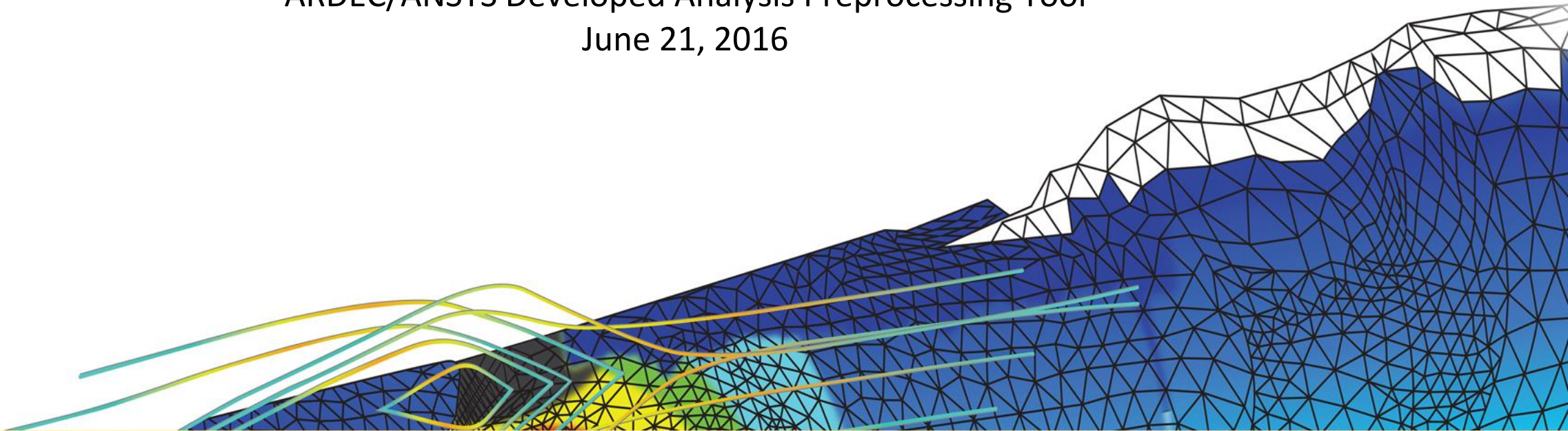




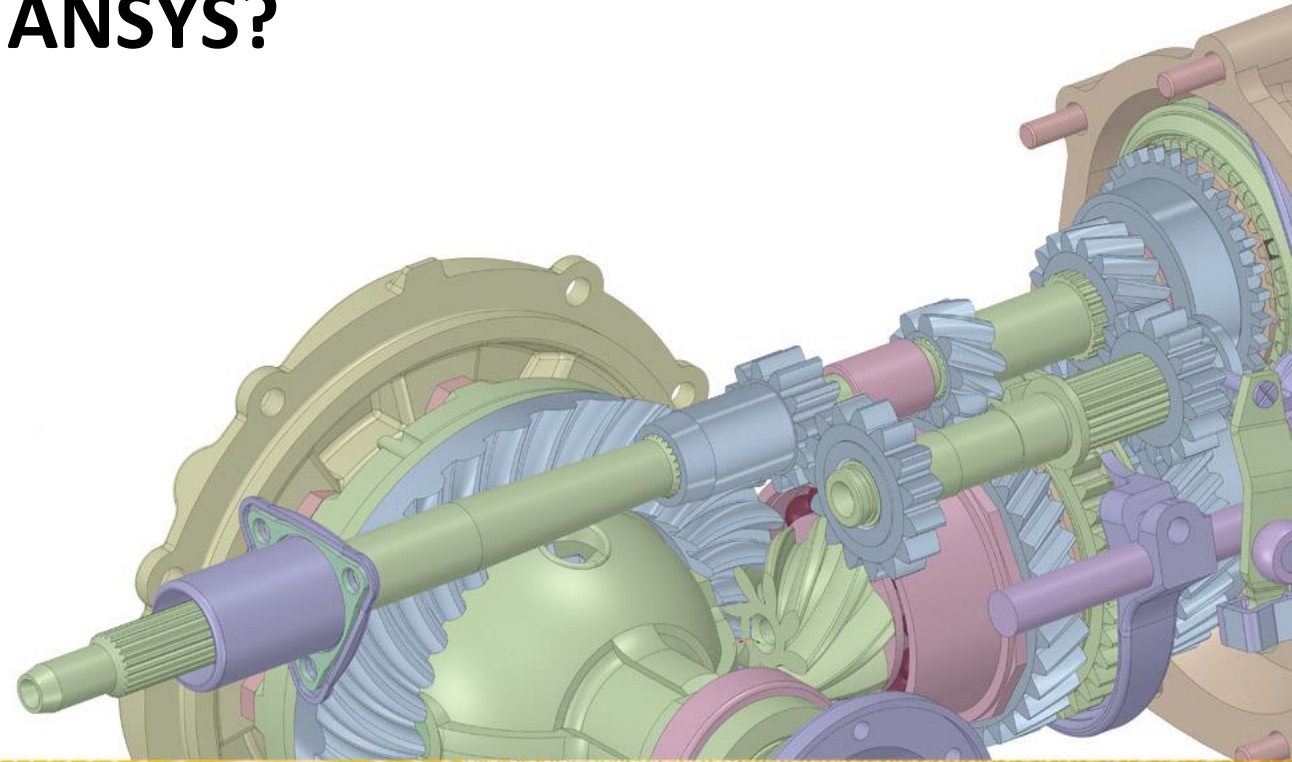
ADAPT

ARDEC/ANSYS Developed Analysis Preprocessing Tool
June 21, 2016





Who is ANSYS?



Our Strengths

FOCUSED

This is all we do.

Leading product technologies in all physics areas

\$150 million spent on development annually

1,000+ developers, most with advanced degrees

~300 supporting engineers dedicated to N. America



CAPABLE

2,900+
employees

75
locations

40
countries

TRUSTED

96 of the top 100

FORTUNE 500 Industrials

ISO 9001 and NQA-1 certified



Recognized as one of the world's **MOST INNOVATIVE
AND FASTEST-GROWING COMPANIES***

INDEPENDENT



Long-term financial stability

CAD agnostic

- **Key Facts**

- World's largest multi-physics simulation software package
- Deep expertise in deploying and servicing complex multi-physics simulation software


- **Who uses ANSYS?**

- 100% of top 5 aircraft OEMs
- 90% top 50 defense contractors
- 100% of top 10 space agencies
- 96% of FORTUNE 500 industrials

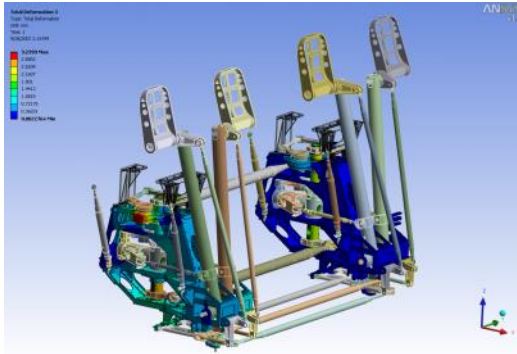
- **ANSYS has long-standing experience working with the US government (DoD/DoE) and the Aerospace and Defense industry**

- Fully ITAR compliant with certification
- Intellectual property handled with care, always fully protected for all parties
- Cooperative Research and Development Agreement (CRADA) successfully executed with U.S. Army ARDEC

Top A&D Companies Rely on ANSYS Tools

Commercial and Military Aircraft		Electronic Systems	Space	Federal Defense and Weapons Systems	
OEMs Airbus Boeing Embraer Bombardier Alenia COMAC IRKUT Tupolev Northrop Grumman Aerospace Systems Lockheed Martin Aerospace Systems General Atomics Bell Sikorsky Eurocopter Agusta Westland	Engines GE Aviation Pratt and Whitney Honeywell Rolls Royce MTU Aero Engines ITP Snecma Suppliers GE Aviation Honeywell UTC Aerospace Systems Safran GKN Meggitt Moog	Northrop Grumman Lockheed Martin Aerospace Systems Thales L-3 Rockwell Collins Raytheon Harris BAE Sagem General Dynamics Cobham Elbit Systems	NASA JAXA SpaceX Astrobotic Astrium SP Korolev Rocket and Space Corporation Ampac ISP NEC Toshiba Space Systems Orbital Sciences United Launch Alliance United Space Alliance	US Army US Air Force US Navy US DOD DGA AWE DSTL DRDC Lockheed Martin Boeing Northrop Grumman General Dynamics JPL JHU APL Wyle Labs SAIC QinetiQ Raytheon DRS General Dynamics Textron	MBDA Aerojet Rafael Remington Sturm Ruger ATK Roketsan Ruag Diehl BGT
 					

Workbench Platform

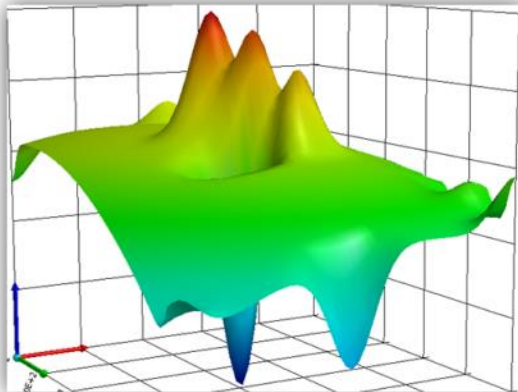
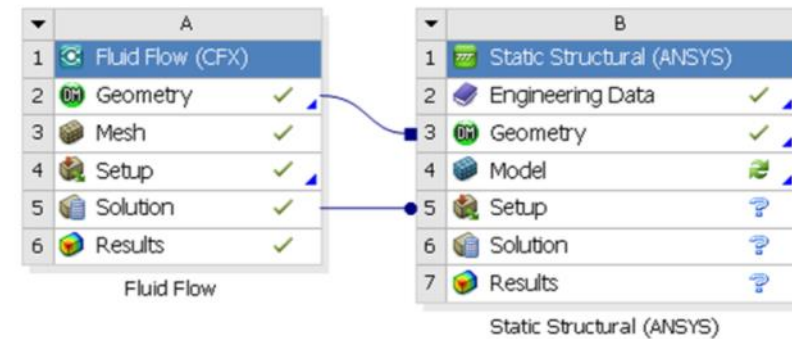


Comprehensive Setup

The ANSYS Workbench platform delivers the most complete set of pre-processing capabilities, including meshing and geometry, to set up the most challenging real-world problems

Drag-n-Drop Multiphysics

Data during multiphysics solutions are automatically translated from one physics to another through graphical connections

