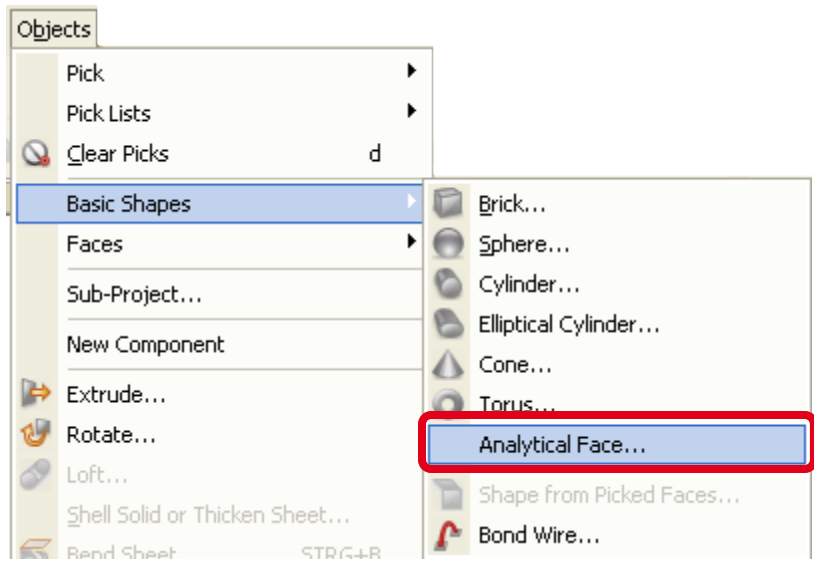
- 3D curves and faces can be created using analytical expressions.



Enter parameterization

# Analytical Modeling (II)

- 3D curves and faces can be created using analytical expressions.

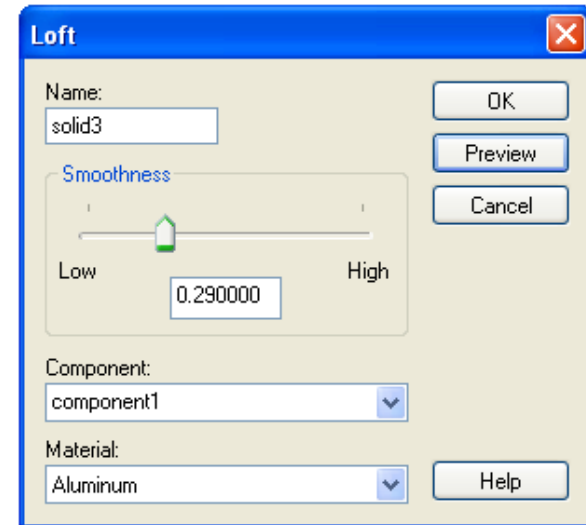
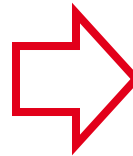
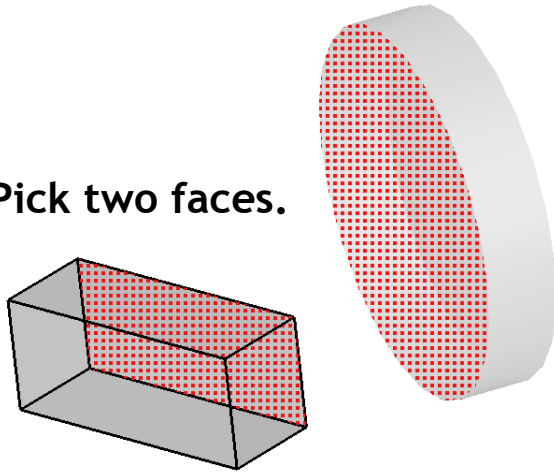




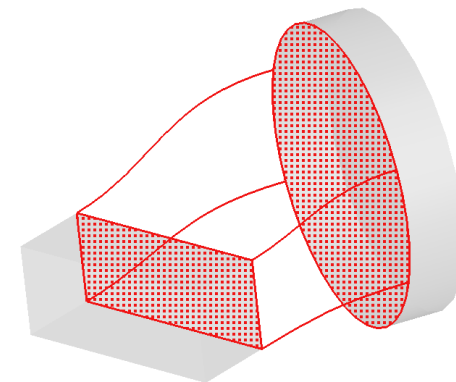
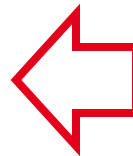
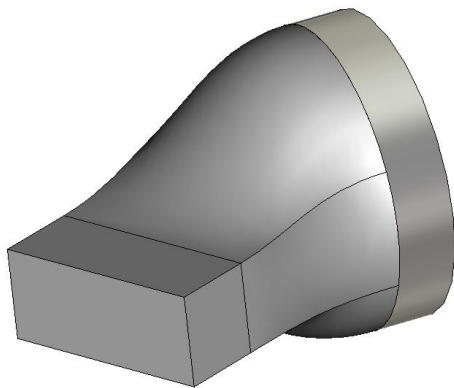
# Loft Operation

- Two picked faces can be used to create a new shape by a loft operation.

Pick two faces.



Choose the properties of the loft operation.



