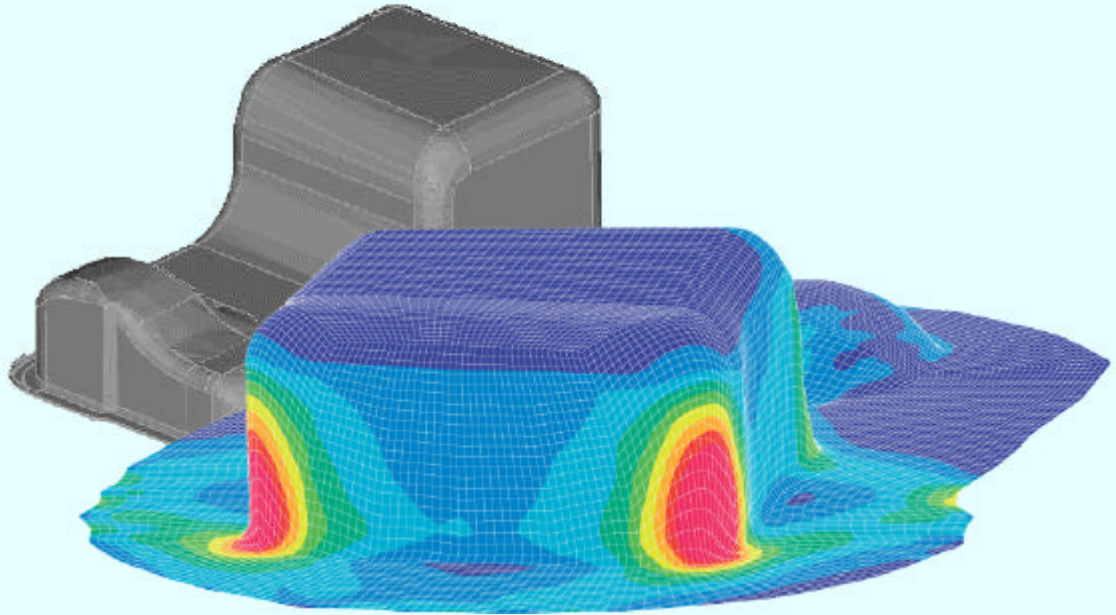


# A D I N A

## SYSTEM OVERVIEW



Deep drawing of an oil pan

### Programs

**ADINA**

Structural analysis

**ADINA-F**

Incompressible and fully compressible flows

**ADINA-T**

Heat transfer and field problems

**ADINA-FSI**

Fluid flows with structural interaction

**ADINA-TMC**

Thermo-mechanical coupling

**AUI**

ADINA User Interface

**ADINA-M / AUI**

ADINA User Interface with solid modeling

**TRANSOR**

Interface to I-DEAS, MSC.Patran

**900-NODE VERSION**

Promotional version

Available on UNIX, Windows and Linux

# ADINA

The Finite Element System for Structures, Heat Transfer and CFD

## Our Mission

The mission of ADINA R & D is to provide ONE finite element program system – the ADINA System – that can be used to perform comprehensive finite element analysis of structures, heat transfer, fluids, and their interactions, all in one.

## Application Examples

- ☛ Earthquake analysis of large bridges (San Francisco-Oakland Bay Bridge)
- ☛ Implicit / static solution of car roof crush “rollover” (Ford Windstar, Ford Taurus)
- ☛ Metal forming simulation using implicit / static solution (deep drawing, stamping, rolling)
- ☛ Hydro-forming of metals and plastics
- ☛ Fluid flow-structure interaction analysis of refrigerator compressors
- ☛ Analysis of car headlamp (specular radiosity, humidity, lens distortions)
- ☛ Earthquake sloshing analysis of large tanks
- ☛ Acoustic solution coupled with CFD (microphones, speakers, hearing aids)
- ☛ Dynamic wave propagation analysis (simulation of drop tests)
- ☛ Consolidation and undrained analysis of porous media (dams, tunnels, bridges)
- ☛ Thermo-mechanical coupled analysis of brakes (contact, friction, heat generated by friction)
- ☛ Analysis of MEMS devices
- ☛ Fluid flow-structure interaction analysis of automobile components (ABS braking systems, pumps, shock absorbers)
- ☛ Fluid flow-structure interaction analysis in bioengineering (flow through blood vessels, artificial lung, artificial heart, brain damage)
- ☛ Analysis of nuclear pressure vessels (fluid-structure interaction, contact, material nonlinearity, creep)
- ☛ High Mach number CFD with structural interaction (rocket launching)
- ☛ Analysis of tires (rubber, contact, aquaplaning)
- ☛ Simulation of excavation and construction of tunnels
- ☛ Fracture mechanics analysis of structural components (nuclear reactors, turbines, concrete, pressure vessels)
- ☛ CFD and structural analysis of heat exchangers
- ☛ Analysis of large roofs (hangers, stadiums, airports)
- ☛ Analysis of concrete structures
- ☛ Analysis of fabric structures with wrinkling
- ☛ Bearing simulation (contact, fluid flow-structure interaction)