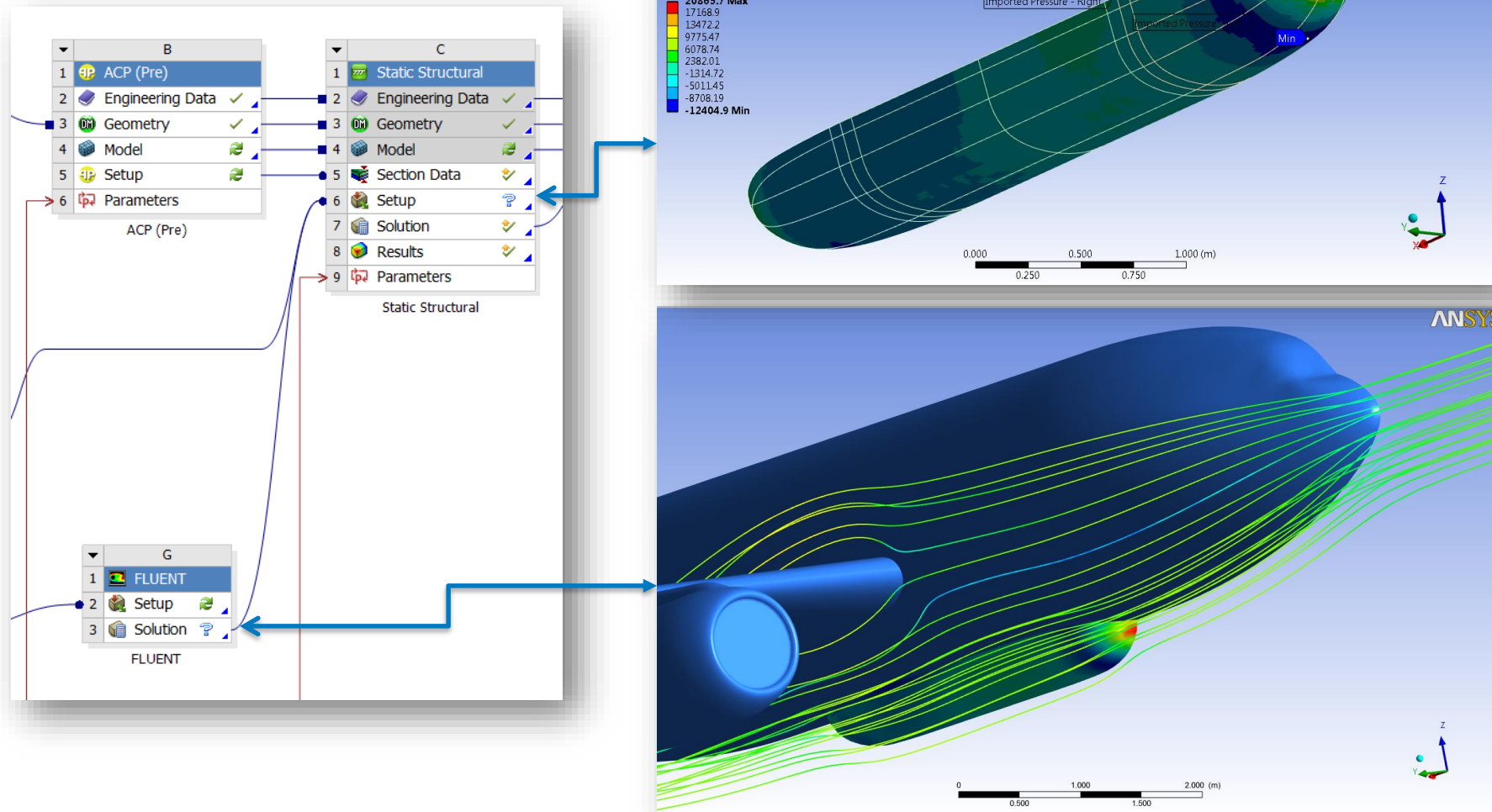


One-Click Parametric

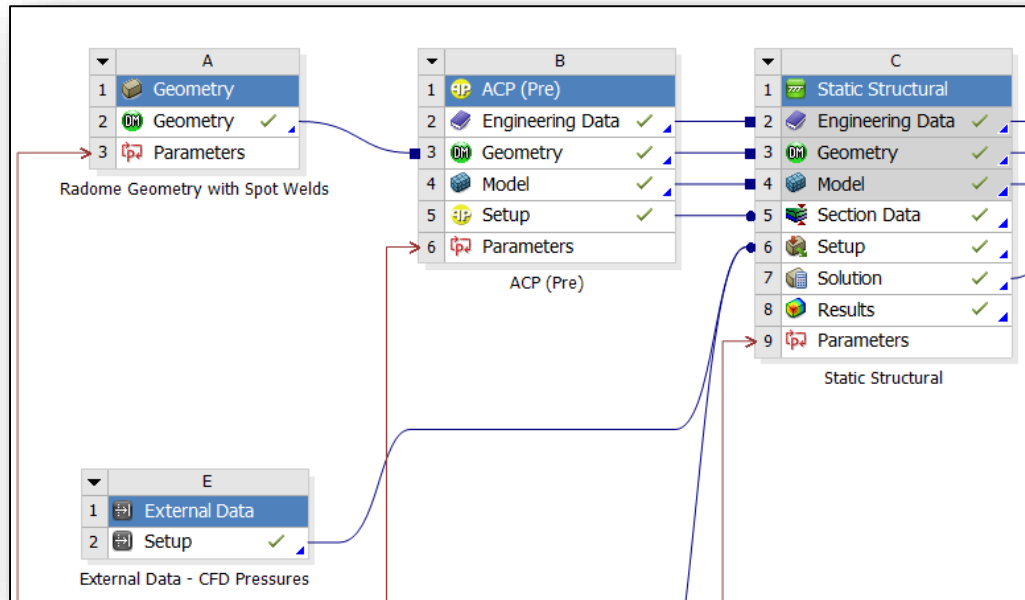
Parameters from integrated applications are centrally accessible in Workbench and always available to perform system-level design optimization with little additional effort over a single simulation

Multiphysics Capabilities: 1- and 2-way FSI

*Incorporate fluid/thermal loading directly from CFD
(1-way and 2-way FSI)*



Incorporate Loading from 3rd Party Output



Data Mapping

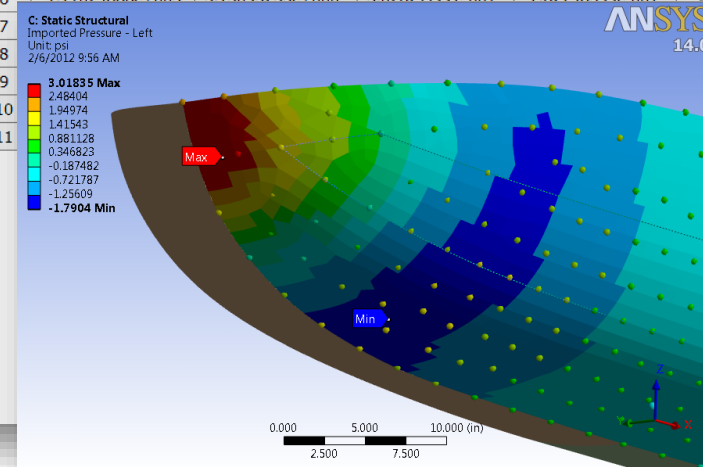
- Pressure
- Temperature
- Heat Transfer
- Thickness
- Displacements

3	Dimension	3D
4	Start Import At Line	7
5	Format Type	Delimited
6	Delimiter Type	Comma
7	Delimiter Character	Comma
8	Length Unit	m
9	Coordinate System Type	Cartesian
10	Analytical Transformation	
11	X Coordinate	x
12	Y Coordinate	y
13	Z Coordinate	z
14	Rigid Transformation	
15	Origin X	0 in
16	Origin Y	0 in
17	Origin Z	0 in
18	Theta XY	0 radian
19	Theta YZ	0 radian
20	Theta ZX	0 radian

	A	B	C	D	E
1	Column	Data Type	Data Unit	Data Identifier	Combined Identifier
2	A	Pressure	Pa	Pressure1	File1:Pressure1
3	B	X Coordinate	m		File1
4	C	Y Coordinate	m		File1
5	D	Z Coordinate	m		File1

Preview of File - D:\Documents\AD_TEAM_Activities\Application_Examples\Radome\Radome

	A	B	C	D
1	Pressure	X Coordinate	Y Coordinate	Z Coordinate
2	1.32274744e+003	3.20173836e+000	2.76913911e-001	-7.00325191e-001
3	2.36605591e+003	3.20759726e+000	2.57290602e-001	-7.78904557e-001
4	3.62845947e+003	3.28097200e+000	2.21993595e-001	-7.12953269e-001
5	-1.09361597e+003	3.11276960e+000	3.21908236e-001	-6.87757611e-001
6	-1.11024866e+003	3.13093233e+000	3.02621722e-001	-7.62748599e-001



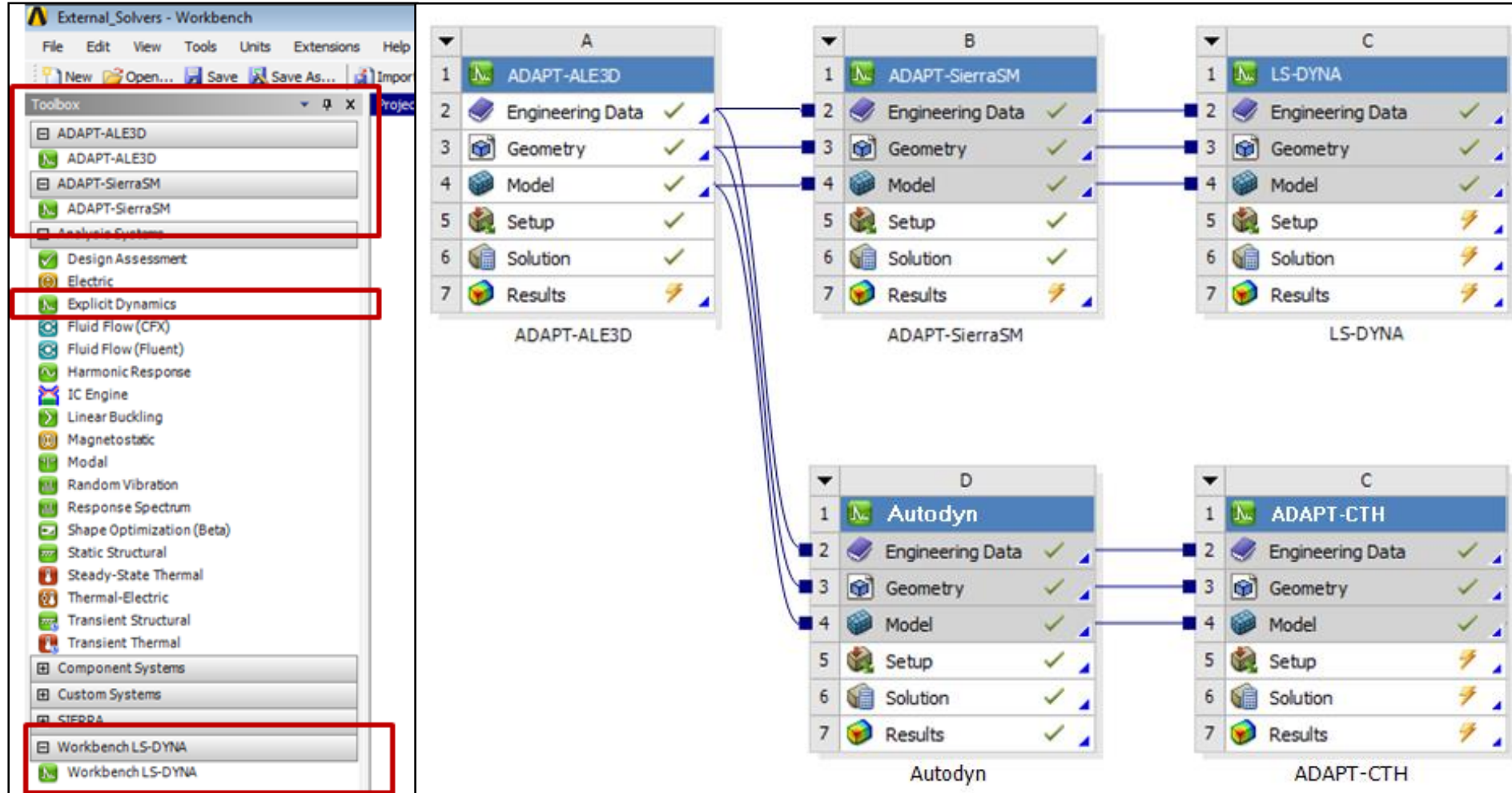
Commitment to Customization

- **ANSYS is committed to providing a revolutionary level of customization for simulation software**
 - Beyond scripting and automation... true customization
 - Allow customers to leverage our powerful platform for their own needs



- **ANSYS Customization Suite takes customizing simulation software to new levels**

Multiple Solvers, One User Interface



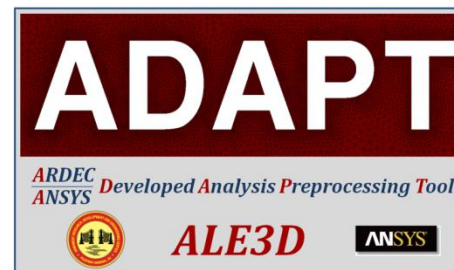


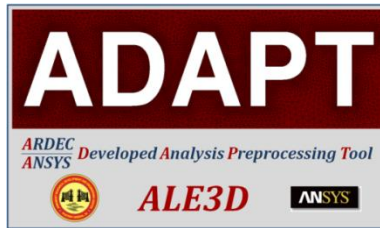
ADAPT

ARDEC/ANSYS Developed Analysis Preprocessing Tool



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.