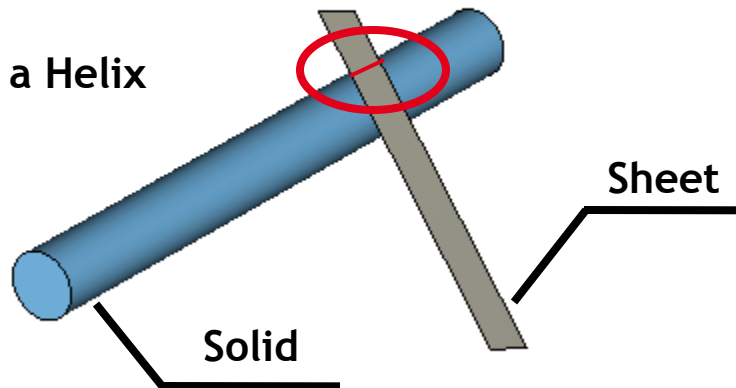
Preview

# Bending

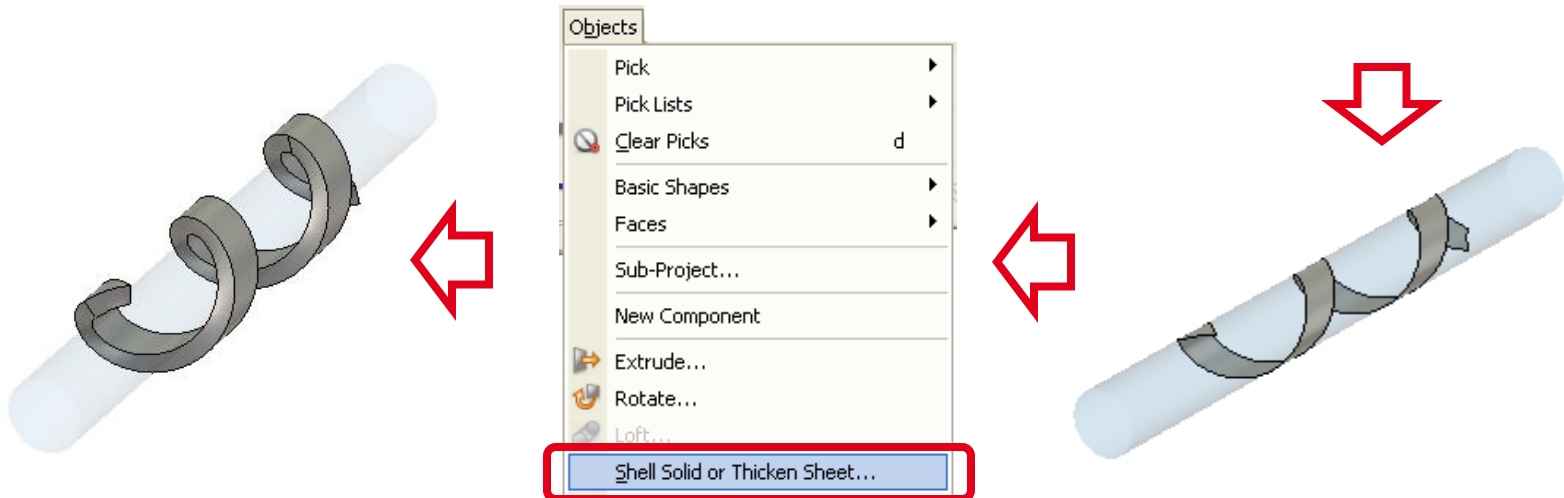
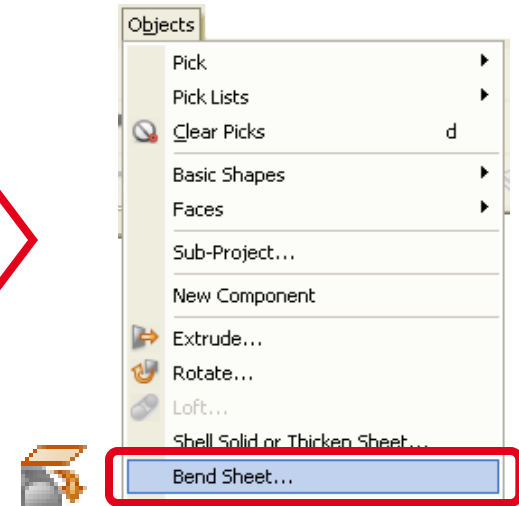
- It is possible to bend a sheet on a solid object.

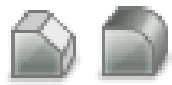
Example:

Creation of a Helix

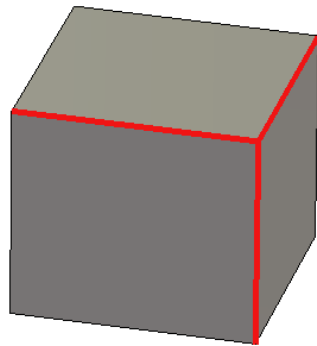


The solid and the sheet must touch each other.

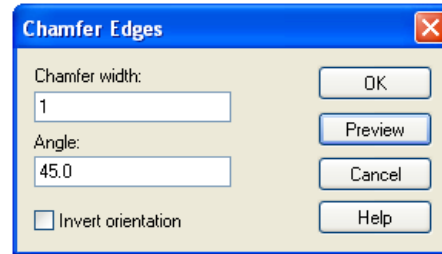




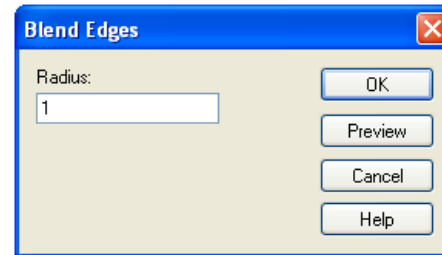
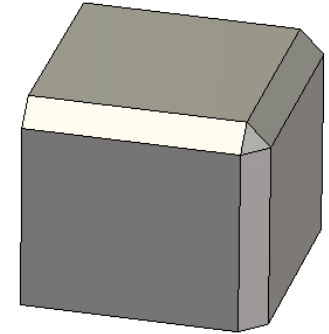
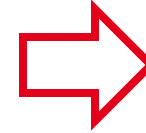
# Blend and Chamfer Edges



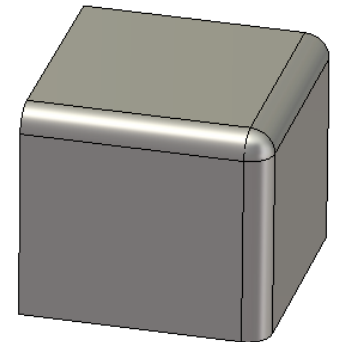
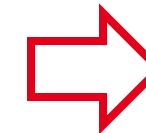
Select edges.



Specify angle and width.



Specify radius.

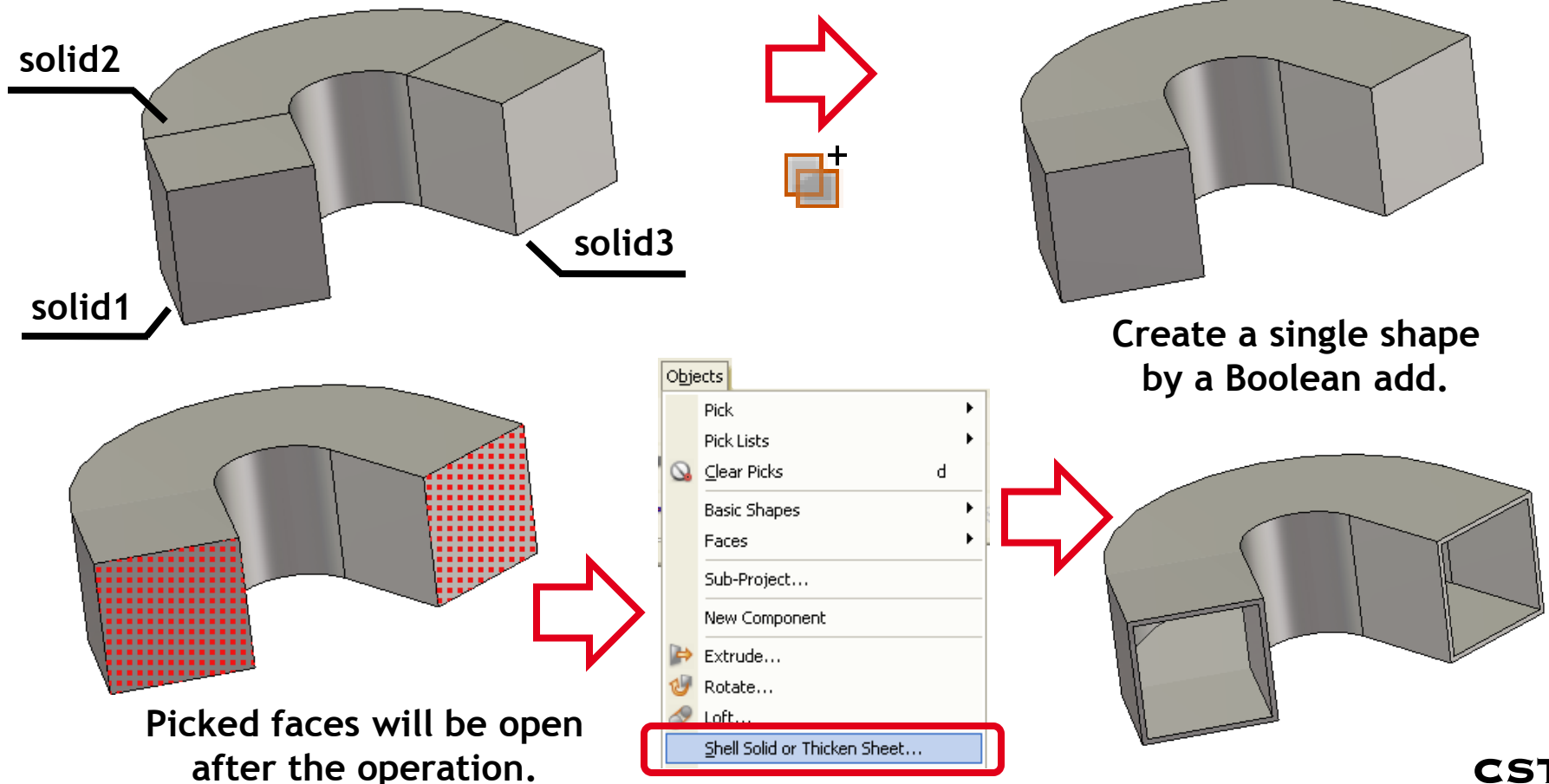


# Shell Operation

- A solid object can be shelled.

