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DYNA3D/ParaDyn Regression Test Suite Inventory

J.I. Lin

Methods Development Group

December 10, 2010

Auspices

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DYNA3D/ParaDyn Regression Test Suite Inventory

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Introduction

The following table constitutes an initial assessment of feature coverage across the regression test suite used for DYNA3D and ParaDyn. It documents the regression test suite at the time of production release 10.1 in September 2010. The columns of the table represent groupings of functionalities, e.g., material models. Each problem in the test suite is represented by a row in the table. All features exercised by the problem are denoted by a check mark (✓) in the corresponding column.

The definition of “feature” has not been subdivided to its smallest unit of user input, e.g., algorithmic parameters specific to a particular type of contact surface. This represents a judgment to provide code developers and users a reasonable impression of feature coverage without expanding the width of the table by several multiples.

All regression testing is run in parallel, typically with eight processors. Many are strictly regression tests acting as a check that the codes continue to produce adequately repeatable results as development unfolds, compilers change and platforms are replaced. A subset of the tests represents true verification problems that have been checked against analytical or other benchmark solutions. Users are welcomed to submit documented problems for inclusion in the test suite, especially if they are heavily exercising, and dependent upon, features that are currently underrepresented.

DYNA3D/ParaDyn Regression Test Suite Inventory

V10.1 Jerry Lin 2 Sept 2010

[illegible]

Problems: 344 Features: 269

[illegible]

Problem Name					Equation-of-State (form)														H-L Beam Quadrature Rules					H-L Beam Cross Sect.			Beam Orient.	Shell Int. Rule	Interface Save	Single Point Constraints	Sliding Boundary Planes	Symmetry Planes with Failure	Time History Blocks			
	66	68	70	71	1	2	3	4	5	6	8	9	11	12	13	14	15	16	17	18	-n	1	2	3	4	5	0	1	2						Node	Element
bar1																																			✓	✓
bar10																					✓													✓	✓	
bar10_leos																																		✓	✓	
bar11																																		✓	✓	
bar12																																		✓	✓	
bar13																																		✓	✓	
bar14																																		✓	✓	
bar15																					✓												✓	✓		
bar17																					✓												✓	✓		
bar18																																		✓	✓	
bar19																																		✓	✓	
bar1_12																																		✓	✓	
bar1_2																																		✓	✓	
bar1_4																																		✓	✓	
bar1_5																																		✓	✓	
bar1_6																																		✓	✓	
bar1_7																																		✓	✓	
bar1_9																																		✓	✓	
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bar21																																		✓	✓	
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bar4																																		✓	✓	
bar40																																		✓	✓	
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bar62																																		✓	✓	
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bar64																																		✓	✓	
bar65																																		✓	✓	
bar66	✓																																	✓	✓	
bar7																																		✓	✓	
bar70																													</							

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _t)							Prescribed Kinematics			Rigid Walls	Constraints (IDOF)			Init. Cond.				
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc		T-disp	R-vel	R-acc		R-disp		0	1-7
bar1																													✓
bar10																													✓
bar10_leos																													✓
bar11																													✓
bar12																													✓
bar13																													✓
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bar21							✓																						✓
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bar66							✓																						✓
bar7																													✓
bar70																													✓
bar71																													✓
bar8																													✓

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell			
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC	thickness	birth/death		
bar1																																
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Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads			Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc.	Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
bar1																									
bar10																									
bar10_leos																									
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bar8																									

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag	Optional Output												Fiber Orient. for Mat. 62	
	Mass	Stiffness	Friction-like Vis.						Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain					
bar1																						
bar10																						
bar10_leos																						
bar11																						
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bar13																						
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bar15																						
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Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
bar1								
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[illegible]

Problem Name					Equation-of-State (form)														H-L Beam Quadrature Rules					H-L Beam Cross Sect.			Beam Orient.	Shell Int. Rule	Interface Save	Single Point Constraints	Sliding Boundary Planes	Symmetry Planes with Failure	Time History Blocks				
	66	68	70	71	1	2	3	4	5	6	8	9	11	12	13	14	15	16	17	18	-n	1	2	3	4	5	0	1	2							Node	Element
bar9					✓																														✓	✓	
basic1																																			✓	✓	
basic2																																			✓	✓	
basic21																																			✓	✓	
basic21i																																			✓	✓	
basic23																																			✓	✓	
basic23i																																			✓	✓	
basic27																																			✓	✓	
basic2i																																			✓	✓	
basic31																																			✓	✓	
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basic43i																																			✓	✓	
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basic60																																			✓	✓	
basic63																																			✓	✓	
basic7																																			✓	✓	
BS-mat1																																			✓	✓	
BS-mat1o																												✓								✓	✓
BS-mat28																																			✓	✓	
BS-mat3																																			✓	✓	
HL2-mat1																											✓								✓	✓	
HL2-mat1o																											✓								✓	✓	
HL2-mat24																											✓								✓	✓	
HL2-mat3																											✓								✓	✓	
HL2-mat71				✓																							✓								✓	✓	
bending-24																					✓			✓	✓	✓	✓	✓	✓						✓	✓	
bending-3																					✓			✓	✓	✓	✓	✓							✓	✓	
bending-71				✓																	✓			✓	✓	✓	✓	✓								✓	✓
tension-24																					✓			✓	✓	✓	✓	✓								✓	✓
tension-3																					✓			✓	✓	✓	✓	✓								✓	✓
tension-71				✓																	✓			✓	✓	✓	✓	✓								✓	✓
torque-24																					✓			✓	✓	✓	✓	✓								✓	✓
torque-3																					✓			✓	✓	✓	✓	✓								✓	✓
torque-71				✓																	✓			✓	✓	✓	✓	✓								✓	✓
truss1																					✓			✓	✓	✓	✓	✓							✓	✓	
truss24																					✓			✓	✓	✓	✓	✓								✓	✓
truss24pl																					✓			✓	✓	✓	✓	✓								✓	✓
truss3																					✓			✓	✓	✓	✓	✓								✓	✓
truss3pl																					✓			✓	✓	✓	✓	✓								✓	✓
truss71				✓																	✓			✓	✓	✓	✓	✓								✓	✓
truss71pl				✓																	✓			✓	✓	✓	✓	✓								✓	✓
vrt_BS																																			✓	✓	
vrt_HL0																				✓															✓	✓	
vrt_HL2																						✓													✓	✓	
vrt_HL3																							✓												✓	✓	
vrt_HL4																								✓											✓	✓	
vrt_HL5																									✓										✓	✓	
al_sph_rod				✓																															✓	✓	
ang_vel																																			✓	✓	
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constraint2																																			✓		
csf																																					
d3samp1																																					
d3samp10																																			✓		