ADAPT-ALE3

- ANSYS ACT extensions (Add-ons) creating a customized GUI for pre-processing ALE3D analyses
- Supports the most commonly used functionality of the solver
- Exports the mesh and input deck from ANSYS...input deck is ready to run
- **Easy to learn for new and occasional users, but powerful enough for advanced users**

Benefits to the government

- Fills the usability gap by utilizing a pre-existing commercial GUI customized for government solvers
- Reduces pre-preprocessing time and difficulty for ALE3D analyses
- ADAPT is a free add-on for ANSYS that the DoD will own
- Potential to save the government millions

Motivation

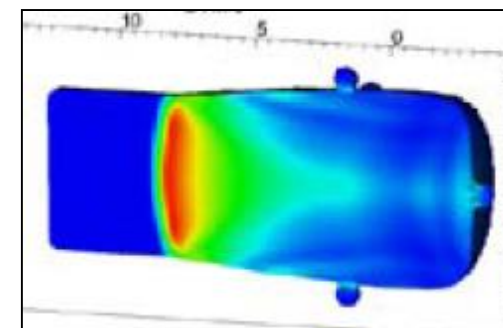
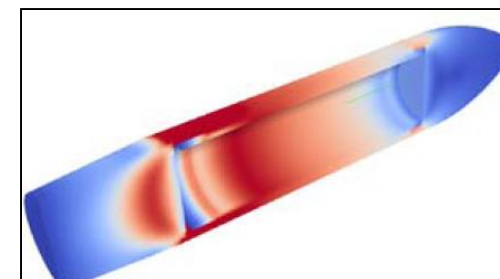
- **ARDEC would like to increase usage of DoD/DoE codes by in-house analysts**
 - Desire to use ALE3D, Sierra/SM, CTH, EPIC,... more effectively, efficiently, while broadening the user base

Pros

- Well suited for DoD/DoE types of applications
- High fidelity solvers
- Highly parallel processing
- Free distribution to government organizations
- No restrictions on number of licenses/CPU's used in solving

Cons

- Cumbersome Pre/Post Processing workflow
- No 3D interactive GUI for pre-processing
- Longer learning curve than commercial codes
- Each code has it's own unique input deck format



- **Much effort has been put into the development of these government codes and ARDEC wants to see them better utilized in support of DoD programs for the Warfighter.**

“Hybrid” Approach

- **Utilize the strengths of existing technologies (don’t reinvent the wheel)**
 - Utilize an advanced and flexible commercial Graphical User Interface (ANSYS)
 - Utilize a powerful government simulation solver (ALE3D, Sierra/SM, EPIC, CTH,...)

Method

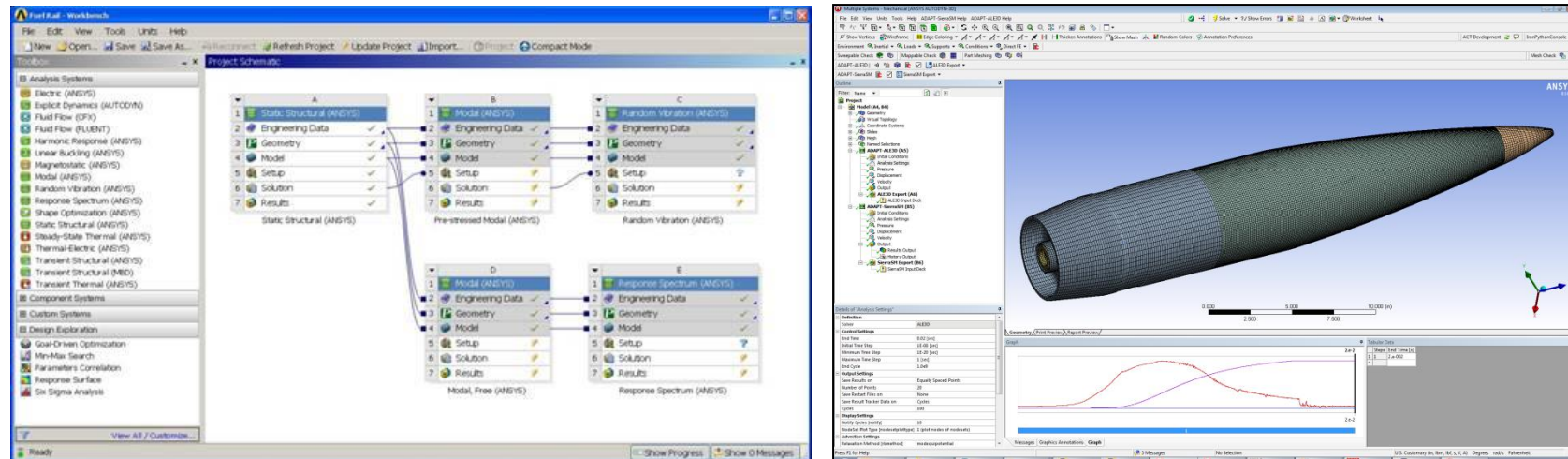
- **ANSYS Workbench**
 - Developing ADAPT using the ANSYS Application Customization Toolkit (ACT) which is a Python/XML based software development kit that interfaces directly with the ANSYS GUI
 - To the user...it’s an extension (add-on) for ANSYS

Load	Scripted Extensions	Version
<input checked="" type="checkbox"/>	ADAPT_ALE3D	1
<input checked="" type="checkbox"/>	ADAPT_SierraSM	1



- **With ACT we can...**
 1. **Customize the user-interface (buttons, menus, features, objects...)**
 2. **Extract any of the model’s data (parts, mesh, loads, boundary conditions, settings, contact...)**

...ANSYS can now be customized to “front-end” or preprocess virtually any code/solver

- **ANSYS Workbench is an industry leader in simulation GUI environments**



- **Intuitive, powerful, easy to learn, easy to use**
- **Workbench framework makes geometry creation/CAD import, meshing, BC assignment, contact creation, etc. incredibly easy**
 - We're not reinventing the wheel...
- **Access to ANSYS materials library**
 - Extensive off-the-shelf library, easy creation of custom materials

- Through a **CRADA** (Cooperative Research and Development Agreement) ARDEC and ANSYS are jointly developing the ADAPT ACT extensions to act as a preprocessor to ALE3D (and others)
 → 
- **The ADAPT extensions will not be full GUIs**
 - The most generally used ALE3D features are covered
 - Not all ALE3D blocks or commands are currently covered
 - Most advantageous to a new user but also powerful for an advanced user
- **Users set up a problem in the ANSYS Workbench environment**
 - ADAPT outputs an input deck and associated mesh file
 - Effort has been put into making a clean, commented, and readable input deck
- **Input decks are, in general, ready-to-run**
 - Users should still review deck and ensure accuracy and edit as needed
 - Add any desired advanced functionality
 - We are NOT trying to make a full GUI supporting all functionality
 - We are removing the difficulty of working with an input deck based code

The screenshot displays the ADAPT Workbench interface for a project named 'M549_ADAPT_ALL - Workbench'. The interface includes a menu bar (File, View, Tools, Units, Extensions, Help), a toolbar with icons for New, Open, Save, Import, Reconnect, Refresh Project, Update Project, and Compact Mode, and a Project Schematic view.

The Project Schematic view shows two analysis systems, A and B, each with a list of components and their status. Red boxes highlight specific areas:

- Top Left:** A list of analysis systems including ADAPT-ALE3D, ADAPT-SierraSM, and Analysis Systems.
- Top Center:** A comparison of the component lists for ADAPT-ALE3D and ADAPT-SierraSM.
- Top Right:** A detailed view of the component lists for ADAPT-ALE3D and ADAPT-SierraSM, showing components like Engineering Data, Geometry, Model, Setup, Solution, and Results.
- Bottom Left:** A list of analysis systems including ADAPT-ALE3D, ADAPT-SierraSM, and Analysis Systems.
- Bottom Right:** A table showing the progress of the analysis systems.

The Progress table at the bottom right shows the following data:

	A	B	C
1	Status	Details	Progress

The screenshot displays the ANSYS ADAPT user interface. The main window shows a 3D model of a projectile with a mesh. The left sidebar contains a tree view of the project structure, including sections for ADAPT-ALE3D and ADAPT-SierraSM. The bottom-left pane shows the 'Details of Analysis Settings' for the ALE3D solver, with tabs for Definition, Control Settings, Output Settings, Display Settings, and Advection Settings. The bottom-right pane shows a graph of results over time.

ADAPT-SierraSM Help ADAPT-ALE3D Help

ADAPT-ALE3D | **ALE3D Export**

ADAPT-SierraSM **SierraSM Export**

Additional Customization:

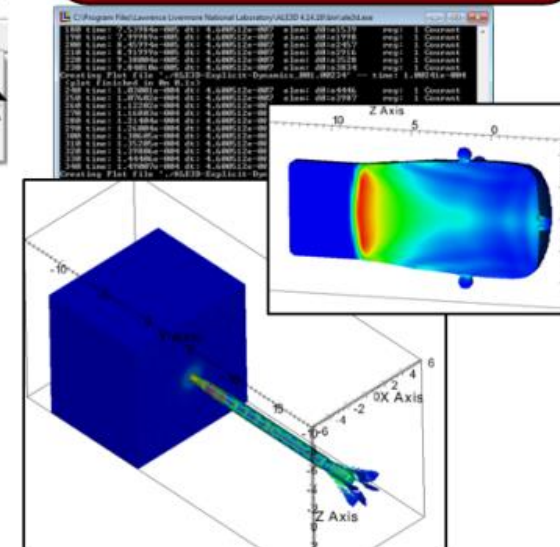
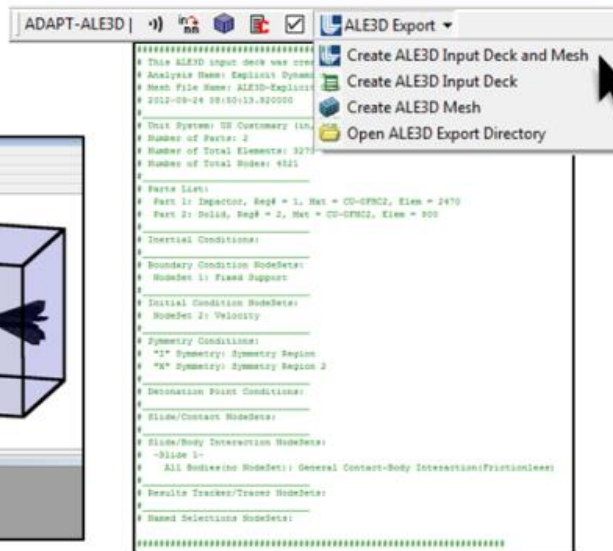
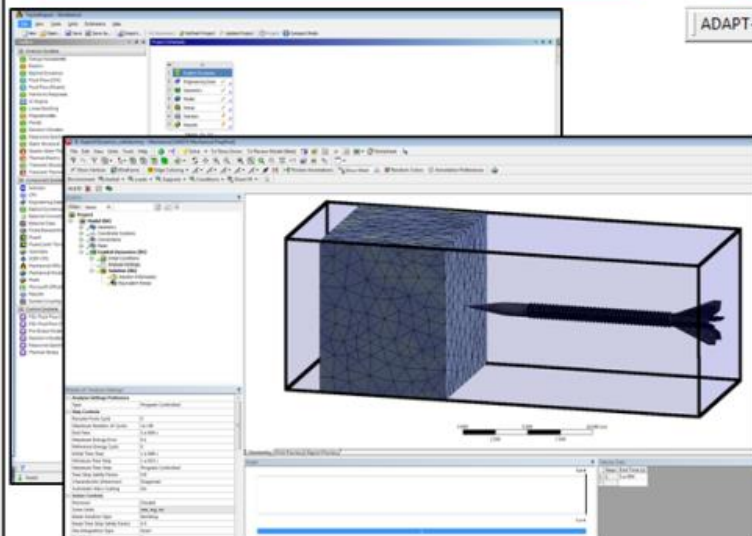
- Solver specific...
- boundary conditions
- analysis settings
- results
- history data
- warning/error checking
- feature/interface filtering