# ADINA

	ADINA	ADINA-F	ADINA-T	ADINA-FSI	ADINA-TMC	AUI	ADINA-M / AUI	TRANSOR	900-Node Version
<b>Structural Linear</b>									
Statics	✓			✓	✓				✓
Transient implicit	✓			✓	✓				✓
Transient explicit	✓								✓
Frequency	✓								✓
Mode superposition	✓								✓
Cyclic symmetry	✓								✓
Substructuring	✓								✓
Acoustic fluids	✓			✓	✓				✓
<b>Structural Nonlinear</b>									
Material nonlinearity	✓			✓	✓				✓
Large deformations	✓			✓	✓				✓
Large strains (2-D, 3-D, shell)	✓			✓	✓				✓
Statics	✓			✓	✓				✓
Transient implicit	✓			✓	✓				✓
Transient explicit	✓								✓
Contact	✓			✓	✓				✓
Frequency, frequency with contact	✓								✓
Mode superposition	✓								✓
Fracture mechanics	✓								✓
Porous media	✓			✓	✓				✓
Substructuring	✓								✓
Restart, mapping solution	✓			✓	✓				✓
Element birth / death	✓			✓	✓				✓
Initial strains / stresses	✓			✓	✓				✓
Automatic time stepping	✓			✓	✓				✓
User-supplied elements	✓								✓
<b>Structural Materials</b>									
Elastic	✓			✓	✓				✓
Thermoelastic, thermoplastic	✓			✓	✓				✓
Plastic (isotropic, orthotropic)	✓			✓	✓				✓
Creep	✓			✓	✓				✓
Rubber	✓			✓	✓				✓
Geotechnical	✓			✓	✓				✓
Concrete	✓			✓	✓				✓
Viscoelastic	✓			✓	✓				✓
Moment-curvature	✓			✓	✓				✓
Strain-rate dependency	✓			✓	✓				✓
User-supplied materials	✓			✓	✓				✓
<b>Contact of Structures</b>									
Self contact	✓			✓	✓				✓
Surface to surface	✓			✓	✓				✓
Node to surface	✓			✓	✓				✓
Node to node	✓			✓	✓				✓
Tied contact	✓			✓	✓				✓
Mesh glueing	✓			✓	✓				✓
Rigid targets	✓			✓	✓				✓
Post-impact corrections	✓			✓	✓				✓
Metal forming features	✓			✓	✓				✓
<b>Solution in Frequency Domain</b>									
Response spectrum	✓								✓
Fourier analysis						✓	✓		✓
Harmonic vibration	✓					✓	✓		✓
Random vibration	✓					✓	✓		✓
Floor response spectrum						✓	✓		✓