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.	
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc		R-disp		0		1-7
bar9																													✓
basic1					✓			✓			✓								✓										
basic2					✓			✓			✓								✓										
basic21					✓			✓			✓								✓										
basic21i					✓			✓			✓								✓										
basic23					✓			✓			✓								✓										
basic23i					✓			✓			✓								✓										
basic27					✓			✓			✓								✓										
basic2i					✓			✓			✓								✓										
basic31					✓			✓			✓								✓										
basic40					✓			✓			✓								✓										
basic43i					✓			✓			✓								✓										
basic46					✓			✓			✓								✓										
basic46i					✓			✓			✓								✓										
basic60					✓			✓			✓								✓										
basic63					✓			✓			✓								✓										
basic7					✓			✓			✓								✓										
BS-mat1					✓			✓		✓									✓			✓							
BS-mat1o					✓			✓		✓									✓			✓							
BS-mat28					✓			✓		✓									✓			✓							
BS-mat3					✓			✓		✓									✓			✓							
HL2-mat1					✓			✓		✓									✓			✓							
HL2-mat1o					✓			✓		✓									✓			✓							
HL2-mat24					✓			✓		✓									✓			✓							
HL2-mat3					✓			✓		✓									✓			✓							
HL2-mat71					✓			✓		✓									✓			✓							
bending-24					✓																✓								
bending-3					✓																✓								
bending-71					✓																✓								
tension-24					✓														✓										
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tension-71					✓														✓										
torque-24					✓																✓								
torque-3					✓																✓								
torque-71					✓																✓								
truss1					✓			✓											✓										
truss24					✓			✓											✓										
truss24pl					✓														✓										
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vrt_BS					✓			✓		✓									✓			✓							
vrt_HL0					✓			✓		✓									✓			✓							
vrt_HL2					✓			✓		✓									✓			✓							
vrt_HL3					✓			✓		✓									✓			✓							
vrt_HL4					✓			✓		✓									✓			✓							
vrt_HL5					✓			✓		✓									✓			✓							
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cohesive1																		✓											
constraint1																								✓	✓			✓	
constraint2																									✓			✓	
csf					✓			✓																					
d3samp1																													
d3samp10					✓						✓																		

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell			
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC		thickness	birth/death	
bar9																																
basic1																																
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truss71pl																																
vrt_BS																																
vrt_HL0																																

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (T _{type})						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
bar9																								
basic1																								
basic2																								
basic21																								
basic21i																		✓						
basic23																		✓						
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HL2-mat1																								
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HL2-mat24																								
HL2-mat3																								
HL2-mat71																								
bending-24																								
bending-3																								
bending-71																								
tension-24																								
tension-3																								
tension-71																								
torque-24																								
torque-3																								
torque-71																								
truss1																								
truss24																								
truss24pl																								
truss3																								
truss3pl																								
truss71																								
truss71pl																								
vrt_BS																								
vrt_HL0																								
vrt_HL2																								
vrt_HL3																								
vrt_HL4																								
vrt_HL5																								
al_sph_rod																								
ang_vel																								
base_acc											✓		✓											
cohesive1																								
constraint1																								
constraint2																								
csf																								
d3samp1																								
d3samp10																								

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output										Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
bar9																							
basic1	✓							✓									✓						
basic2	✓							✓									✓						
basic21	✓							✓									✓						
basic21i	✓							✓									✓						
basic23	✓							✓									✓						
basic23i	✓							✓									✓						
basic27	✓							✓									✓						
basic2i	✓							✓									✓						
basic31	✓							✓									✓						
basic40	✓							✓									✓						
basic43i	✓							✓									✓						
basic46	✓							✓									✓						
basic46i	✓							✓									✓						
basic60	✓							✓									✓						
basic63	✓							✓									✓						
basic7	✓		✓					✓									✓						
BS-mat1	✓												✓				✓						
BS-mat1o	✓												✓				✓						
BS-mat28	✓												✓				✓						
BS-mat3	✓												✓				✓						
HL2-mat1	✓												✓				✓						
HL2-mat1o	✓												✓				✓						
HL2-mat24	✓												✓				✓						
HL2-mat3	✓												✓				✓						
HL2-mat71	✓												✓				✓						
bending-24													✓				✓						
bending-3													✓				✓						
bending-71													✓				✓						
tension-24													✓				✓						
tension-3													✓				✓						
tension-71													✓				✓						
torque-24													✓				✓						
torque-3													✓				✓						
torque-71													✓				✓						
truss1	✓												✓				✓						
truss24	✓												✓				✓						
truss24pl													✓				✓						
truss3	✓												✓				✓						
truss3pl													✓				✓						
truss71	✓												✓				✓						
truss71pl													✓				✓						
vrt_BS	✓												✓				✓						
vrt_HL0	✓												✓				✓						
vrt_HL2	✓												✓				✓						
vrt_HL3	✓												✓				✓						
vrt_HL4	✓												✓				✓						
vrt_HL5	✓												✓				✓						
al_sph_rod								✓												✓			
ang_vel																							
base_acc																							
cohesive1	✓						✓										✓						
constraint1																							
constraint2																							
csf	✓																						
d3samp1																							
d3samp10																							

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
bar9								
basic1								
basic2								
basic21								
basic21i								
basic23								
basic23i								
basic27								
basic2i								
basic31								
basic40								
basic43i								
basic46								
basic46i								
basic60								
basic63								
basic7								
BS-mat1								
BS-mat1o								
BS-mat28								
BS-mat3								
HL2-mat1								
HL2-mat1o								
HL2-mat24								
HL2-mat3								
HL2-mat71								
bending-24								
bending-3								
bending-71								
tension-24								
tension-3								
tension-71								
torque-24								
torque-3								
torque-71								
truss1								
truss24								
truss24pl								
truss3								
truss3pl								
truss71								
truss71pl								
vrt_BS								
vrt_HL0								
vrt_HL2								
vrt_HL3								
vrt_HL4								
vrt_HL5								
al_sph_rod							✓	
ang_vel								
base_acc								
cohesive1								
constraint1								
constraint2								
csf								
d3samp1								
d3samp10								