Workflow

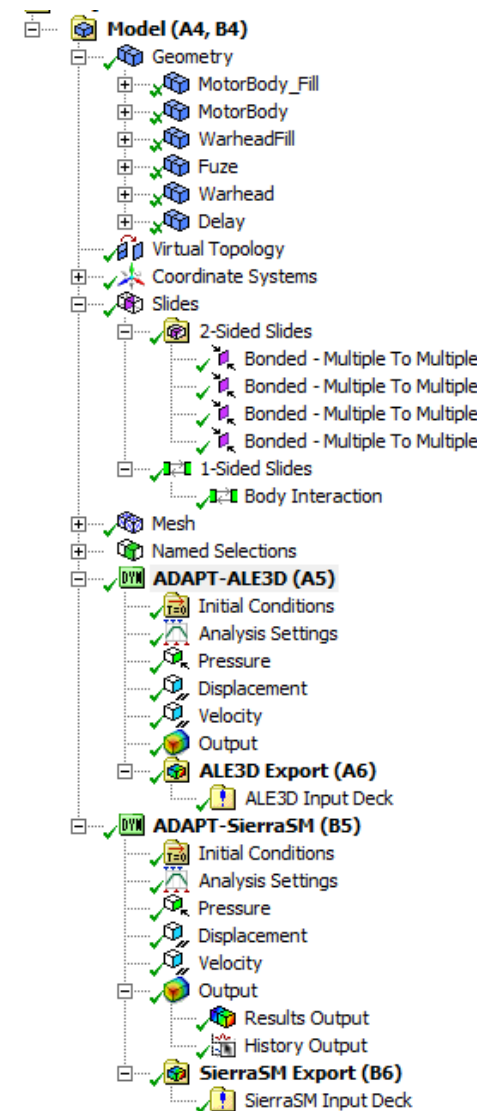
Set up the analysis in the ANSYS® Workbench™ graphical user interface

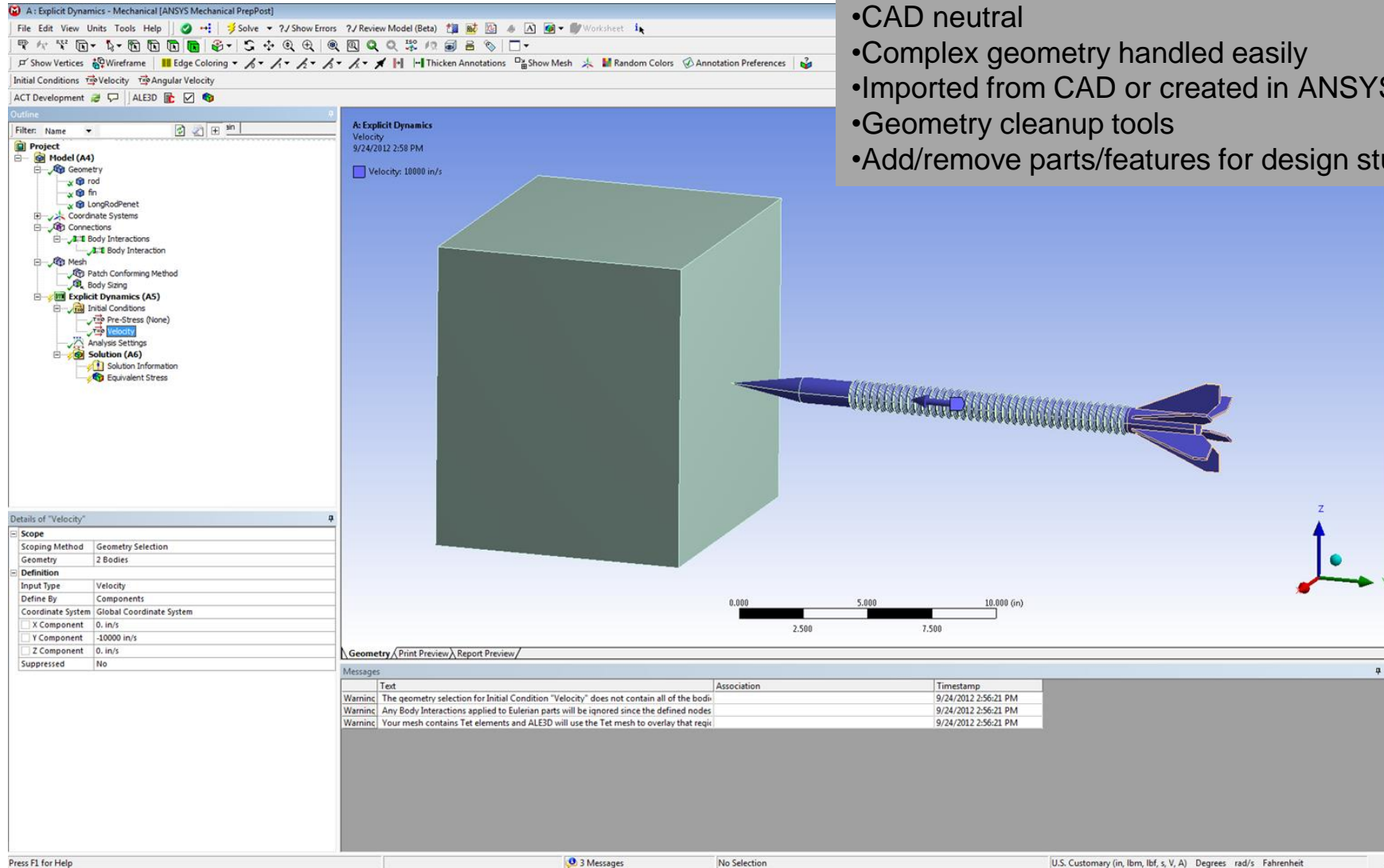
Run the ADAPT-ALE3D ACT extension which exports the ALE3D input deck and mesh file

Generate and Run the ALE3D analysis, post-process the results in VisIt



- **Current capabilities of ADAPT include:**
 - Meshing
 - Contact & Interactions (Slides)
 - Boundary & Load Condition Assignment
 - Tabular Data
 - Symmetry
 - Multiple Unit Systems
 - Run Control Parameters
 - Nodeset Definition
 - Result Plot Types
 - History Data (Tracers)
 - Lagrange & Euler Setups (ALE3D only)
 - Common Material Models
 - 2D & 3D applications
 - B-Division Units (ALE3D only)
 - User-Defined Commands
 - for advanced or unsupported functionality





Outline

- Project
 - Model (A4)
 - Geometry
 - rod
 - fn
 - LongRodPenet
 - Coordinate Systems
 - Connections
 - Body Interactions
 - Body Interaction
 - Mesh
 - Patch Conforming Method
 - Body Sizing
 - Explicit Dynamics (A5)
 - Initial Conditions
 - Pre-Stress (None)
 - Velocity
 - Analysis Settings
 - Solution (A6)
 - Solution Information
 - Equivalent Stress

Details of "Velocity"

Scope	
Scoping Method	Geometry Selection
Geometry	2 Bodies
Definition	
Input Type	Velocity
Define By	Components
Coordinate System	Global Coordinate System
X Component	0. in/s
Y Component	-10000 in/s
Z Component	0. in/s
Suppressed	No

Geometry / Print Preview / Report Preview

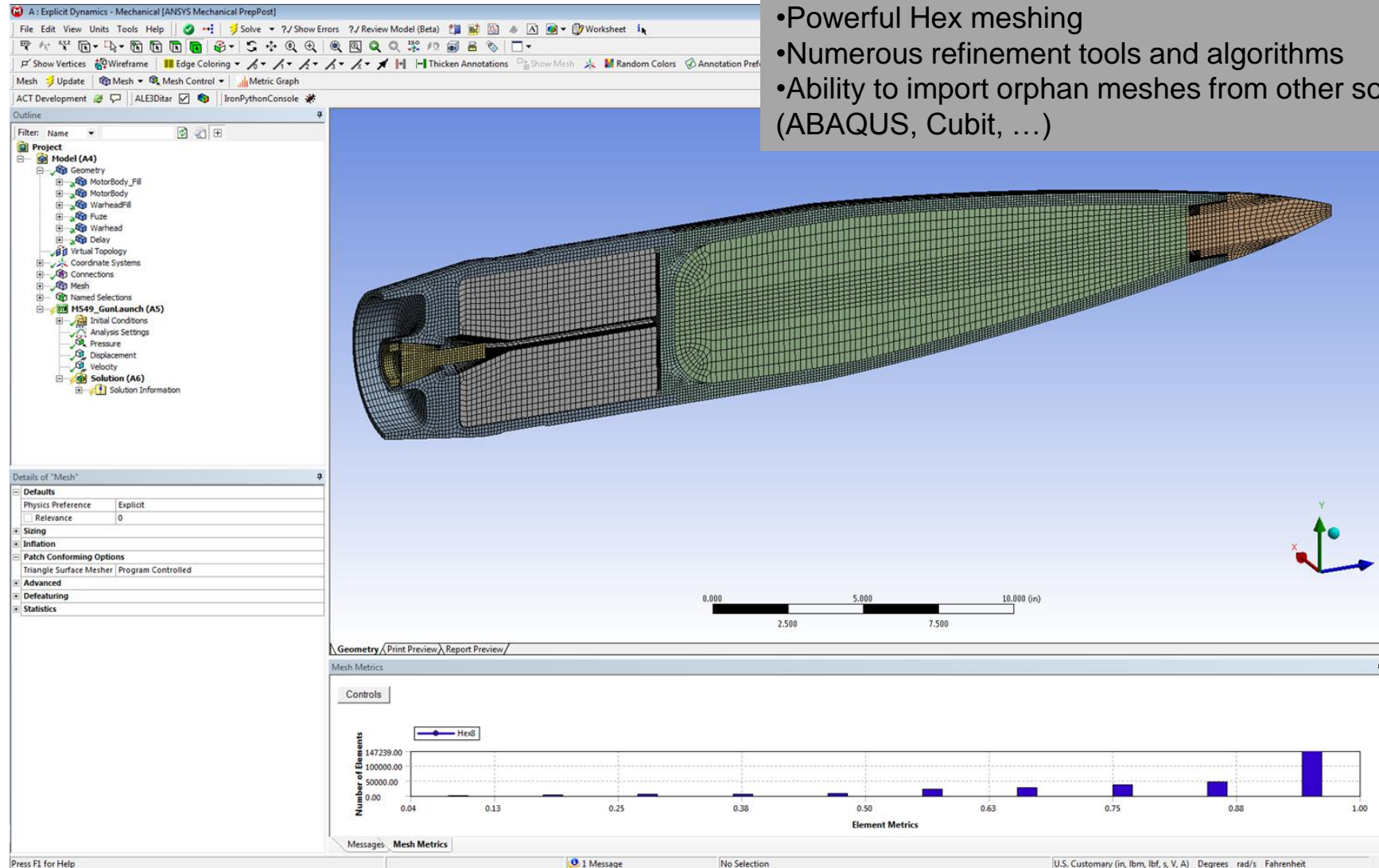
Messages

Text	Association	Timestamp
Warning: The geometry selection for Initial Condition "Velocity" does not contain all of the bodies.		9/24/2012 2:56:21 PM
Warning: Any Body Interactions applied to Eulerian parts will be ignored since the defined nodes		9/24/2012 2:56:21 PM
Warning: Your mesh contains Tet elements and ALE3D will use the Tet mesh to overlay that requi		9/24/2012 2:56:21 PM