Example:

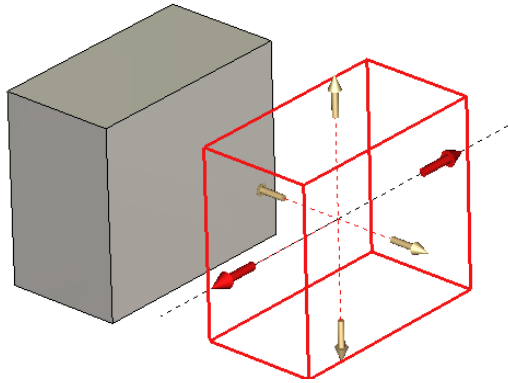
A waveguide bend consisting of three shapes is shelled.



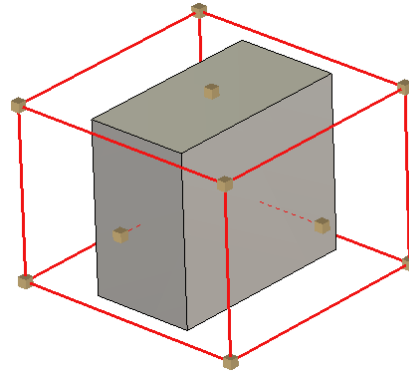


# Transform Operation

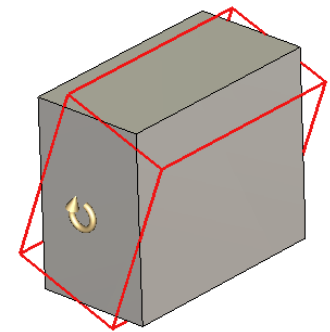
- Existing objects can be translated, rotated, mirrored, and scaled.



Translate



Scale



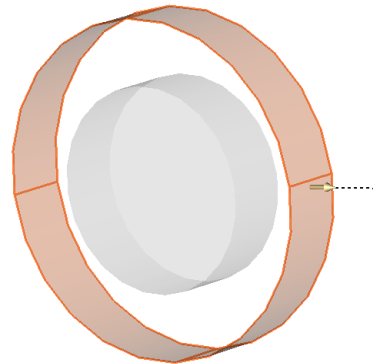
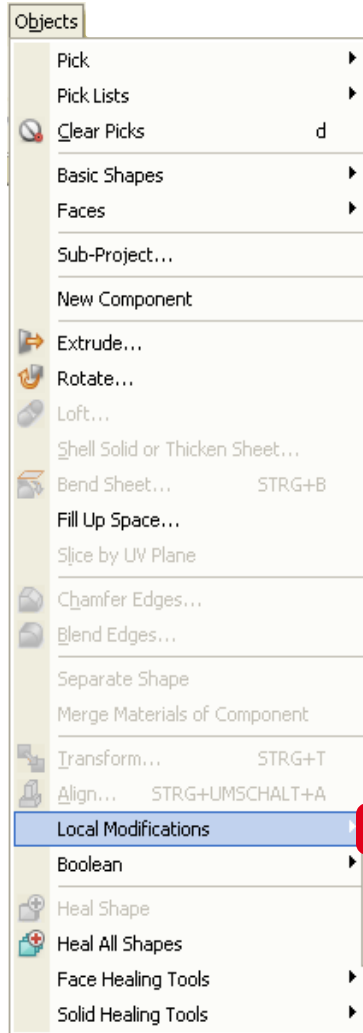
Rotate

- Use the mouse to translate, rotate, or scale objects interactively.
- Perform several transformations to the same shape using the “Apply” button.
- Selecting more than one solid will turn the shape center into the common center.

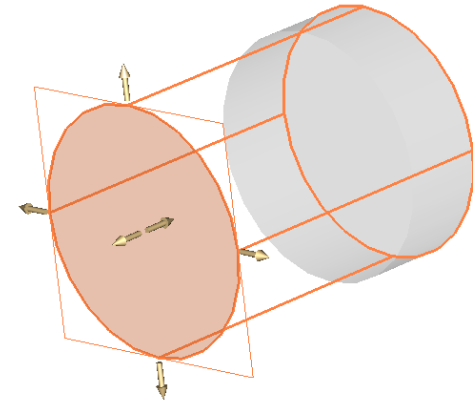




# Local Modifications - Face Modifications



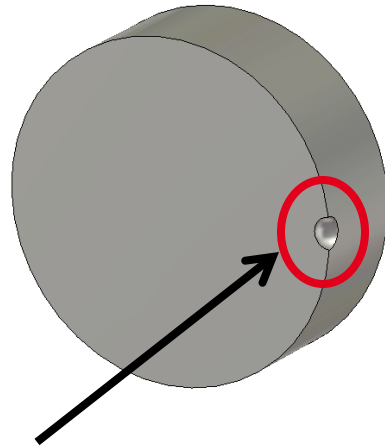
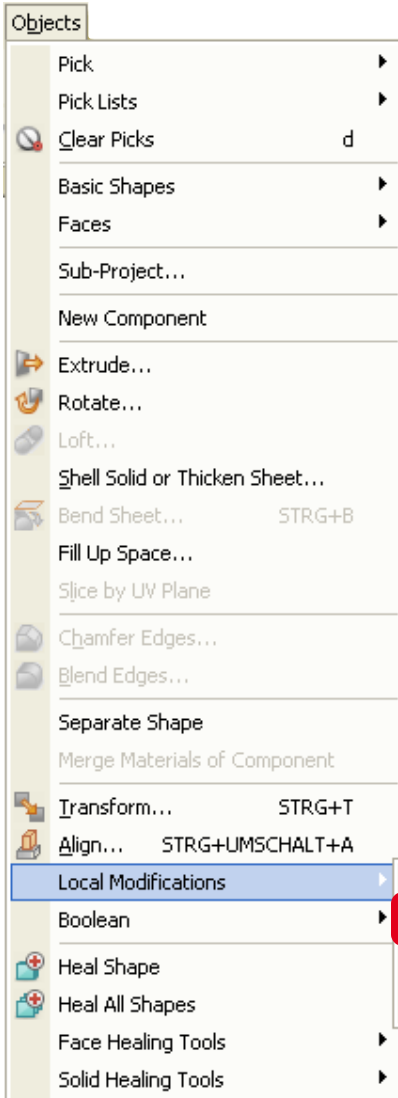
**Offset Face:** Interactively move the face of a solid in its normal direction.