[illegible]

Problem Name	Gas	Gravity	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.	
	Pressure	Stress Init.			0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc		R-disp	0	1-7		8
d3samp17																											✓		
d3samp18																											✓		
d3samp19																											✓		
d3samp2																								✓			✓		
d3samp20					✓												✓												
d3samp21					✓												✓												
d3samp22					✓												✓												
d3samp3																											✓		
d3samp4																											✓		
d3samp5					✓												✓												
d3samp5a					✓												✓												
d3samp6																											✓		
d3samp7																											✓		
d3samp8																											✓		
d3samp9					✓												✓												
d3self1																											✓		
d3snd1																											✓		
d3snd1d																											✓		
d3snd2																											✓		
d3snd2d																											✓		
d3snd3																											✓		
d3snd3d																											✓		
d3snd3n																											✓		
d3snd4																											✓		
d3snd5																											✓		
d3snd6																											✓		
delam1					✓												✓												
det_pts																													
discrete					✓												✓				✓								
dr_bar																	✓												
dr_bar_e																	✓												
es_bfl					✓																								
fdamp1					✓												✓												
fdamp2					✓												✓												
fdamp3					✓												✓												
fdamp4					✓												✓												
fdamp5					✓												✓												
fdamp6					✓												✓												
gravity_init																													
isave1		✓																											
isave1a																											✓		
kingery_hemi				✓																							✓		
kingery_sphere				✓																									
leos_sph_rod					✓																						✓		
max_press					✓												✓										✓		
mk24					✓												✓												
mk71					✓												✓												
mom_dep																											✓		
nrbc_norm					✓				✓																				
nrbc_shear									✓																				
one_d_slide					✓												✓												
piston	✓				✓	✓											✓												
rb_switch																											✓		
rbm_shell																											✓		
rig_wall1					✓												✓							✓			✓		
rig_wall2					✓												✓							✓			✓		
rigid_body1																											✓		

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell		
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC		thickness	birth/death
d3samp17											✓						✓														
d3samp18																	✓														
d3samp19																															
d3samp2																															
d3samp20																															
d3samp21			✓							✓																					
d3samp22			✓																												
d3samp3			✓																												
d3samp4			✓																												
d3samp5											✓						✓												✓		
d3samp5a				✓																											
d3samp6			✓														✓														
d3samp7																															
d3samp8																															
d3samp9																															
d3self1			✓															✓													
d3snd1												✓																			
d3snd1d												✓							✓												
d3snd2												✓								✓											
d3snd2d												✓							✓	✓											
d3snd3												✓								✓											
d3snd3d												✓							✓												
d3snd3n												✓																			
d3snd4												✓					✓														
d3snd5												✓					✓			✓											
d3snd6												✓					✓														
delam1																															
det_pts																															
discrete																															
dr_bar																															
dr_bar_e																															
es_bfl																															
fdamp1																															
fdamp2																															
fdamp3																															
fdamp4																															
fdamp5																															
fdamp6																															
gravity_init																															
isave1																															
isave1a																															
kingery_hemi																															
kingery_sphere																															
leos_sph_rod											✓						✓			✓					✓						
max_press																															
mk24																															
mk71																															
mom_dep																															
nrbc_norm																															
nrbc_shear																															
one_d_slide																															
piston			✓																												
rb_switch			✓																												
rbm_shell																															
rig_wall1																															
rig_wall2																															
rigid_body1																															

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
d3samp17																								
d3samp18																								
d3samp19																								
d3samp2																								
d3samp20																						✓		
d3samp21																						✓		
d3samp22																								
d3samp3																								
d3samp4																								
d3samp5																								
d3samp5a																								
d3samp6																								
d3samp7																								
d3samp8																								
d3samp9																								
d3self1																								
d3snd1																								
d3snd1d																								
d3snd2																								
d3snd2d																								
d3snd3																								
d3snd3d																								
d3snd3n																								
d3snd4																								
d3snd5																								
d3snd6																								
delam1																								
det_pts														✓										
discrete																								
dr_bar																								
dr_bar_e																								
es_bfl																								
fdamp1																								
fdamp2																								
fdamp3																								
fdamp4																								
fdamp5																								
fdamp6																								
gravity_init																								
isave1																								
isave1a																								
kingery_hemi																								
kingery_sphere																								
leos_sph_rod																								
max_press																								
mk24																								
mk71																								
mom_dep													✓											
nrbc_norm																								
nrbc_shear																								
one_d_slide																								
piston																								
rb_switch																								
rbm_shell																								
rig_wall1																								
rig_wall2																								
rigid_body1																								

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output										Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
d3samp17																							
d3samp18																							
d3samp19																							
d3samp2																							
d3samp20																							
d3samp21								✓															
d3samp22								✓															
d3samp3																							
d3samp4																							
d3samp5																							
d3samp5a																							
d3samp6																							
d3samp7																							
d3samp8																							
d3samp9																							
d3self1								✓															
d3snd1								✓															
d3snd1d								✓															
d3snd2								✓															
d3snd2d								✓															
d3snd3								✓															
d3snd3d								✓															
d3snd3n								✓															
d3snd4								✓															
d3snd5								✓															
d3snd6								✓															
delam1		✓					✓										✓						
det_pts																							
discrete													✓										
dr_bar																							
dr_bar_e																							
es_bfl																							
fdamp1																	✓		✓				
fdamp2																	✓		✓				
fdamp3																	✓		✓				
fdamp4																	✓		✓				
fdamp5																	✓		✓				
fdamp6																	✓		✓				
gravity_init																							
isave1																	✓						
isave1a																	✓						
kingery_hemi																							
kingery_sphere																							
leos_sph_rod												✓									✓		
max_press																			✓				
mk24																							
mk71																							
mom_dep																							
nrbc_norm																							
nrbc_shear																							
one_d_slide		✓																					
piston																							
rb_switch																							
rbm_shell																							
rig_wall1																							
rig_wall2																							
rigid_body1																							