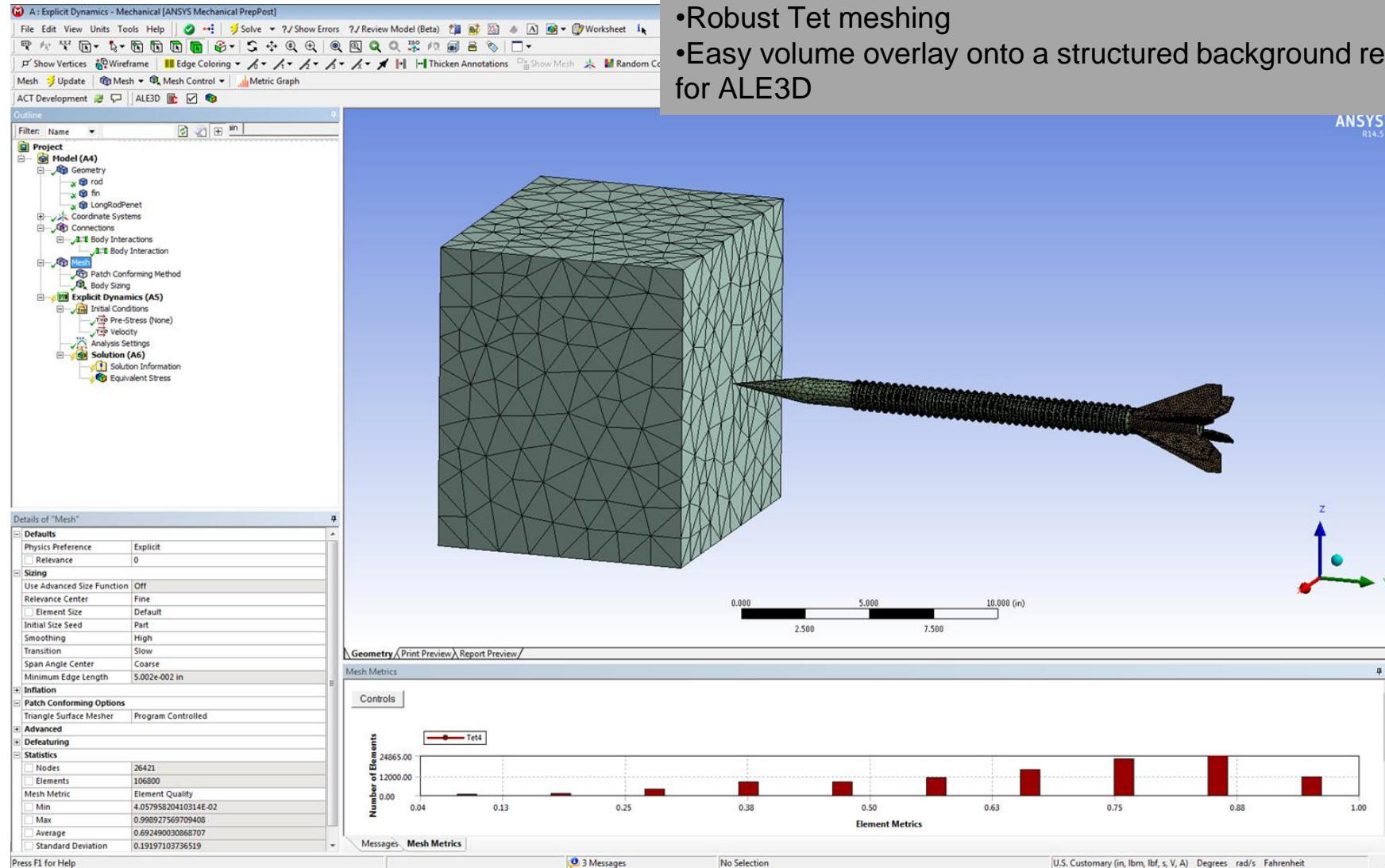
Press F1 for Help | 3 Messages | No Selection | U.S. Customary (in, lbf, s, V, A) Degrees rad/s Fahrenheit

- CAD neutral
- Complex geometry handled easily
- Imported from CAD or created in ANSYS
- Geometry cleanup tools
- Add/remove parts/features for design studies

- Powerful Hex meshing
- Numerous refinement tools and algorithms
- Ability to import orphan meshes from other sources (ABAQUS, Cubit, ...)



- Robust Tet meshing
- Easy volume overlay onto a structured background region for ALE3D



ANSYS Features – 2-sided and 1-sided Contact (Slides)



File Edit View Units Tools Help Solve ?/ Show Errors ?/ Review Model (Beta) Worksheet

ACT Development ACT Development

Outline

Filter: Name

- Project
 - Model (A4)
 - Geometry
 - Coordinate Systems
 - Connections
 - Contacts
 - Bonded - Multiple To Multiple
 - Bonded - Multiple To Multiple
 - Body Interactions
 - Mesh
 - Sweep Method
 - Sweep Method 2
 - MultZone
 - proj_gunlaunch_nospin (A5)
 - Initial Conditions
 - Analysis Settings
 - Pressure
 - Displacement
 - Solution (A6)
 - Solution Information

Details of "Multiple Selection"

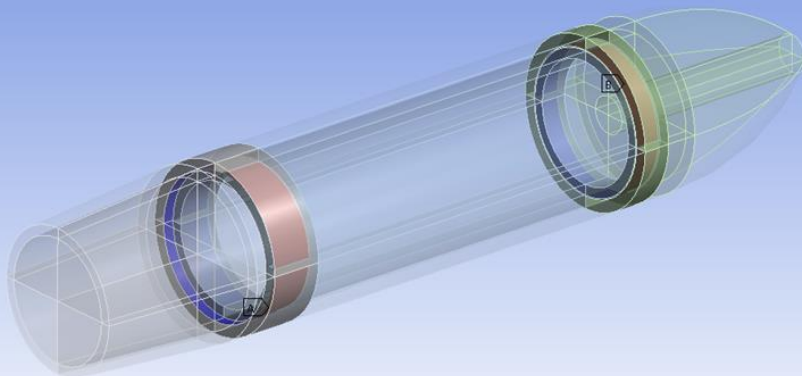
Scope	
Scoping Method	Geometry Selection
Definition	
Type	Bonded
Scope Mode	Manual
Behavior	Program Controlled
Trim Contact	Program Controlled
Maximum Offset	3.937e-006 in
Breakable	No
Suppressed	No

Multiple Selection (2 Objects Selected)

Bonded - Multiple To Multiple
9/19/2012 9:47 AM

Bonded - Multiple To Multiple

Bonded - Multiple To Multiple



Geometry / Print Preview / Report Preview /

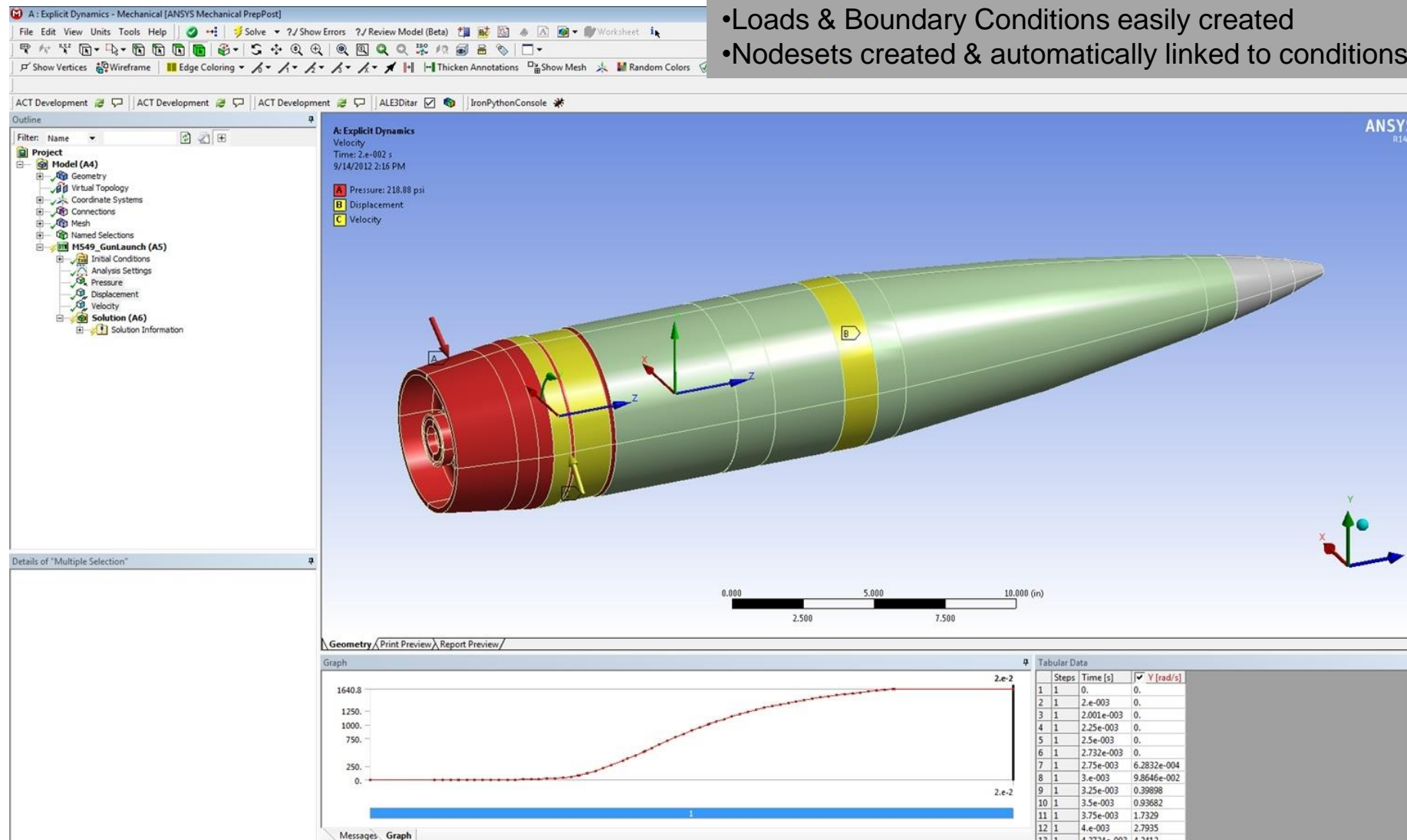
Messages

Text	Association	Timestamp
Warning: No result plots were defined. Default plot variables include:		9/17/2012 1:57:59 PM
Warning: The "Maximum Number of Cycles" in the Analysis Settings was not modified and may		9/17/2012 1:55:24 PM

2 Messages No Selection U.S. Customary (in, lbm, lbf, s, V, A) Degrees rad/s Fahrenheit

- Contact/Slides easily created
- Automatic detection & creation of 2-sided contacts based on search criteria
- Nodesets created & automatically linked as master/slave contact pairs for slides

Examples – Boundary Condition Assignment



Examples – Materials Manager & Libraries

Burn - Workbench

File Edit View Tools Units Extensions Help

New Open... Save Save As... Import... Reconnect Refresh Project Update Project Return to Project Compact Mode

Toolbox

- Physical Properties
 - Density
 - Linear Elastic
 - Experimental Stress Strain Data
 - Hyperelastic
 - Plasticity
 - Strength
 - Thermal
 - Brittle/Granular
 - Equations of State
 - Porosity
 - Failure
 - Plastic Strain Failure
 - Principal Stress Failure
 - Principal Strain Failure
 - Stochastic Failure
 - Tensile Pressure Failure
 - Crack Softening Failure
 - Johnson Cook Failure
 - Grady Spall Failure

Outline of Schematic A2: Engineering Data

	A	B	C
1	Contents of Engineering Data		
2	Material		Source
3	PBX-9010		"LNL Explosives Handbook" Dobr... January 1985
4	Stainless Steel NL		
5	Structural Steel		Fatigue Data at zero mean stress 2, Table 5-110.1
*	Click here to add a new material		

Properties of Outline Row 3: PBX-9010

	A	B	C	D	E
1	Property	Value	Unit		
2	Density	1787	kg m ⁻³		
3	Explosive JWL				
4	Parameter A	5.8145E+11	Pa		
5	Parameter B	6.801E+09	Pa		
6	Parameter R1	4.1			
7	Parameter R2	1			
8	Parameter W	0.35			
9	C-J Detonation Velocity	8390	m s ⁻¹		
10	C-J Energy / unit mass	5.036E+06	J kg ⁻¹		
11	C-J Pressure	3.4E+10	Pa		
12	Burn on compression fraction	0			
13	Pre-burn bulk modulus	0	Pa		
14	Adiabatic Constant	0			
15	Additional specific energy / unit mass	0	J kg ⁻¹		
16	Begin Time	0	s		
17	End Time	0	s		

Messages

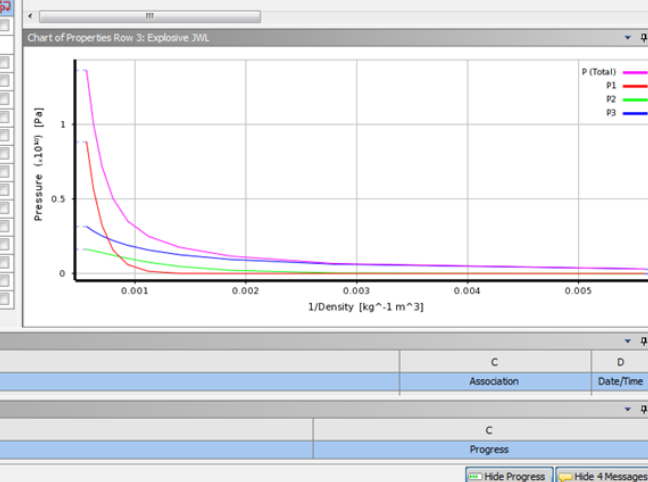
	A	B	C	D
1	Type	Text	Association	Date/Time

Progress

	A	B	C
1	Status	Details	Progress

Ready

- ANSYS material models correlated to appropriate ALE3D material models
- Access to ANSYS libraries or create your own
- ALE3D “KO” models can be supported with a reference library



Examples – Importing External Meshes

The screenshot shows the 'Project Schematic' in ANSYS Workbench. A red box highlights the 'Finite Element Modeler' component in the 'A' column, which is connected to the 'Model' component in the 'B' column. The 'Model' component is labeled 'EXODUS-II Mesh: GunLaunch-Projectile.g'. A red arrow points from the 'Model' component to the 'Cubit Mesh' window below.