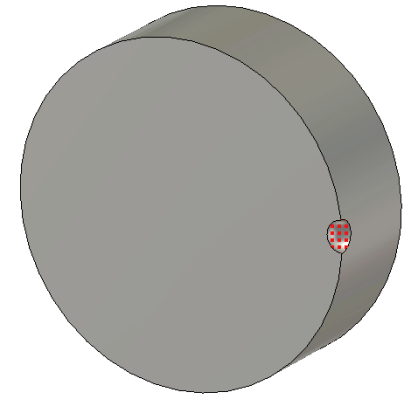
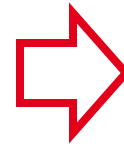
**Move Face:** Interactively move the face of a solid in a coordinate direction.

Local Modifications are especially helpful when you are working with an imported CAD model for which the model history is not available. The "Local Modification" tools help you to modify such geometries.

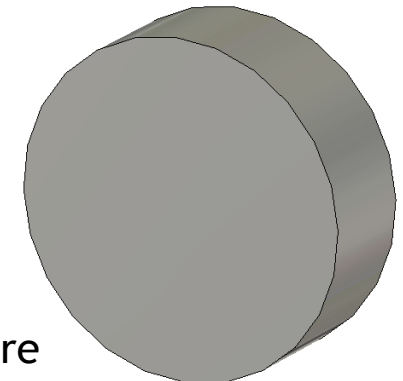
# Local Modifications - Remove Feature



Feature to be removed

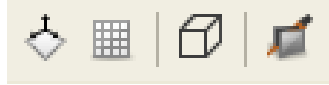


Pick the feature



Remove the feature

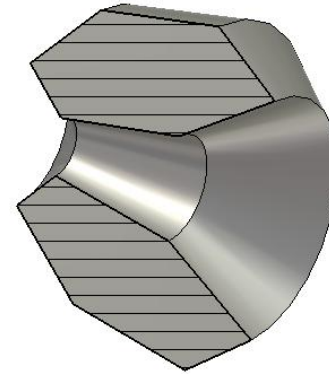
# View Options



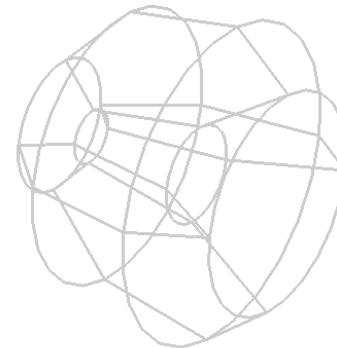
- Several options are available to gain better insight into the structure.



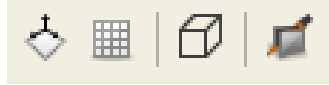
Cutting Plane 



Wireframe Mode 



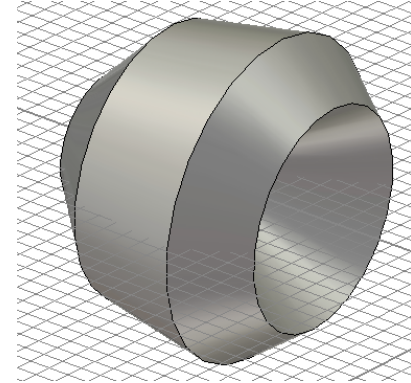
# View Options



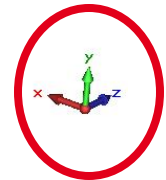
- Several options are available to gain better insight into the structure.



Working Plane 

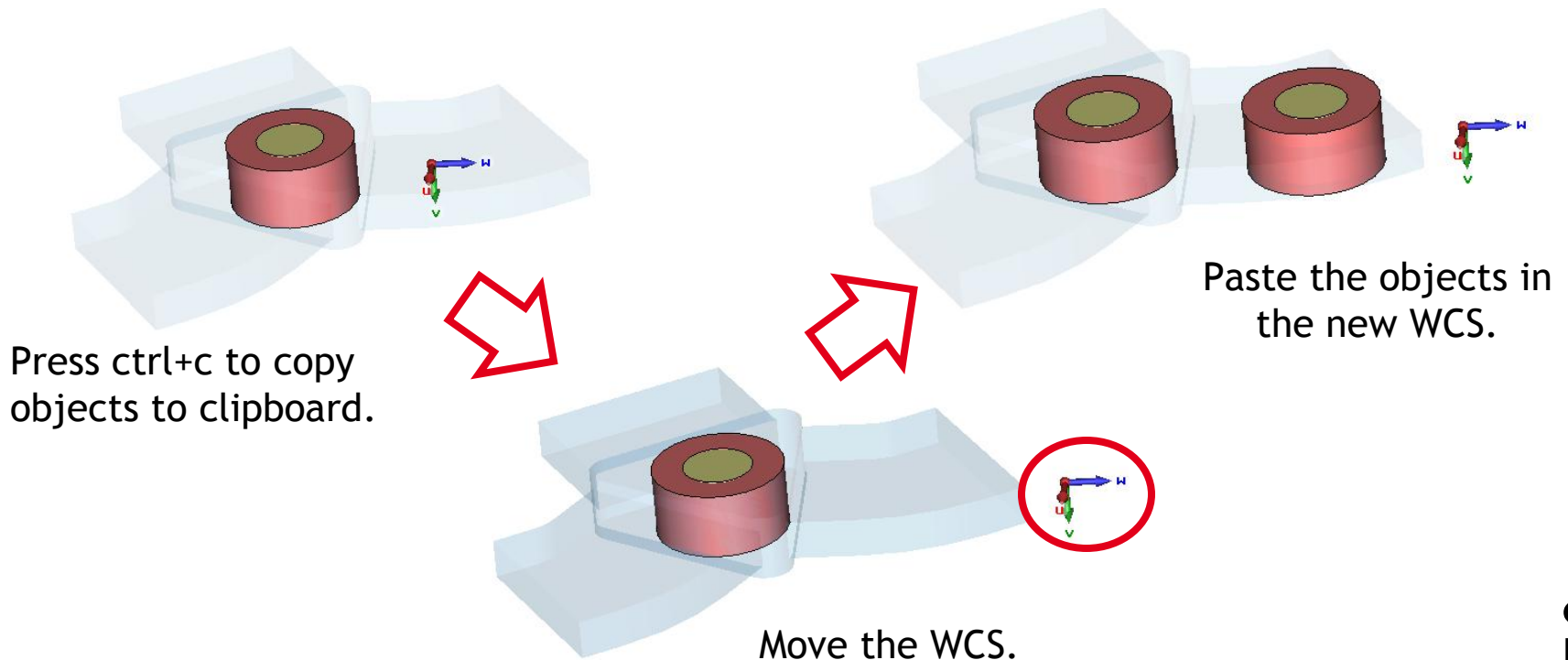


Coordinate Axes 



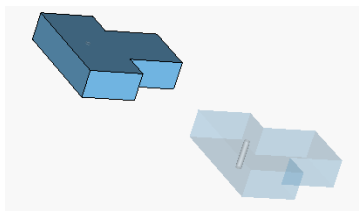
# Copy / Paste Structure Parts

- Ctrl+C stores the selected solids on the active working coordinate system (WCS) to the clipboard. Ctrl+V pastes the clipboard into the active working coordinate system.
- Copy and paste of structure parts works even between different CST projects.