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
d3samp17								
d3samp18								
d3samp19								
d3samp2								
d3samp20								
d3samp21								
d3samp22								
d3samp3								
d3samp4								
d3samp5								
d3samp5a								
d3samp6								
d3samp7								
d3samp8								
d3samp9								
d3self1								
d3snd1								
d3snd1d								
d3snd2								
d3snd2d								
d3snd3								
d3snd3d								
d3snd3n								
d3snd4								
d3snd5								
d3snd6								
delam1								
det_pts								
discrete								
dr_bar			✓					
dr_bar_e			✓		✓			
es_bfl								
fdamp1								
fdamp2								
fdamp3								
fdamp4								
fdamp5								
fdamp6								
gravity_init								
isave1								
isave1a								
kingery_hemi								
kingery_sphere								
leos_sph_rod							✓	
max_press								
mk24								
mk71								
mom_dep								
nrbc_norm								
nrbc_shear								
one_d_slide								
piston								
rb_switch								
rbm_shell								
rig_wall1								
rig_wall2								
rigid_body1								

Problem Name	Materials (type)																																																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	48	49	50	51	52	56	57	58	59	60	62	63	64	65					
rigid_body2																				✓																																													
rigid_body3																				✓																																													
rot_init1	✓																			✓																																													
rot_init2	✓																			✓																																													
sbi	✓																																																																
sbp			✓																																																														

Problem Name					Equation-of-State (form)														H-L Beam Quadrature Rules					H-L Beam Cross Sect.			Beam Orient.	Shell Int. Rule	Interface Save	Single Point Constraints	Sliding Boundary Planes	Symmetry Planes with Failure	Time History Blocks			
	66	68	70	71	1	2	3	4	5	6	8	9	11	12	13	14	15	16	17	18	-n	1	2	3	4	5	0	1	2						Node	Element
rigid_body2																																			✓	
rigid_body3																																			✓	
rot_init1																																			✓	
rot_init2																																			✓	
sbi																																			✓	
sbp																																				✓

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.	
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc	R-disp		0	1-7	8	
rigid_body2																													✓
rigid_body3																													✓
rot_init1																													✓
rot_init2																													✓
sbi					✓													✓			✓								
sbp																													✓

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell			
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC	thickness	birth/death		
rigid_body2																																
rigid_body3																																
rot_init1																																
rot_init2																																
sbi																																
sbp																																

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
rigid_body2																								
rigid_body3		✓	✓		✓	✓		✓		✓						✓								
rot_init1																								
rot_init2																								
sbi															✓									
sbp																								

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output										Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
rigid_body2																							
rigid_body3																							
rot_init1				✓																			
rot_init2				✓																			
sbi																							
sbp													✓										

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
rigid_body2								
rigid_body3								
rot_init1								
rot_init2		✓						
sbi								
sbp								

[illegible]

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc		R-disp	0	1-7	
shear_trac1					✓						✓																	
shear_trac2					✓						✓																	
shear_trac3					✓						✓																	
spc																												✓
spf					✓						✓																	✓
stiff_damp																												
tbssl1																		✓										
tbssl2																		✓										
thermal1					✓																							
thermal2					✓																							✓
tnswf					✓													✓										✓
ma_bar3																												✓
ma_beam_bs					✓				✓		✓							✓			✓							
ma_beam_hl					✓				✓		✓							✓			✓							
ma_beam_tr					✓				✓									✓										
ma_plate_4blt					✓												✓											
ma_plate_4yase					✓												✓											
ma_plate_bd					✓												✓											
ma_plate_blt					✓												✓											
ma_plate_hl					✓												✓											
ma_plate_mem					✓												✓											
ma_plate_yase					✓												✓											
ma_shell_bciz					✓				✓		✓							✓			✓							
ma_shell_blt28					✓				✓		✓							✓			✓							
ma_shell_c0					✓				✓		✓							✓			✓							
ma_shell_y28					✓				✓		✓							✓			✓							
ml40																												✓
ml41																												✓
ml41u																												✓
ml41u_full																												✓
ml42																												✓
ml43																												✓
mmd_h1					✓																							
mmd_h3					✓																							
mmd_s1					✓																							
mmd_s3					✓																							
ntet20																												✓
ntet20s																												✓
ntet21																												✓
ntet21s																												✓
ntet22																												✓
ntet22s																												✓
ntet23																												✓
ntet23s																												✓
plate1					✓						✓																	
plate12					✓						✓																	
plate15					✓						✓																	
plate18					✓						✓																	
plate19					✓						✓																	
plate2					✓						✓																	
plate21					✓						✓																	
plate21i					✓						✓																	
plate22					✓						✓																	
plate22i					✓						✓																	
plate23					✓						✓																	
plate23i					✓						✓																	
plate24					✓						✓																	

[illegible]

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
shear_trac1																								
shear_trac2																								
shear_trac3																								
spc																								
spf																								
stiff_damp																								
tbssl1																								
tbssl2																								
thermal1																								
thermal2																								
tnswf	✓																							
ma_bar3																								
ma_beam_bs																								
ma_beam_hl																								
ma_beam_tr																								
ma_plate_4blt																								
ma_plate_4yase																								
ma_plate_bd																								
ma_plate_blt																								
ma_plate_hl																								
ma_plate_mem																								
ma_plate_yase																								
ma_shell_bciz																								
ma_shell_blt28																								
ma_shell_c0																								
ma_shell_y28																								
ml40																								
ml41																								
ml41u																								
ml41u_full																								
ml42																								
ml43																								
mmd_h1																								
mmd_h3																								
mmd_s1																								
mmd_s3																								
ntet20																								
ntet20s																								
ntet21																								
ntet21s																								
ntet22																								
ntet22s																								
ntet23																								
ntet23s																								
plate1																								
plate12																								
plate15																								
plate18																								
plate19																								
plate2																								
plate21																								
plate21i																								
plate22																								
plate22i																								
plate23																								
plate23i																								
plate24																								