- Workbench imports external meshes
- Can reuse existing geometry/meshes for future analyses (i.e. multiple impacters on a target)
- Can Import existing EXODUS-II meshes

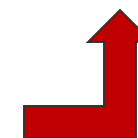
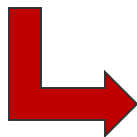
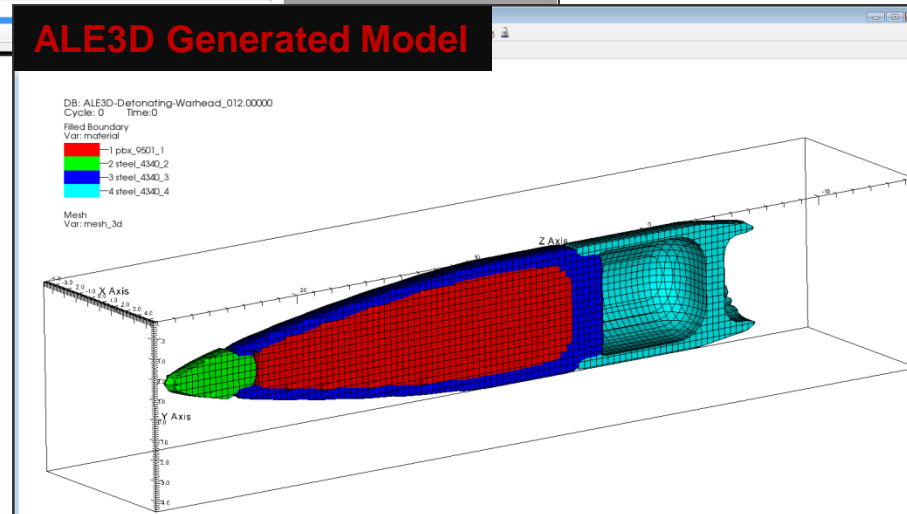
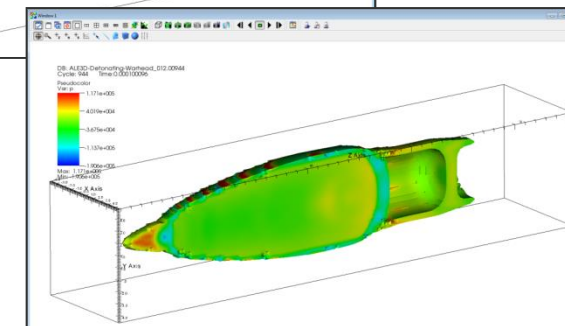
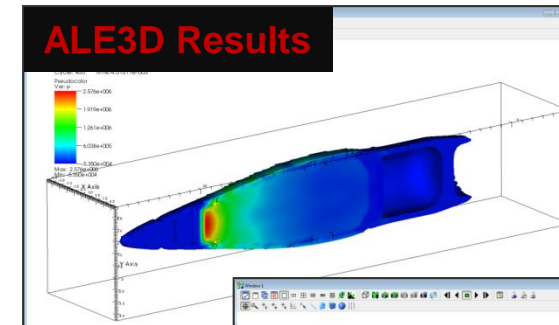
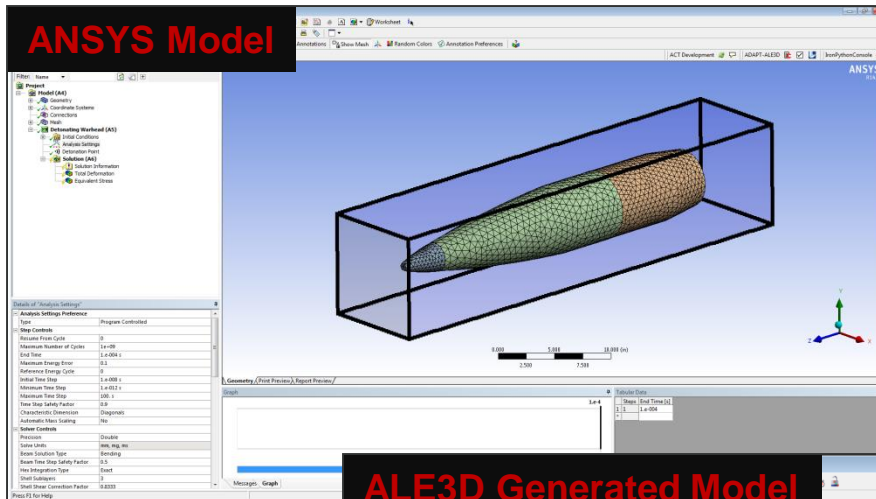
The screenshot shows the 'Project Schematic' in ANSYS Workbench. A red box highlights the 'ADAPT-Sierra/SM' component in the 'B' column, which is connected to the 'Model' component in the 'A' column. The 'Model' component is labeled 'EXODUS-II Mesh: GunLaunch-Projectile.g'. A red arrow points from the 'Model' component to the 'ADAPT-Sierra/SM' window below.

The screenshot shows the 'Project Schematic' in ANSYS Workbench. A red box highlights the 'ADAPT-Sierra/SM' component in the 'B' column, which is connected to the 'Model' component in the 'A' column. The 'Model' component is labeled 'EXODUS-II Mesh: GunLaunch-Projectile.g'. A red arrow points from the 'Model' component to the 'ADAPT-Sierra/SM' window below.

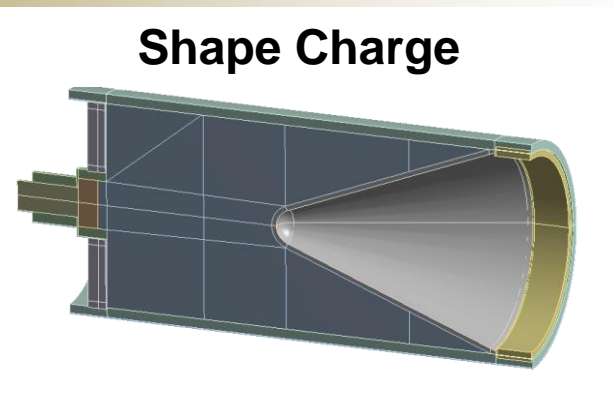
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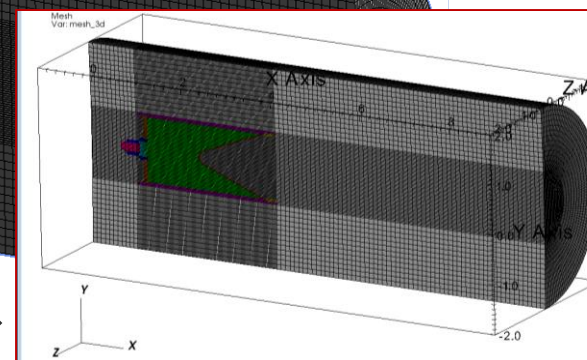
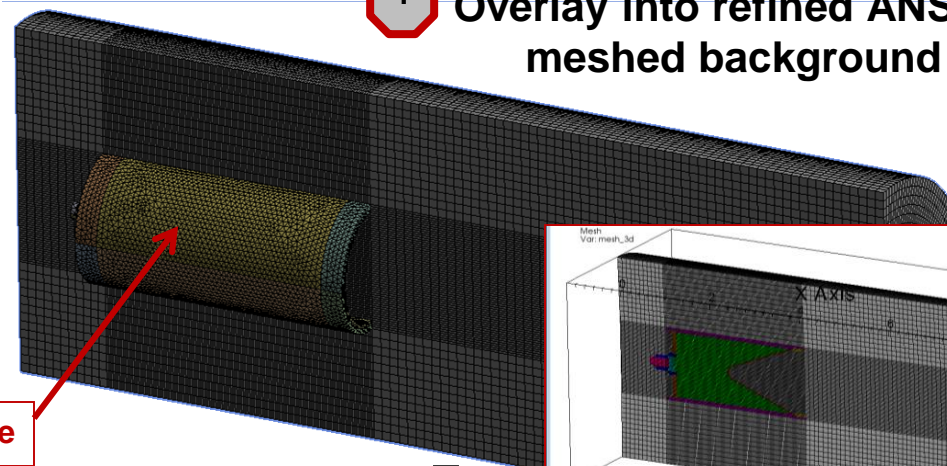
- Eulerian/Full Advection, Tet mesh overlay into background “box”



ALE3D Example: Shape Charge (3 methods)

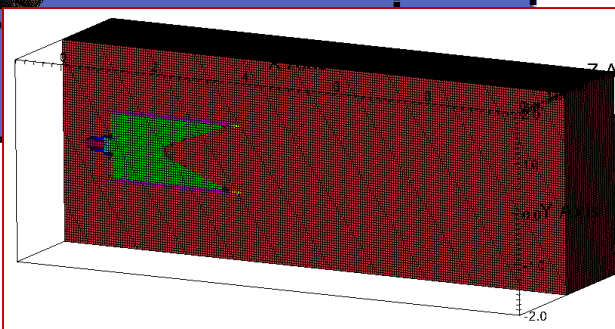
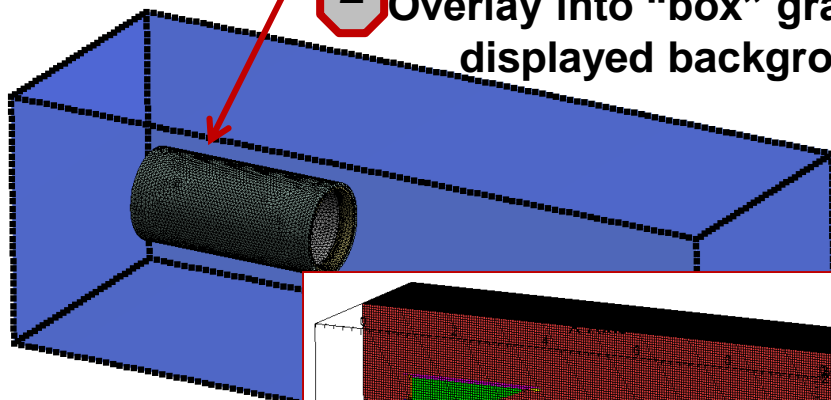