# ADINA

	ADINA	ADINA-F	ADINA-T	ADINA-FSI	ADINA-TMC	AUI	ADINA-M / AUI	TRANSOR	900-Node Version
<b>Frequency Analysis of Structures</b>									
Lanczos	✓								✓
Subspace	✓								✓
Determinant search	✓								✓
<b>Buckling of Structures</b>									
Linearized buckling	✓								✓
Collapse (nonlinear) analysis	✓								✓
<b>CFD</b>									
Steady-state		✓		✓					✓
Transient		✓		✓					✓
Incompressible flows		✓		✓					✓
Slightly compressible flows		✓		✓					✓
Low-speed compressible flows		✓		✓					✓
High-speed compressible flows		✓		✓					✓
K- $\epsilon$ , K- $\omega$ turbulence models		✓		✓					✓
Flow through porous media		✓		✓					✓
Natural / forced convection		✓		✓					✓
Conjugate heat transfer		✓		✓					✓
Mass transfer		✓		✓					✓
Solid elements		✓		✓					✓
Automatic nondimensionalization procedure		✓		✓					✓
Automatic time stepping, CFL option		✓		✓					✓
Restart, mapping solution		✓		✓					
Constraint conditions		✓		✓					✓
Element birth / death		✓		✓					✓
Include / exclude hydrostatic pressure		✓		✓					✓
Automatic remeshing		✓		✓					
<b>CFD Boundary Conditions</b>									
Prescribed solution variables		✓		✓					✓
Prescribed rotational velocity		✓		✓					✓
Concentrated / distributed loads		✓		✓					✓
Field centrifugal load		✓		✓					✓
Concentrated / distributed heat flow		✓		✓					✓
Heat and mass convections		✓		✓					✓
Radiation / specular radiation		✓		✓					✓
Angular velocity		✓		✓					✓
Fluid-structure interface		✓		✓					✓
Free surface		✓		✓					✓
Fluid-fluid interface		✓		✓					✓
Phase change		✓		✓					✓
Gap		✓		✓					✓
External flow		✓		✓					✓
Supersonic / subsonic flow at inlet		✓		✓					✓
Supersonic / subsonic flow at outlet		✓		✓					✓
User-supplied boundary conditions		✓		✓					
<b>CFD Material Models</b>									
Constant		✓		✓					✓
Time-dependent		✓		✓					✓
Temperature-dependent		✓		✓					✓
Pressure-dependent		✓		✓					✓
Pressure-temperature-dependent		✓		✓					✓
Non-Newtonian		✓		✓					✓
User-supplied materials		✓		✓					✓
Acoustic fluids	✓			✓	✓				✓

# ADINA

	ADINA	ADINA-F	ADINA-T	ADINA-FSI	ADINA-TMC	AUI	ADINA-M / AUI	TRANSOR	900-Node Version
<b>Thermal Analysis of Structures</b>									
Steady-state			✓		✓				✓
Transient			✓		✓				✓
Conduction			✓		✓				✓
Convection			✓		✓				✓
Radiation			✓						✓
Phase change			✓		✓				✓
Seepage			✓		✓				✓
Joule-heating			✓		✓				✓
Element birth / death			✓		✓				✓
Automatic time stepping			✓		✓				✓
User-supplied materials			✓		✓				✓
<b>Multiphysics, Coupled Problems</b>									
Potential based (acoustic) fluids / structures	✓			✓					✓
Incompressible fluids / structures				✓					
Slightly compressible fluids / structures				✓					
Low speed compressible fluids / structures				✓					
High speed compressible fluids / structures				✓					
Thermo-structural (one way)	✓				✓				✓
Thermo-mechanical coupling, plastic work and / or frictional contact					✓				
Thermal-electric			✓		✓				
Piezoelectric			✓		✓				
<b>Solvers</b>									
Sparse	✓	✓	✓	✓	✓				✓
Iterative	✓	✓	✓	✓	✓				✓
Multigrid	✓	✓	✓	✓	✓				✓
Direct skyline	✓	✓	✓	✓	✓				✓
Explicit	✓	✓							✓
<b>Preprocessing / Postprocessing for Structures and CFD</b>									
Graphical User Interface						✓	✓	✓	✓
Solid modeling							✓		
Automatic meshing						✓	✓		✓
Mapped meshing						✓	✓		✓
Direct finite element input						✓	✓	✓	✓
Nastran import						✓			✓
Interactive graphics, OpenGL						✓	✓		✓
Vector image output						✓	✓		✓
Bitmap image output						✓	✓		✓
AVI movie output						✓	✓		✓
Graphs, listings						✓	✓		✓
Parametric input						✓	✓		✓
Macros, shortcut keys						✓	✓		✓
Icon customization						✓	✓		✓
Online documentation						✓	✓	✓	✓
<b>CAD Support for Structures &amp; CFD</b>									
SolidWorks							✓		
Unigraphics, SolidEdge							✓		
All Parasolid-based CAD programs							✓		
I-DEAS								✓	
MSC.Patran								✓	
IGES geometry input						✓	✓		✓
Parallel Versions	✓	✓	✓	✓	✓				

# PROGRAM DISTRIBUTION

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