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output									Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain	
shear_trac1																			✓			
shear_trac2																			✓			
shear_trac3																			✓			
spc													✓									
spf																						
stiff_damp		✓																				
tbssl1																						
tbssl2																						
thermal1																						
thermal2																						
tnswf																						
ma_bar3																						
ma_beam_bs	✓												✓				✓					
ma_beam_hl	✓												✓				✓					
ma_beam_tr	✓												✓				✓					
ma_plate_4blt	✓																					
ma_plate_4yase	✓																					
ma_plate_bd	✓																					
ma_plate_blt	✓																					
ma_plate_hl	✓																					
ma_plate_mem	✓																					
ma_plate_yase	✓																					
ma_shell_bciz	✓												✓			✓					✓	
ma_shell_blt28	✓												✓			✓					✓	
ma_shell_c0	✓												✓			✓					✓	
ma_shell_y28	✓												✓			✓					✓	
ml40																						
ml41																						
ml41u																						
ml41u_full																						
ml42																						
ml43																						
mmd_h1																						
mmd_h3																						
mmd_s1																						
mmd_s3																						
ntet20																						
ntet20s																						
ntet21																						
ntet21s																						
ntet22																						
ntet22s																						
ntet23																						
ntet23s																						
plate1	✓																					
plate12	✓																					
plate15	✓																					
plate18	✓																					
plate19	✓																					
plate2	✓																					
plate21	✓																					
plate21i	✓																					
plate22	✓																					
plate22i	✓																					
plate23	✓																					
plate23i	✓																					
plate24	✓																					

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
shear_trac1								
shear_trac2								
shear_trac3								
spc								
spf								
stiff_damp								
tbssl1								
tbssl2								
thermal1								
thermal2								
tnswf								
ma_bar3						✓		
ma_beam_bs						✓		
ma_beam_hl						✓		
ma_beam_tr						✓		
ma_plate_4blt						✓		
ma_plate_4yase						✓		
ma_plate_bd						✓		
ma_plate_blt						✓		
ma_plate_hl						✓		
ma_plate_mem						✓		
ma_plate_yase						✓		
ma_shell_bciz						✓		
ma_shell_blt28						✓		
ma_shell_c0						✓		
ma_shell_y28						✓		
ml40								
ml41								
ml41u								
ml41u_full								
ml42								
ml43								
mmd_h1								✓
mmd_h3								✓
mmd_s1								✓
mmd_s3								✓
ntet20								
ntet20s								
ntet21								
ntet21s								
ntet22								
ntet22s								
ntet23								
ntet23s								
plate1								
plate12								
plate15								
plate18								
plate19								
plate2								
plate21								
plate21i								
plate22								
plate22i								
plate23								
plate23i								
plate24								

[illegible]

Problem Name					Equation-of-State (form)														H-L Beam Quadrature Rules					H-L Beam Cross Sect.			Beam Orient.	Shell Int. Rule	Interface Save	Single Point Constraints	Sliding Boundary Planes	Symmetry Planes with Failure	Time History Blocks				
	66	68	70	71	1	2	3	4	5	6	8	9	11	12	13	14	15	16	17	18	-n	1	2	3	4	5	0	1	2						Node	Element	
plate28																																				✓	
plate2i																																				✓	
plate3																																				✓	
plate30																																				✓	
plate33																																				✓	
plate33i																																				✓	
plate34																																				✓	
plate38																																				✓	
plate39																																				✓	
plate4																																				✓	
plate41																																				✓	
plate42																																				✓	
plate46																																				✓	
plate46i																																				✓	
plate71				✓																																✓	
plate_4blt																																				✓	
plate_4yase																																				✓	
plate_bd																																				✓	
plate_blt																																				✓	
plate_hl																																				✓	
plate_mem																																				✓	
plate_yase																																				✓	
RESTART/bar1																																				✓	✓
RESTART/bending-3																						✓			✓	✓	✓	✓	✓	✓						✓	
RESTART/plate1																																				✓	
RESTART/torque-3																						✓			✓	✓	✓	✓	✓							✓	
RESTART/truss1																						✓														✓	
BCIZ_2g																																				✓	
BCIZ_2u																																				✓	
BCIZ_5t																																				✓	
BD_2g																																				✓	
BD_2u																																				✓	
BD_5t																																				✓	
BLT_28s																																				✓	
BLT_28v																																				✓	
BLT_2gc																																				✓	
BLT_2gs																																				✓	
BLT_2gv																																				✓	
BLT_2uv																																				✓	
BLT_3gv																																				✓	
BLT_4gv																																				✓	
BLT_5gv																																				✓	
BLT_5tv																																				✓	
BLT_6tv																																				✓	
BLTr_2g																																				✓	
BLTr_2u																																				✓	
BLTr_5t																																				✓	
CO_2g																																				✓	
CO_2u																																				✓	
CO_5t																																				✓	
HL_2gc																																				✓	
HL_2gs																																				✓	
HL_2gv																																				✓	
HL_2gvm																																				✓	
HL_2gvp																																				✓	
HL_2uv																																				✓	
HL_5tv																																					