1 Overlay into refined ANSYS hex meshed background region

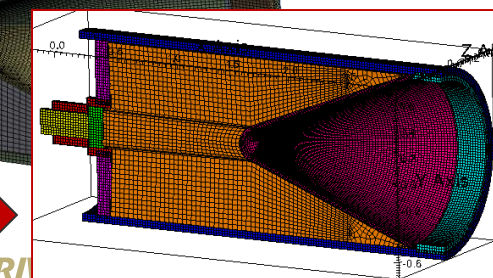
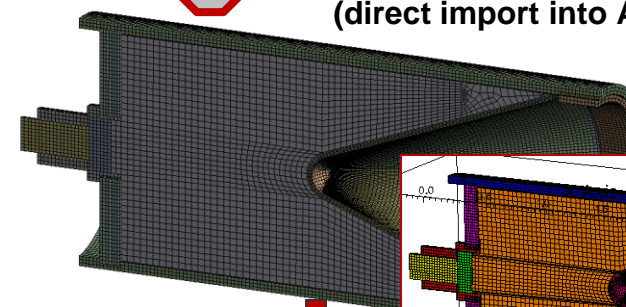


Tet meshed shape charge

2 Overlay into "box" graphically displayed background region



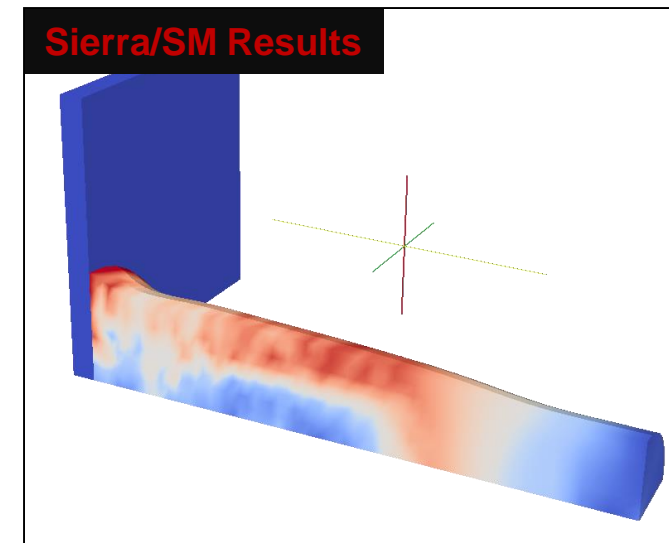
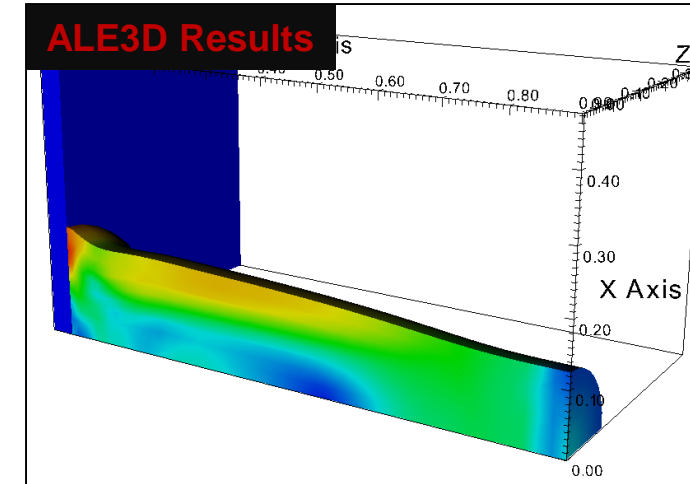
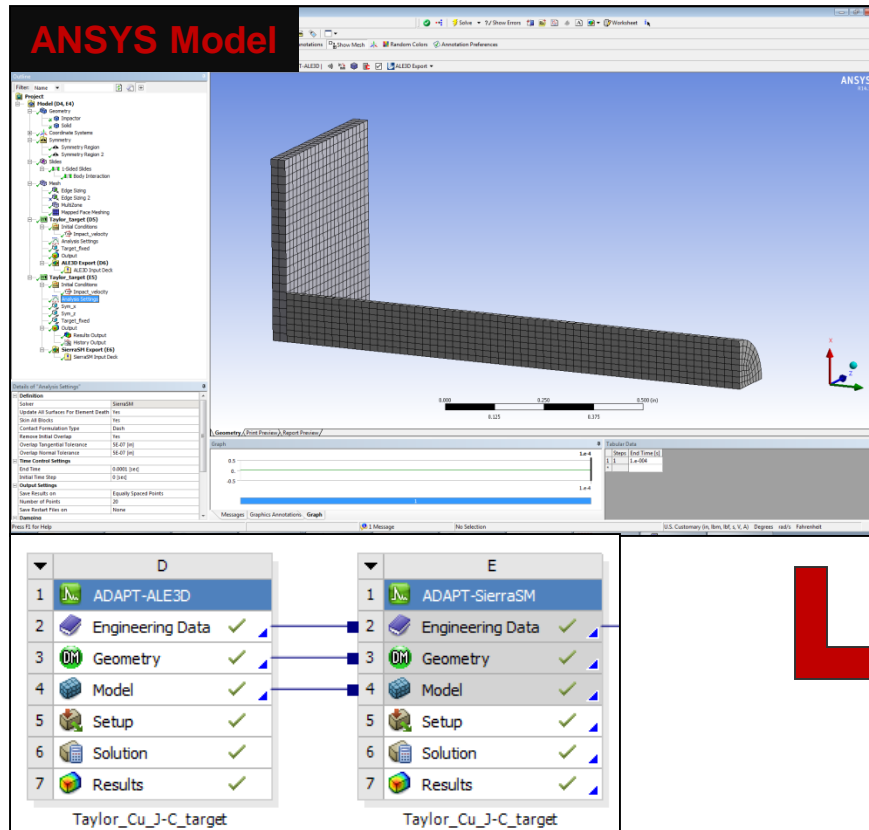
3 Conformal hex mesh
(direct import into ALE3D)



TECHNOLOGY DRIVEN

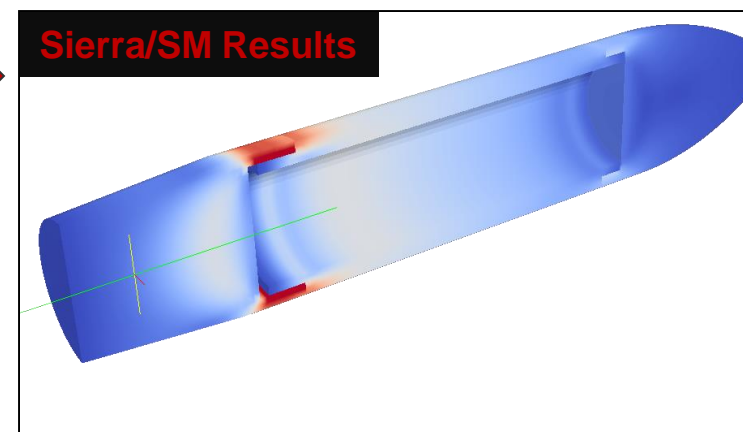
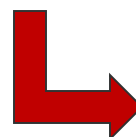
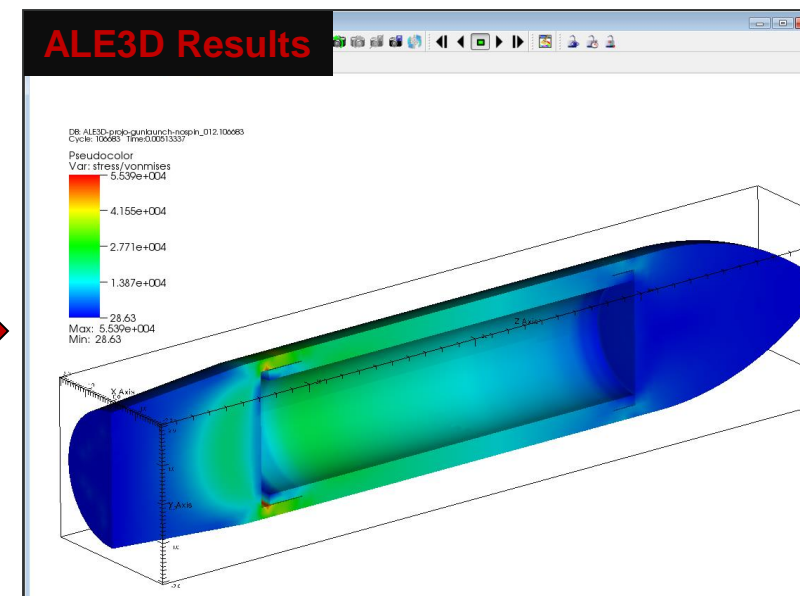
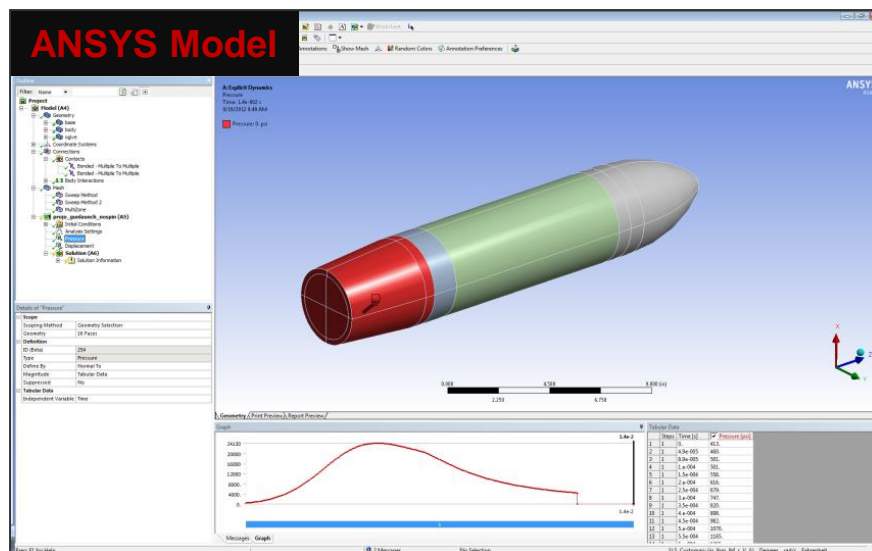
ALE3D & Sierra/SM Example: Taylor Cylinder

- Lagrange, hex mesh, quarter symmetric Taylor Cylinder



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

- Lagrange hex mesh projectile





ADAPT-ALE3D

- Advection Suite – global and region advection settings
- GUI display of ALE3D mesh generator commands (i.e. mbox, mcylinder...)
- Expand supported material models
- Expand supported slides
- Support Thermal/Chemistry blocks
- Parameter Studies



Security

- ARDEC and ANSYS are taking the security of ALE3D, and all ITAR information very seriously
 - Anthony Dawson is the only other co-developer of the source code
 - US Citizen, Former DoD/ARDEC employee
 - All ITAR information is secure on dedicated ITAR computers and offices

Release Timeline:

- Full release of ADAPT-ALE3D Version 1.0 released April 2013

Life-Cycle Support:

- **Distribution** – ARDEC and DoE lab
- **Configuration Control** – ANSYS releases, DoE code releases
- **Training** – ARDEC and/or ANSYS
- **New Development** – prioritize enhancements based on overall benefit
- **Technical Support** –
 - ANSYS to support their software
 - DoE lab to support their solver
 - ARDEC to support ADAPT specific issues

Cost of this effort to the government





- ADAPT-ALE3D development
 - Less than 9 months to be at a very mature state
 - Less than 1 man-year of labor
 - Less than \$200K of fiscal investment
- ADAPT extensions are free and minimal preprocessing ANSYS licenses required for use
 - \$8K, Geometry prep and Mechanical licenses
 - ANSYS revenue generation from ADAPT is not a goal of the project
 - ANSYS wants to form a long-term, mutually beneficial relationship with the DoD/DoE

Benefits to the government

- Reduces pre-preprocessing time and difficulty for ALE3D analyses
 - Use more as an engineering tool as opposed to a research tool
- More effective and efficient modeling
 - Utilizing the best government-developed tools for each application
 - Learn 1 GUI to preprocess for multiple powerful solvers
- Potential to save the government millions

- **ARDEC and ANSYS are excited about this new capability**
 - It's imperative to be part of this revolutionary new approach to DoD simulation
- **The Cost-to-Benefit ratio is unmatched**
 - In under a year with 1 man-year of labor a customized GUI was developed for 2 government solvers
 - As DoD modeling and simulation usage continues the funding focus can shift to this hybrid government code/commercial GUI solution
 - Better utilize our in-house codes while reducing the burden of commercial software
 - Ultimately saving the government money
- **Powerful for both novice and advanced users**
 - ADAPT enables a user to focus on the critical technical aspects of an analysis
- **Your input on this project is greatly valued**
 - Contact us if you want to use ADAPT, want a demo, or have questions
 - Let us know what you would like to see next for ALE3D, Sierra/SM, and beyond
 - Currently working with LLNL and SNL but desire even more involvement
 - Future potential expansion: ADAPT-???