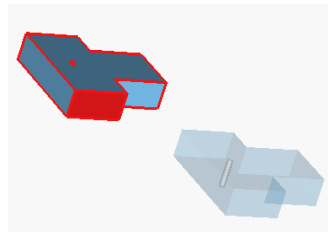


# Align Objects

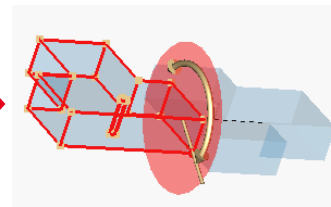
- Copied or imported objects can be aligned with the current model.



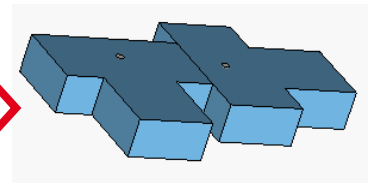
Select shape and choose “Align...”



Select faces to align with.



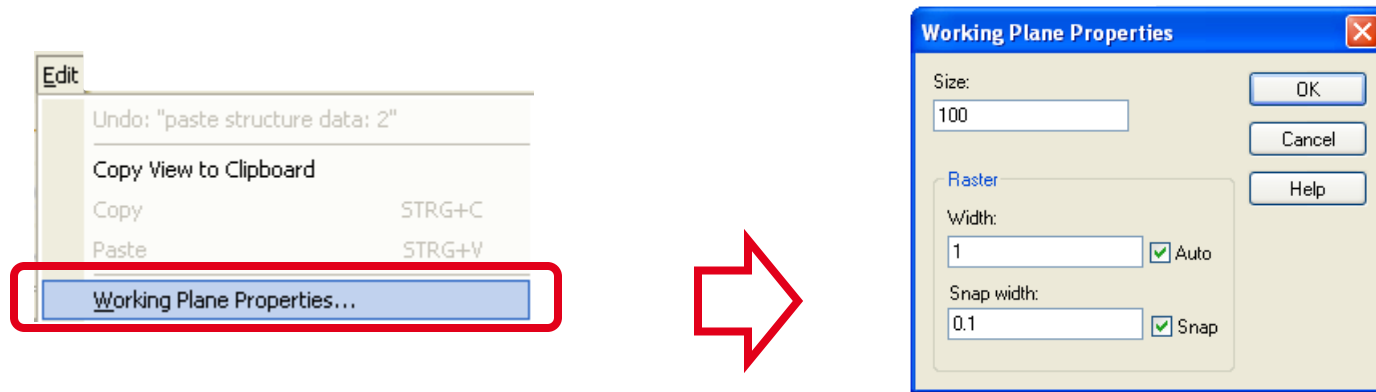
Choose angle.



Final Result

- For copied and imported objects, the alignment is started automatically.
- For shapes selected in the “Navigation Tree” start by choosing “Align...” from the “Objects” menu.

# Interactive CAD Modeling Using the Mouse



1. Adjust the “Snap width” according to the raster of your structure.
2. Use the **pick tools**, whenever geometrical information is already available.
  - Pick points to define new shapes / height of extrusion / transform.
  - Pick edges for rotation axis / to adjust WCS.
  - Pick face for extrude / rotate / transform / to adjust WCS.
3. Use the **local working coordinate system (WCS)**.
4. Use the keyboard only for new (independent) geometric information (e.g. points which cannot be picked and do not fit into the snapping raster).

**Relative construction via picks and WCS avoids redundant information.  
Parameters/Values are entered once and are later referenced via picks.**

# Solver Overview



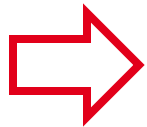
Which solver is best suited to my application?



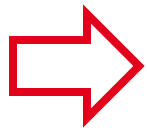


# Which Solver is the “Best”?

- Unique answer to this question is not easily possible as the performance and accuracy depend on many parameters:
  - Electrical size and geometry of the problem,
  - Material models and material parameters used,
  - Resonant behavior of the model,
  - Type of the mesh and the boundary conditions,
  - Architecture of the workstation used for the simulation,
  - etc.

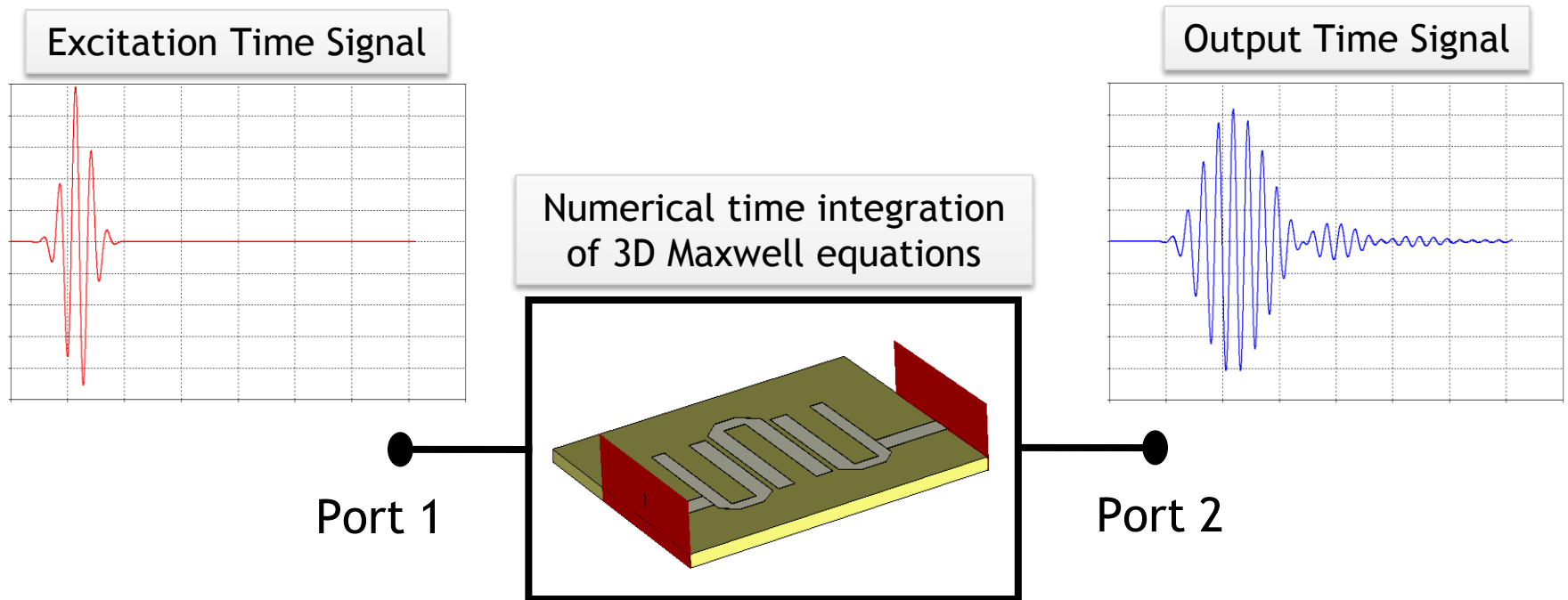


BUT: Some helpful rules of thumb are available.



The application engineers of CST are available to discuss the solver choice and the model setup.