Problem Name	Gas	Gravity	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.	
	Pressure	Stress Init.			0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc		R-disp	0	1-7		8
plate28					✓						✓																		
plate2i					✓						✓																		
plate3					✓						✓																		
plate30					✓						✓																		
plate33					✓						✓																		
plate33i					✓						✓																		
plate34					✓						✓																		
plate38					✓						✓																		
plate39					✓						✓																		
plate4					✓						✓																		
plate41					✓						✓																		
plate42					✓						✓																		
plate46					✓						✓																		
plate46i					✓						✓																		
plate71					✓						✓																		
plate_4blt					✓						✓																		
plate_4yase					✓						✓																		
plate_bd					✓						✓																		
plate_blt					✓						✓																		
plate_hl					✓						✓																		
plate_mem					✓						✓																		
plate_yase					✓						✓																		
RESTART/bar1																												✓	
RESTART/bending-3					✓																✓								
RESTART/plate1					✓						✓																		
RESTART/torque-3					✓																✓								
RESTART/truss1					✓				✓									✓											
BCIZ_2g					✓				✓									✓				✓							
BCIZ_2u					✓				✓									✓				✓							
BCIZ_5t					✓				✓									✓				✓							
BD_2g					✓				✓									✓				✓							
BD_2u					✓				✓									✓				✓							
BD_5t					✓				✓									✓				✓							
BLT_28s					✓				✓									✓				✓							
BLT_28v					✓				✓									✓				✓							
BLT_2gc					✓				✓									✓				✓							
BLT_2gs					✓				✓									✓				✓							
BLT_2gv					✓				✓									✓				✓							
BLT_2uv					✓				✓									✓				✓							
BLT_3gv					✓				✓									✓				✓							
BLT_4gv					✓				✓									✓				✓							
BLT_5gv					✓				✓									✓				✓							
BLT_5tv					✓				✓									✓				✓							
BLT_6tv					✓				✓									✓				✓							
BLTr_2g					✓				✓									✓				✓							
BLTr_2u					✓				✓									✓				✓							
BLTr_5t					✓				✓									✓				✓							
CO_2g					✓				✓									✓				✓							
CO_2u					✓				✓									✓				✓							
CO_5t					✓				✓									✓				✓							
HL_2gc					✓				✓									✓				✓							
HL_2gs					✓				✓									✓				✓							
HL_2gv					✓				✓									✓				✓							
HL_2gvm					✓				✓									✓				✓							
HL_2gvp					✓				✓									✓				✓							
HL_2uv					✓				✓									✓				✓							
HL_5tv					✓				✓									✓				✓							

[illegible]

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
plate28																								
plate2i																								
plate3																								
plate30																								
plate33																								
plate33i																								
plate34																								
plate38																								
plate39																								
plate4																		✓						
plate41																								
plate42																								
plate46																								
plate46i																								
plate71																								
plate_4blt																								
plate_4yase																								
plate_bd																								
plate_blt																								
plate_hl																								
plate_mem																								
plate_yase																								
RESTART/bar1																								
RESTART/bending-3																								
RESTART/plate1																								
RESTART/torque-3																								
RESTART/truss1																								
BCIZ_2g																								
BCIZ_2u																								
BCIZ_5t																								
BD_2g																								
BD_2u																								
BD_5t																								
BLT_28s																								
BLT_28v																								
BLT_2gc																								
BLT_2gs																								
BLT_2gv																								
BLT_2uv																								
BLT_3gv																								
BLT_4gv																								
BLT_5gv																								
BLT_5tv																								
BLT_6tv																								
BLTr_2g																								
BLTr_2u																								
BLTr_5t																								
CO_2g																								
CO_2u																								
CO_5t																								
HL_2gc																								
HL_2gs																								
HL_2gv																								
HL_2gvm																								
HL_2gvp																								
HL_2uv																								
HL_5tv																								

Problem Name	Damping			Matl. Init. Rot.	Body Forces by	Delamination	Cohesive	SAND Flag					Optional Output										Fiber Orient. for
				Motion	Elem. Sets	Elem.	Elem.																Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
plate28	✓																						
plate2i	✓																						
plate3	✓																						
plate30	✓																						
plate33	✓																						
plate33i	✓																						
plate34	✓																						
plate38	✓																						
plate39	✓																						
plate4	✓																						
plate41	✓																						
plate42	✓																						
plate46	✓																						
plate46i	✓																						
plate71	✓																						
plate_4blt	✓																						
plate_4yase	✓																						
plate_bd	✓																						
plate_blt	✓																						
plate_hl	✓																						
plate_mem	✓																						
plate_yase	✓																						
RESTART/bar1																							
RESTART/bending-3													✓				✓						
RESTART/plate1	✓																						
RESTART/torque-3													✓				✓						
RESTART/truss1	✓												✓				✓						
BCIZ_2g	✓												✓								✓		
BCIZ_2u	✓												✓								✓		
BCIZ_5t	✓												✓								✓		
BD_2g	✓												✓								✓		
BD_2u	✓												✓								✓		
BD_5t	✓												✓								✓		
BLT_28s	✓												✓								✓		
BLT_28v	✓												✓								✓		
BLT_2gc	✓												✓								✓		
BLT_2gs	✓												✓								✓		
BLT_2gv	✓												✓								✓		
BLT_2uv	✓												✓								✓		
BLT_3gv	✓												✓								✓		
BLT_4gv	✓												✓								✓		
BLT_5gv	✓												✓								✓		
BLT_5tv	✓												✓								✓		
BLT_6tv	✓												✓								✓		
BLTr_2g	✓												✓								✓		
BLTr_2u	✓												✓								✓		
BLTr_5t	✓												✓								✓		
CO_2g	✓												✓								✓		
CO_2u	✓												✓								✓		
CO_5t	✓												✓								✓		
HL_2gc	✓												✓								✓		
HL_2gs	✓												✓								✓		
HL_2gv	✓												✓								✓		
HL_2gvm	✓												✓								✓		
HL_2gvp	✓												✓								✓		
HL_2uv	✓												✓								✓		
HL_5tv	✓												✓								✓		

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
plate28								
plate2i								
plate3								
plate30								
plate33								
plate33i								
plate34								
plate38								
plate39								
plate4								
plate41								
plate42								
plate46								
plate46i								
plate71								
plate_4blt								
plate_4yase								
plate_bd								
plate_blt								
plate_hl								
plate_mem								
plate_yase								
RESTART/bar1	✓							
RESTART/bending-3	✓							
RESTART/plate1	✓							
RESTART/torque-3	✓							
RESTART/truss1	✓							
BCIZ_2g								
BCIZ_2u								
BCIZ_5t								
BD_2g								
BD_2u								
BD_5t								
BLT_28s								
BLT_28v								
BLT_2gc								
BLT_2gs								
BLT_2gv								
BLT_2uv								
BLT_3gv								
BLT_4gv								
BLT_5gv								
BLT_5tv								
BLT_6tv								
BLTr_2g								
BLTr_2u								
BLTr_5t								
CO_2g								
CO_2u								
CO_5t								
HL_2gc								
HL_2gs								
HL_2gv								
HL_2gvm								
HL_2gvp								
HL_2uv								
HL_5tv								

[illegible]