Examples of ADAPT Flyers



ADAPT-ALE3D

ADAPT-ALE3D is an ANSYS Application Customization Toolkit (ACT) extension that allows a user to set up an analysis in the ANSYS® Workbench™ environment and then export the necessary files to run the analysis in ALE3D. The exported files include an EXODUS-II binary mesh file and ALE3D input deck file. The primary ANSYS® Workbench™ functionality such as loads, boundary conditions, initial conditions, contacts, body interactions, named selections, Lagrange/Eulerian formulation etc. are supported for ALE3D export. More specific ALE3D functionality that is outside of the ANSYS® Workbench™ functionality can be added to the ALE3D input deck manually by using the Command Editor which will add your user-defined text into the specified input deck blocks.

Benefits

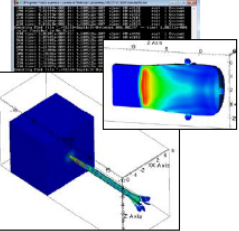
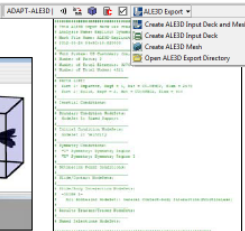
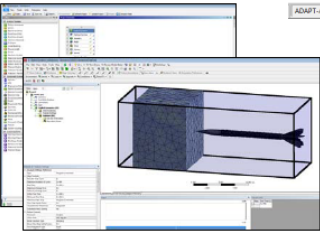
ADAPT-ALE3D provides a solution to the usability gap when using an input deck based solver such as ALE3D. It combines the advanced usability of ANSYS' commercial graphical user interface with the powerful and advanced simulation capability of the ALE3D solver. This will reduce analysis setup time and invite otherwise intimidated users to utilize this powerful solver expanding the ALE3D user community and use of the ANSYS graphical user interface.


Workflow

Set up the analysis in the ANSYS® Workbench™ graphical user interface


Run the ADAPT-ALE3D ACT extension which exports the ALE3D input deck and mesh file

Generate and Run the ALE3D analysis, post-process the results in Visit





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Distribution A: Approved for Public Release



ADAPT-Sierra/SM

ADAPT-Sierra/SM is an ANSYS Application Customization Toolkit (ACT) extension that allows a user to set up an analysis in the ANSYS® Workbench™ environment and then export the necessary files to run the analysis in Sierra/SM. The exported files include an EXODUS-II binary mesh file and Sierra/SM input deck file. The primary ANSYS® Workbench™ functionality such as loads, boundary conditions, initial conditions, contacts, body interactions, named selections are supported for Sierra/SM export. More specific Sierra/SM functionality that is outside of the ANSYS® Workbench™ functionality can be added to the Sierra/SM input deck manually by using the Command Editor which will add your user-defined text into the specified input deck sections.

Benefits

ADAPT-Sierra/SM provides a solution to the usability gap when using an input deck based solver such as Sierra/SM. It combines the advanced usability of ANSYS' commercial graphical user interface with the powerful and advanced simulation capability of the Sierra/SM solver. This will reduce analysis setup time and invite otherwise intimidated users to utilize this powerful solver expanding the Sierra/SM user community and use of the ANSYS user interface.

Workflow

Set up the analysis in the ANSYS® Workbench™ graphical user interface

Run the ADAPT-Sierra/SM ACT extension which exports the Sierra/SM input deck and mesh

Run the Sierra/SM analysis, post-process the results in Paraview





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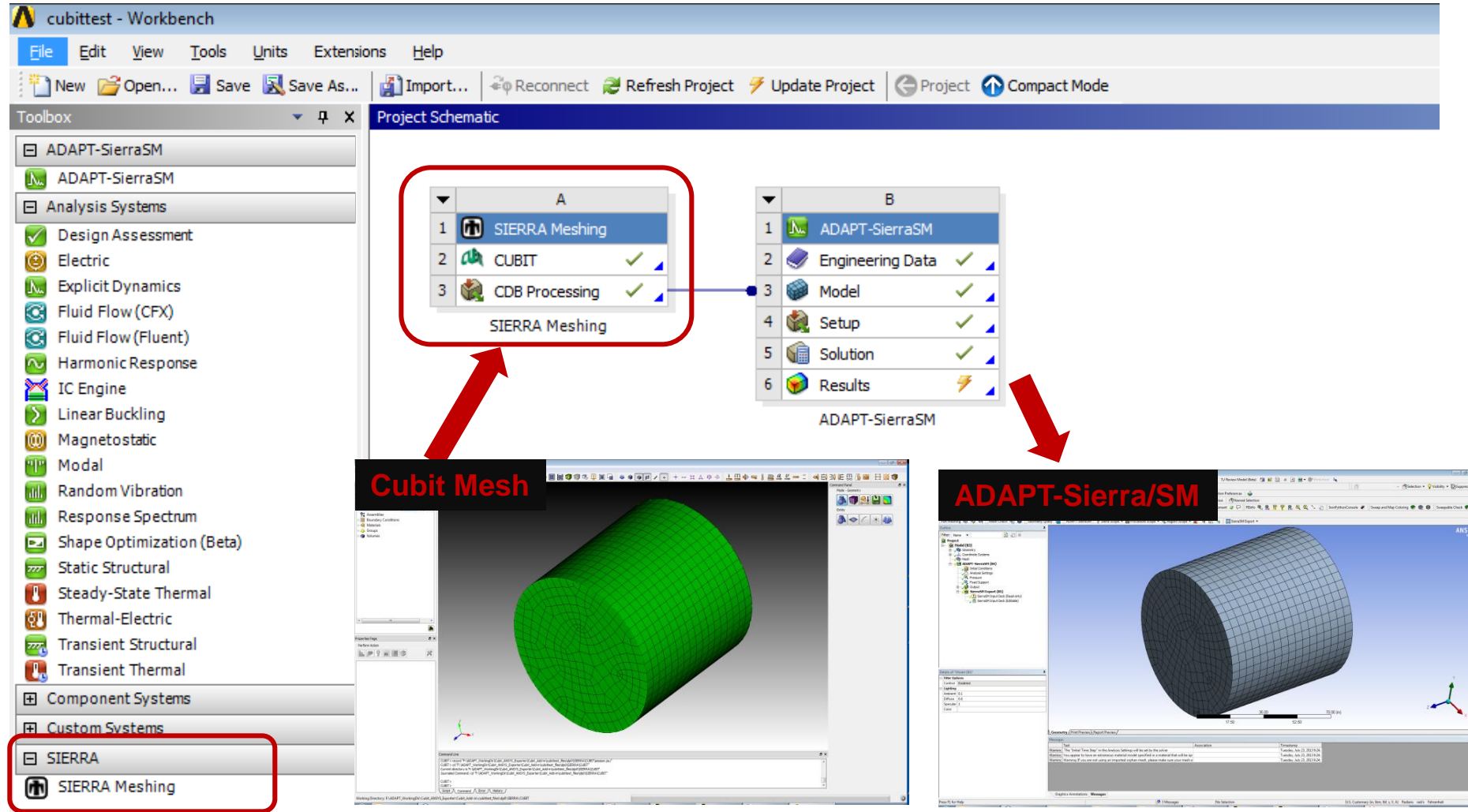


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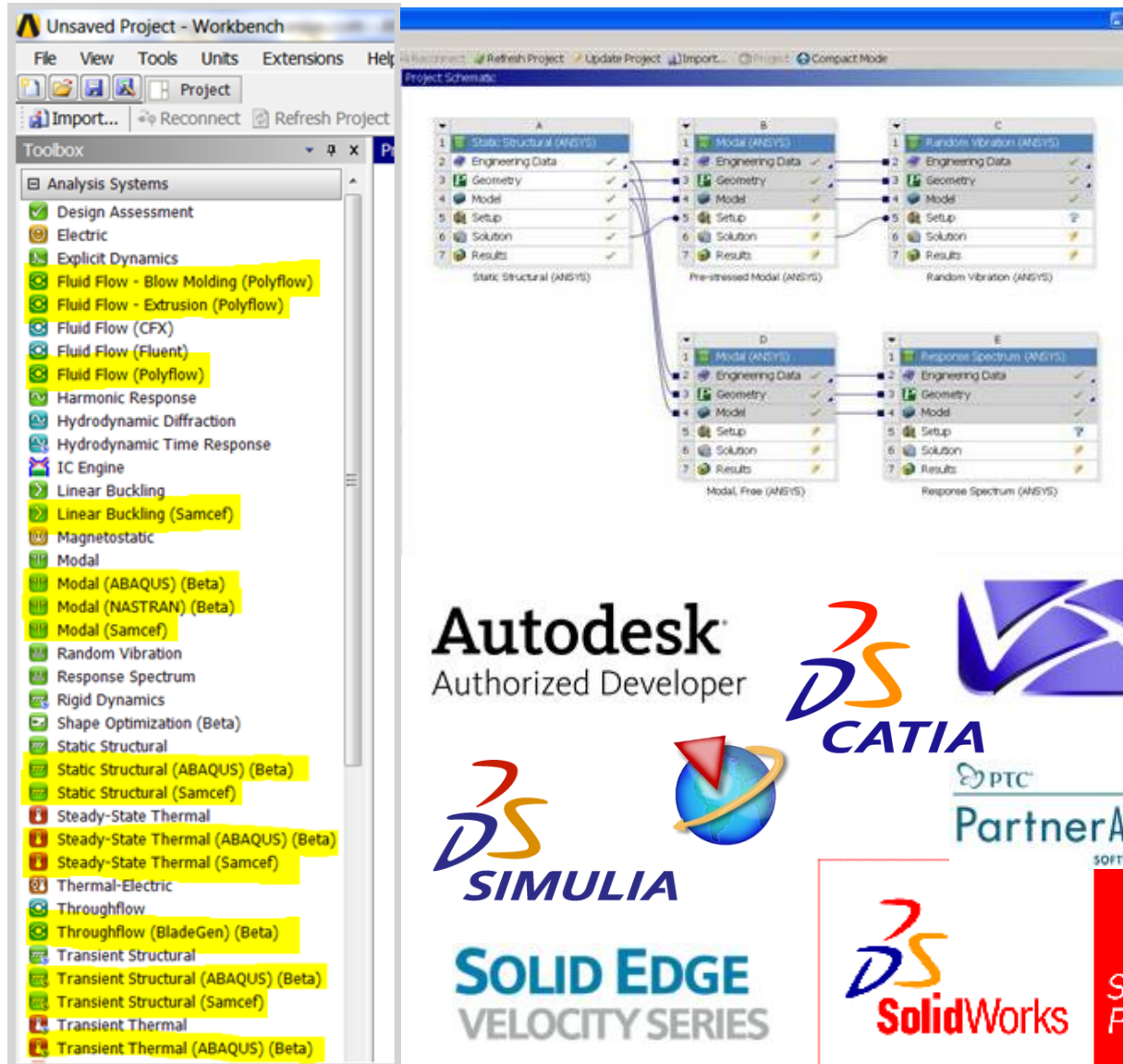
Distribution A: Approved for Public Release

Example: External Government Mesher

- ACT was used to fully integrate CUBIT into the ANSYS Workbench framework
- *All mesh data seamlessly transferred by Workbench*



Experience with Integration



ANSYS maintains partnerships for integration with many various organizations, including competitors

- ABAQUS®
- Autodesk®
- CATIA®
- I-DEAS®
- NASTRAN
- Pro/DESKTOP®
- PTC/Creo®
- Siemens/NX®
- SpaceClaim®
- Solid Edge®
- SolidWorks®
- VX®
- Etc.



Questions?