# Transient Simulation - Behind the Scenes



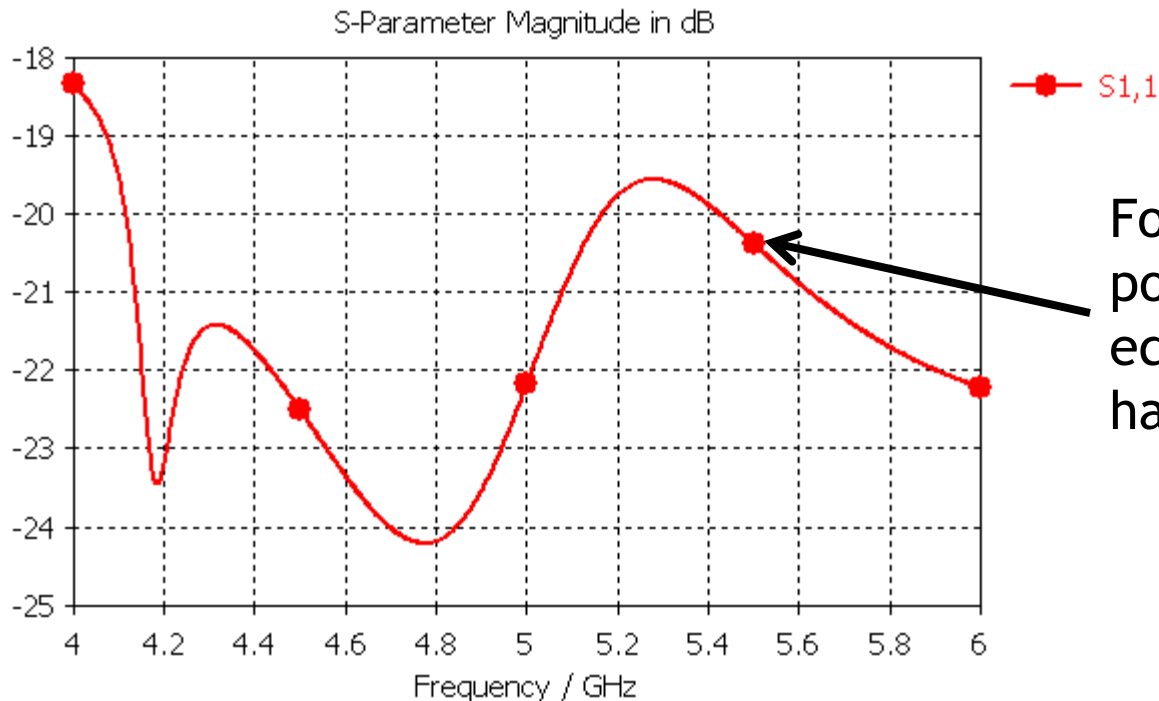
The simulation duration depends on:

1. Duration of input signal (determined by **frequency range** selected)
2. Duration of output signal (determined mainly by the **size** and the **resonances of the model** under study)
3. Time step width for numerical time integration (determined by the **mesh** used to discretize your model)



# Frequency Domain Simulation - Behind the Scenes

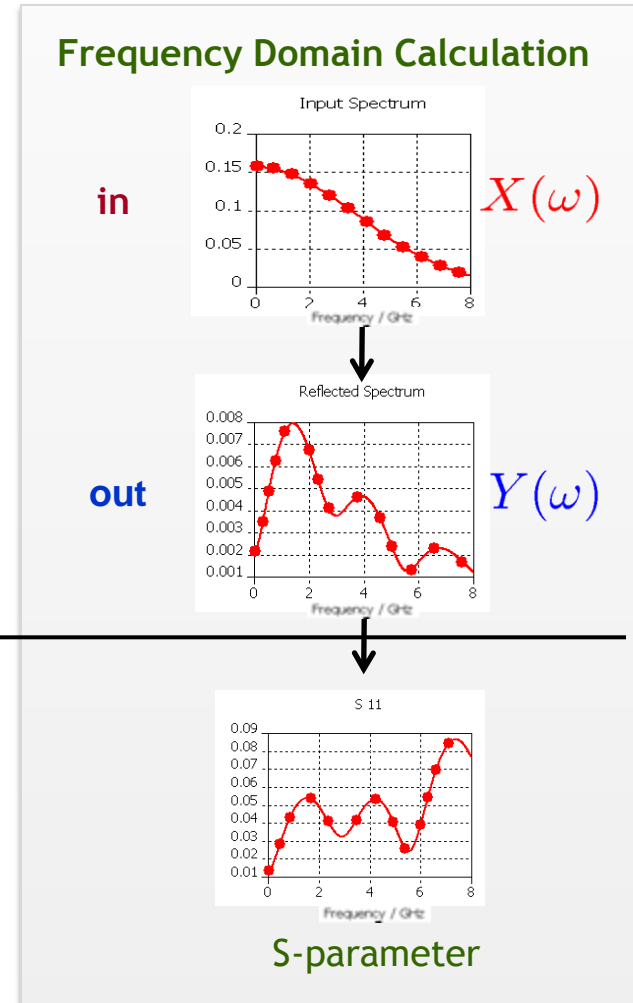
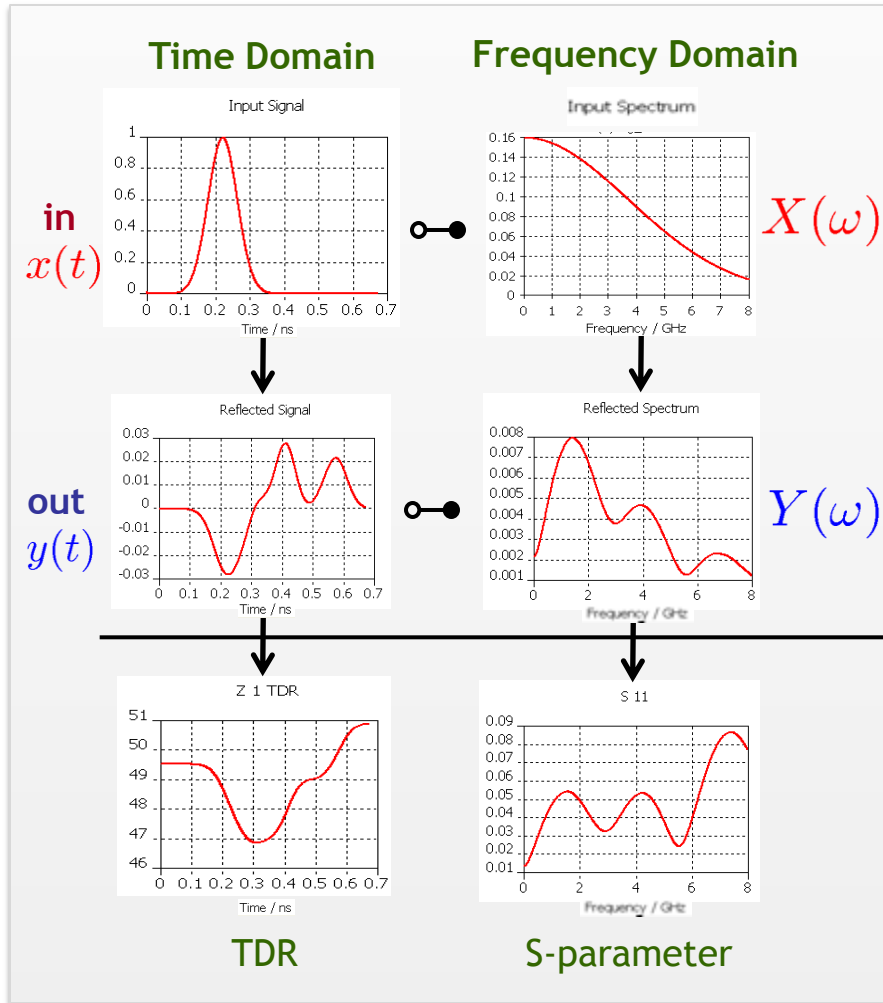
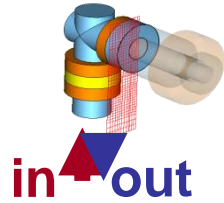
- The steady state behavior of a model is calculated at different frequency points.