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)							Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc		R-disp		0	
MEM_s					✓			✓		✓								✓				✓						
MEM_v					✓			✓		✓								✓				✓						
Y4_2g					✓			✓		✓								✓				✓						
Y4_2u					✓			✓		✓								✓				✓						
Y4_5t					✓			✓		✓								✓				✓						
Y_28					✓			✓		✓								✓				✓						
Y_2g					✓			✓		✓								✓				✓						
Y_2u					✓			✓		✓								✓				✓						
Y_5t					✓			✓		✓								✓				✓						
sslide10lr					✓															✓								
sslide10psl					✓															✓								
sslide10pv					✓															✓								
sslide10pvn					✓															✓								
sslide12ball_l					✓															✓								
sslide12ind_l					✓															✓								
sslide12ind_p					✓															✓								
sslide12l					✓															✓								
sslide12l_vec					✓															✓								
sslide12p					✓															✓								
sslide12p_vec					✓															✓								
sslide12p_vecn					✓															✓								
sslide12pn					✓															✓								
sslide14ball_l					✓															✓								
sslide15l					✓															✓								
sslide15p					✓															✓								
sslide16l					✓															✓								
sslide16p					✓															✓								
sslide17kc					✓															✓								
sslide17kt					✓															✓								
sslide1k					✓															✓								
sslide1k_life					✓															✓								
sslide2kc					✓															✓								
sslide2kt					✓															✓								
sslide3l					✓															✓								
sslide3l_self					✓															✓								
sslide3p					✓															✓								
sslide3p_life					✓															✓								
sslide3pn					✓															✓								
sslide5_12l					✓															✓								
sslide5_12p					✓															✓								
sslide5l					✓															✓								
sslide5p					✓															✓								
sslide5pn					✓															✓								
sslide6k					✓															✓								
sslide7k					✓															✓								
sslide8p					✓															✓								
sslide8pn					✓															✓								
sslide9ps					✓															✓								
sslide9psn					✓															✓								
sslide9pt					✓															✓								
sslide9pt_sf					✓															✓								
sslide9ptn					✓															✓								
sslidemulti					✓															✓								
ssliderigid					✓															✓								
tbasic1					✓			✓			✓								✓									
tplate1					✓						✓																	

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell		
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC		thickness	birth/death
MEM_s																															
MEM_v																															
Y4_2g																															
Y4_2u																															
Y4_5t																															
Y_28																															
Y_2g																															
Y_2u																															
Y_5t																															
sslide10lr										✓						✓	✓							✓						✓	
sslide10psl										✓						✓					✓			✓						✓	
sslide10pv										✓						✓					✓			✓						✓	
sslide10pvn										✓						✓						✓		✓						✓	
sslide12ball_l											✓					✓	✓						✓		✓		✓				
sslide12ind_l											✓					✓	✓						✓	✓		✓					
sslide12ind_p											✓					✓							✓	✓		✓					
sslide12l											✓					✓	✓						✓	✓		✓				✓	
sslide12l_vec											✓					✓	✓						✓	✓		✓				✓	
sslide12p											✓					✓							✓	✓		✓				✓	
sslide12p_vec											✓					✓							✓	✓		✓				✓	
sslide12p_vecn											✓					✓						✓		✓	✓					✓	
sslide12pn											✓					✓						✓		✓	✓					✓	
sslide14ball_l												✓				✓	✓							✓		✓					
sslide15l													✓			✓	✓							✓						✓	
sslide15p														✓		✓								✓						✓	
sslide16l															✓	✓	✓							✓						✓	
sslide16p																✓								✓						✓	
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sslide17kt																✓								✓							
sslide1k	✓															✓								✓							
sslide1k_life	✓															✓								✓						✓	
sslide2kc		✓														✓								✓							
sslide2kt		✓														✓								✓							
sslide3l			✓													✓	✓							✓						✓	
sslide3l_self			✓													✓	✓	✓						✓						✓	
sslide3p			✓													✓								✓						✓	
sslide3p_life			✓													✓								✓						✓	
sslide3pn			✓													✓						✓		✓						✓	
sslide5_12l											✓					✓	✓							✓							
sslide5_12p											✓					✓								✓							
sslide5l					✓											✓	✓							✓							
sslide5p					✓											✓								✓						✓	
sslide5pn					✓											✓					✓			✓						✓	
sslide6k						✓										✓								✓							
sslide7k							✓									✓								✓							
sslide8p								✓								✓								✓							
sslide8pn									✓							✓						✓		✓							
sslide9ps									✓							✓								✓							
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sslide9pt									✓							✓								✓							
sslide9pt_sf									✓							✓								✓							
sslide9ptn									✓							✓						✓		✓							
sslidemulti		✓	✓		✓				✓	✓	✓					✓	✓							✓		✓				✓	
ssliderigid			✓								✓						✓							✓		✓				✓	
tbasic1																															
tplate1																															

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines
					1	2	3	4	5	6	Base Acc.	Presc. Ang. Vel.						N _L	-1	-2	-3	-4	-9999	
MEM_s																								
MEM_v																								
Y4_2g																								
Y4_2u																								
Y4_5t																								
Y_28																								
Y_2g																								
Y_2u																								
Y_5t																								
sslide10lr																								
sslide10psl																								
sslide10pv																								
sslide10pvn																								
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tbasic1																								
tplate1																								