For each frequency point a linear equation system has to be solved.



- The intermediate points in broadband results are calculated by an interpolation.

# Time Domain + Frequency Domain





# Solver Choice (I) - Overview



## General Purpose Solver (3D-Volume)

Solver	Area of Application (Rule of Thumb)
 <b>Transient</b>	<ul style="list-style-type: none"><li>▪ Electrically medium and large sized problems</li><li>▪ Broadband</li><li>▪ Arbitrary time signals</li></ul>
 <b>Frequency Domain</b>	<ul style="list-style-type: none"><li>▪ Narrow band / Single frequency</li><li>▪ Electrically small to medium sized problems</li><li>▪ Periodic structures with Floquet port modes</li></ul>

## Special Solver (3D-Volume): Closed Resonant Structures


 <b>Eigenmode</b>	<ul style="list-style-type: none"><li>▪ Strongly resonant structures, narrow band (e.g. cavities)</li></ul>
 <b>FD Resonant</b>	<ul style="list-style-type: none"><li>▪ Strongly resonant, non radiating structures (e.g. filters)</li></ul>

## Special Solver (3D-Surface): Large Open Metallic Structures

 <b>Integral Equation (based on MLFMM)</b>	<ul style="list-style-type: none"><li>▪ Electrically large structures</li><li>▪ Dominated by metal</li></ul>
 <b>Asymptotic Solver</b>	<ul style="list-style-type: none"><li>▪ RCS calculations for electrically very large objects</li></ul>

# Solver Choice (II) - Resonances

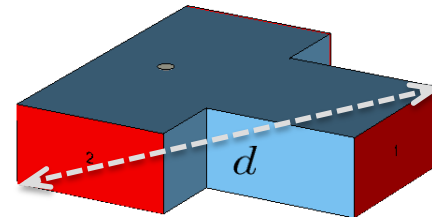
The following rules of thumb apply:

	Weak Resonances	Strong Resonances
		
 General Purpose		
 +AR-Filter for S-parameter calculation only		
 Resonant Fast		





F-solver is better suited to strongly resonant applications than T-solver.

# Solver Choice (III) - Electrical Size

The following rules of thumb apply:



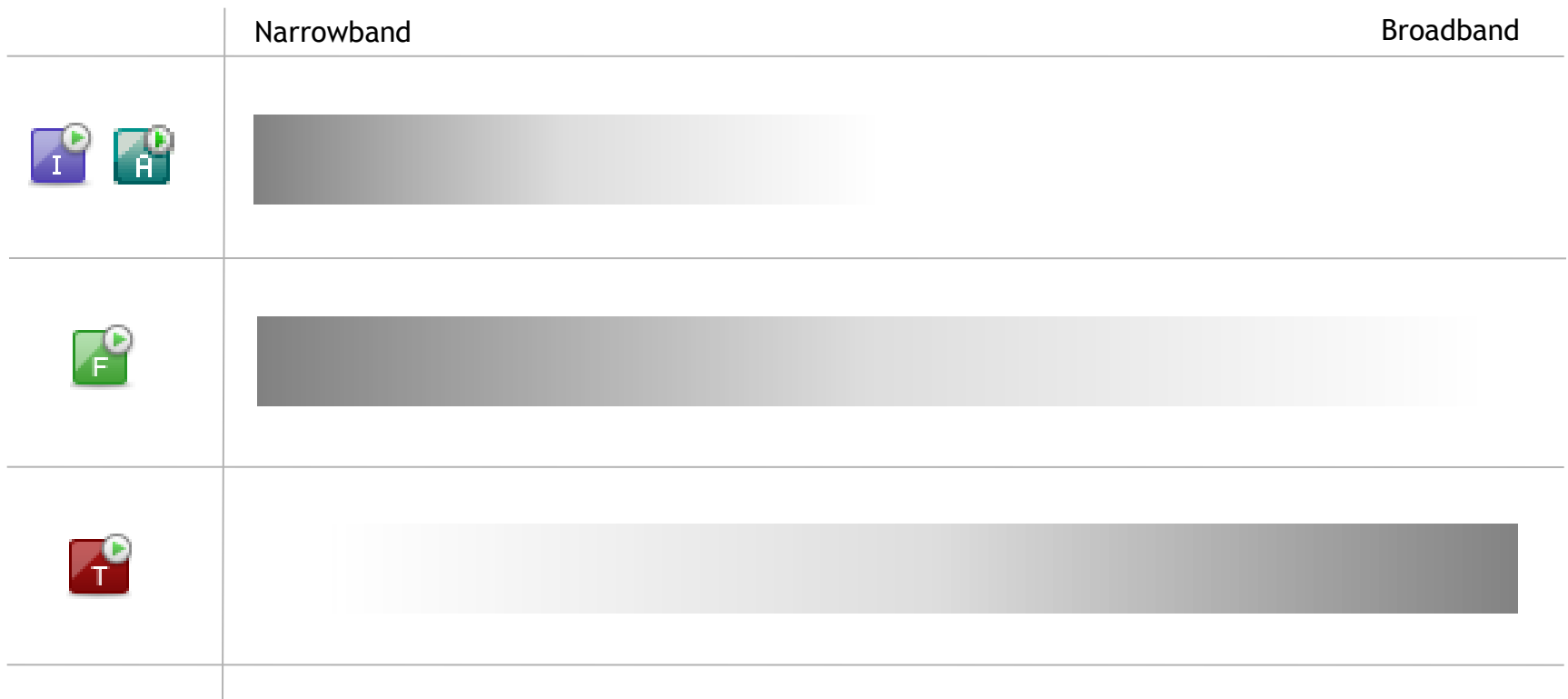
Structure under study

	Electrically Small ( $d < \lambda_{\min}$ )	Electrically Large ( $d \gg (20..30) \cdot \lambda_{\min}$ )
		
	With MPI also very large problems can be solved.	
		
	RCS calculations for electrically very large structures	

For electrically very small structures the quasistatic solvers provided in CST EM STUDIO® might be a good choice.

# Solver Choice (IV) - Bandwidth

The following rules of thumb apply:



F-solver and I-solver are better suited to narrowband applications, while the T-solver is better suited to broadband applications.



# Specialized Products

- In addition to the general purpose solvers of CST MICROWAVE STUDIO® CST offers solvers specialized to certain classes of applications.



**CST PCB STUDIO™**

Specialized solvers for the simulation of PCB boards.



**CST CABLE STUDIO™**

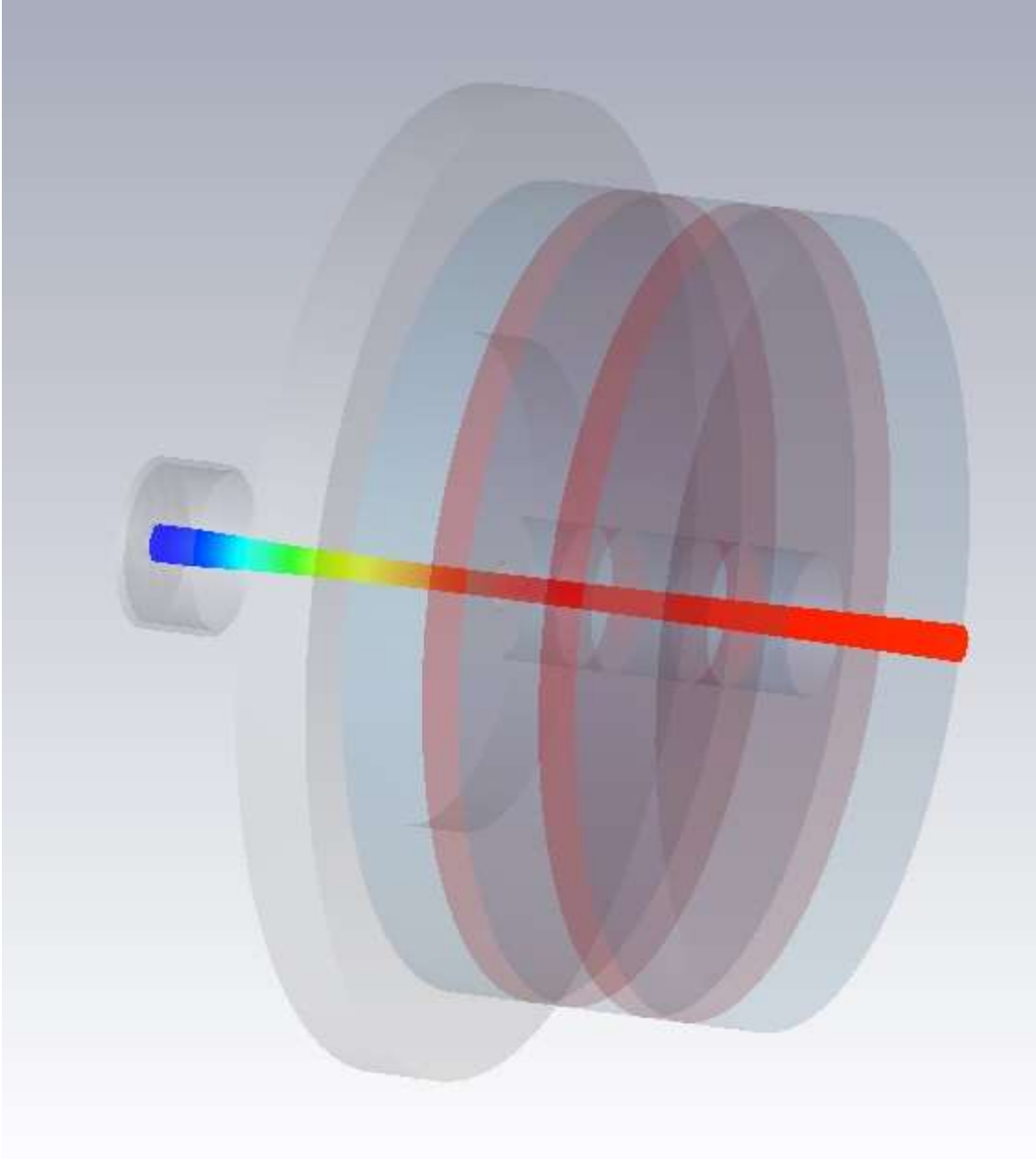
Specialized solvers for the simulation of complete cable harnesses for all kind of EMC investigations.



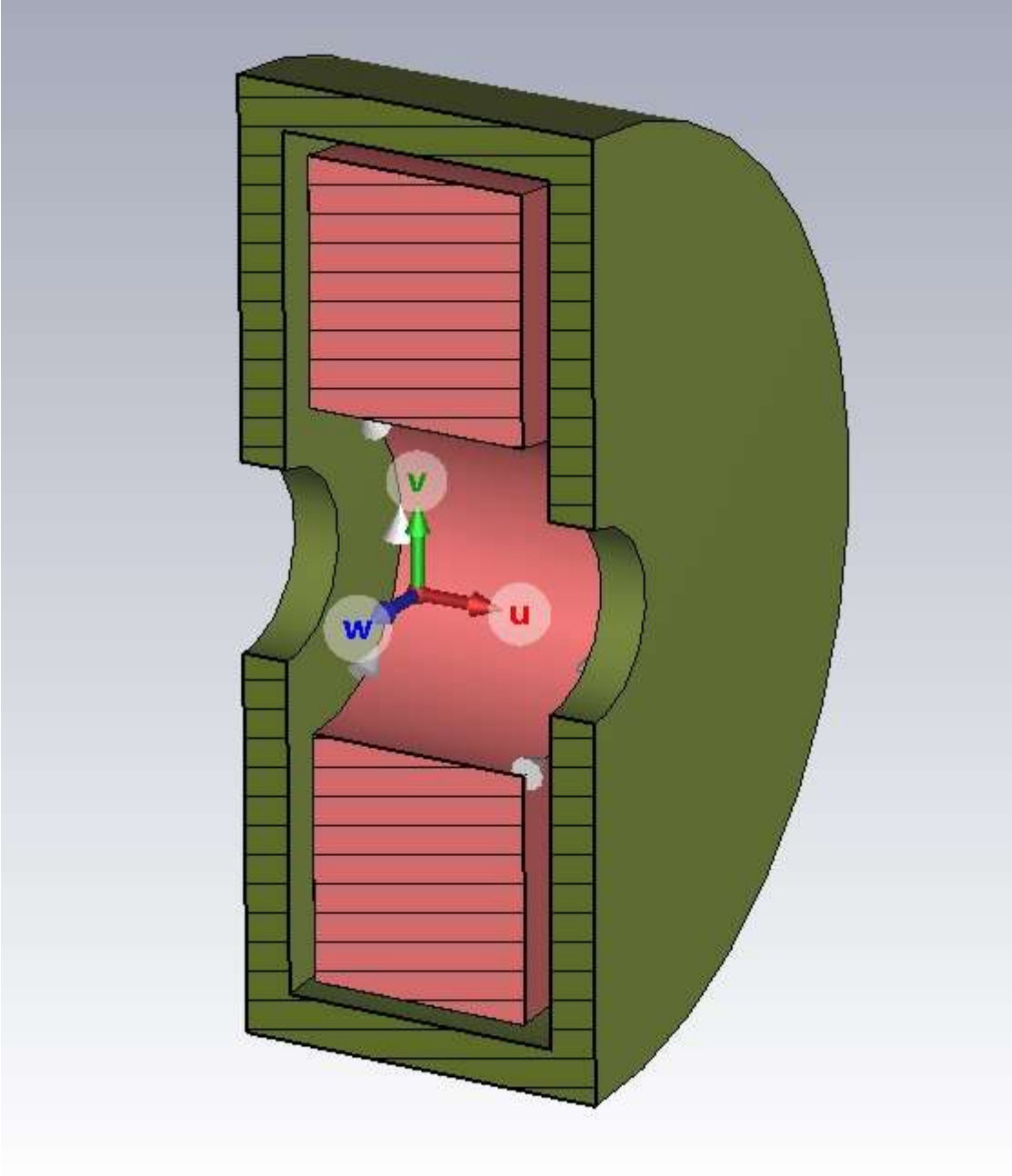
**CST MICROSTRIPES™**

Efficient solvers based on the Transmission Line Matrix (TLM) method. Contains special algorithms for EMC analysis.

# 1- EGun- Uygulaması



# 2- Solenoid Magnet- Uygulaması



### 3- Five Cell SFR Cavity- Uygulaması