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output										Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
MEM_s	✓											✓				✓					✓		
MEM_v	✓											✓				✓					✓		
Y4_2g	✓											✓				✓					✓		
Y4_2u	✓											✓				✓					✓		
Y4_5t	✓											✓				✓					✓		
Y_28	✓											✓				✓					✓		
Y_2g	✓											✓				✓					✓		
Y_2u	✓											✓				✓					✓		
Y_5t	✓											✓				✓					✓		
sslide10lr	✓					✓								✓				✓					
sslide10psl	✓					✓								✓				✓					
sslide10pv	✓					✓								✓				✓					
sslide10pvn	✓					✓								✓				✓					
sslide12ball_l	✓					✓								✓				✓					
sslide12ind_l	✓					✓								✓				✓					
sslide12ind_p	✓					✓								✓				✓					
sslide12l	✓					✓								✓				✓					
sslide12l_vec	✓					✓								✓				✓					
sslide12p	✓					✓								✓				✓					
sslide12p_vec	✓					✓								✓				✓					
sslide12p_vecn	✓					✓								✓				✓					
sslide12pn	✓					✓								✓				✓					
sslide14ball_l	✓							✓										✓					
sslide15l	✓					✓								✓				✓					
sslide15p	✓					✓								✓				✓					
sslide16l	✓					✓								✓				✓					
sslide16p	✓					✓								✓				✓					
sslide17kc	✓					✓								✓				✓					
sslide17kt	✓					✓								✓				✓					
sslide1k	✓					✓								✓				✓					
sslide1k_life	✓					✓								✓				✓					
sslide2kc	✓					✓								✓				✓					
sslide2kt	✓					✓								✓				✓					
sslide3l	✓					✓								✓				✓					
sslide3l_self	✓					✓								✓				✓					
sslide3p	✓					✓								✓				✓					
sslide3p_life	✓					✓								✓				✓					
sslide3pn	✓					✓								✓				✓					
sslide5_12l	✓					✓								✓				✓					
sslide5_12p	✓					✓								✓				✓					
sslide5l	✓					✓								✓				✓					
sslide5p	✓					✓								✓				✓					
sslide5pn	✓					✓								✓				✓					
sslide6k	✓					✓								✓				✓					
sslide7k	✓					✓								✓				✓					
sslide8p	✓					✓								✓				✓					
sslide8pn	✓					✓								✓				✓					
sslide9ps	✓					✓								✓				✓					
sslide9psn	✓					✓								✓				✓					
sslide9pt	✓					✓								✓				✓					
sslide9pt_sf	✓					✓								✓				✓					
sslide9ptn	✓					✓								✓				✓					
sslidemulti	✓					✓								✓				✓					
ssliderigid	✓					✓								✓				✓					
tbasic1	✓																						
tplate1	✓																						

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
MEM_s								
MEM_v								
Y4_2g								
Y4_2u								
Y4_5t								
Y_28								
Y_2g								
Y_2u								
Y_5t								
sslide10lr								
sslide10psl								
sslide10pv								
sslide10pvn								
sslide12ball_l								
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sslide1k_life								
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sslide3p_life								
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Problem Name	Brick formulation (IQH)															Beam (form.)			Shell (formulation)									Shell (IHQ)			H-L Shell Ref. Surf.			Thick Shell (IHQ)		Discrete Springs/Dampers/Masses (type)													Nodal Tet (IHQ)				Meshless (IHQ)			
	1	2	3	4	5	6	7	8	9	10	12	20	21	22	23	1	2	3	1	2	3	4	5	6	7	8	9	1	4	6	top	mid	bot	1	4	1	2	3	4	5	6	21	22	23	24	25	26	m	20	21	22	23	40	41	42	43
Number of tests exercising feature	0	1	77	1	23	17	4	14	63	66	17	0	0	0	0	34	14	11	10	113	5	5	5	8	6	6	6	118	7	6	1	10	1	2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	3	3	1

Problem Name					Equation-of-State (form)														H-L Beam Quadrature Rules					H-L Beam Cross Sect.			Beam Orient.	Shell Int. Rule	Interface Save	Single Point Constraints	Sliding Boundary Planes	Symmetry Planes with Failure	Time History Blocks				
	66	68	70	71	1	2	3	4	5	6	8	9	11	12	13	14	15	16	17	18	-n	1	2	3	4	5	0	1	2							Node	Element
Number of tests exercising feature	1	0	1	9	7	1	0	2	0	0	0	0	0	2	0	0	0	0	0	2	16	9	21	13	11	12	22	4	11	2	8	2	1	5	1	260	154

Problem Name	Gas Pressure	Gravity Stress Init.	Brode	Cross Section Force Output	Load Curves (LCOPT)			Nodal Forces (IDIR)			Surface Traction (N _L)								Prescribed Kinematics						Rigid Walls	Constraints (IDOF)			Init. Cond.
					0	1	2	1-3	4	5-7	N _L	-1	-2	-3	-4	-5	-6	-7	T-vel	T-acc	T-disp	R-vel	R-acc	R-disp		0	1-7	8	
Number of tests exercising feature	1	1	2	1	235	1	3	86	0	60	75	0	2	0	1	0	0	0	109	0	45	70	0	0	3	1	1	1	112

Problem Name	Sliding Interfaces (ITYPE and Options)																												Tie-Breaking Shell		
	1	2	3	4	5	6	7	8	9	10	12	14	15	16	17	friction	lagop	self-generation	closest_seg	sym_plane	sliding only	nodal_stiffness	consider_free	relocate	search box	ind_node	ball_contact	user def. AC	thickness	birth/death	
Number of tests exercising feature	2	5	15	1	4	1	1	2	6	6	15	13	2	2	2	44	24	2	5	3	1	9	2	45	11	4	2	6	23	2	2

Problem Name	Tied Node Sets w/Failure	Rigid Body Merges	Extra Nodes for R.B.	Def-Rigid Switching	Rigid Body Joints (Type)						Global Body Force Loads		Momentum Deposition	Detonation Points	Shell-Solid Interfaces	R.B. Inertia Prop.	Nonreflecting Boundary	Thermal Effect (ITEMP)						1-D Slidelines	
					1	2	3	4	5	6	Base Acc.	Presc.	Ang.	Vel.					N _L	-1	-2	-3	-4	-9999	
Number of tests exercising feature	1	1	1	1	1	1	0	1	0	1	1		1	1	1	1	2	14	0	1	0	0	1		

Problem Name	Damping			Matl. Init. Rot. Motion	Body Forces by Elem. Sets	Delamination Elem.	Cohesive Elem.	SAND Flag					Optional Output										Fiber Orient. for Mat. 62
	Mass	Stiffness	Friction-like Vis.					1	2	10	11	12	Rot. Vel.	damped stress	Interface Force	Reaction Force	Reaction Force Print	Max. Ele. Set P	Pressure	Δt	Sh. Strain		
Number of tests exercising feature	175	2	7	2	46	1	1	32	0	0	0	0	85	6	44	49	106	1	3	2	43	1	

Problem Name	Restart	Dynamic Relaxation				Mass Aug.	SPH	Matl. Driver
		Keyword	Plot	Time His	Elastic			
Number of tests exercising feature	5	1	2	0	1	15	2	4