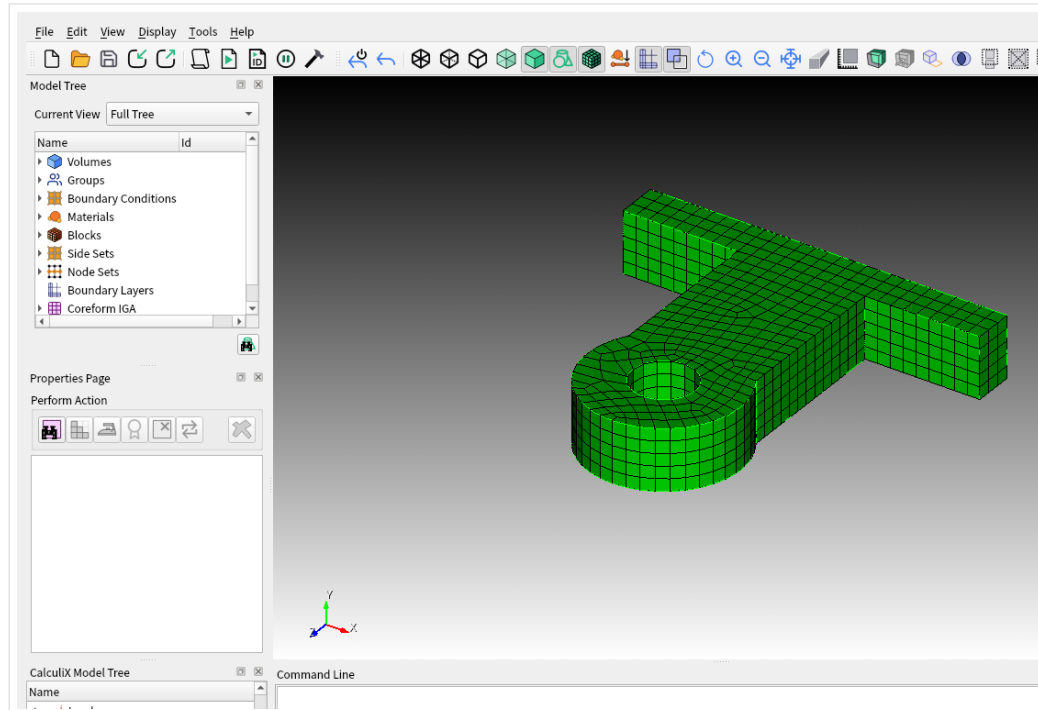
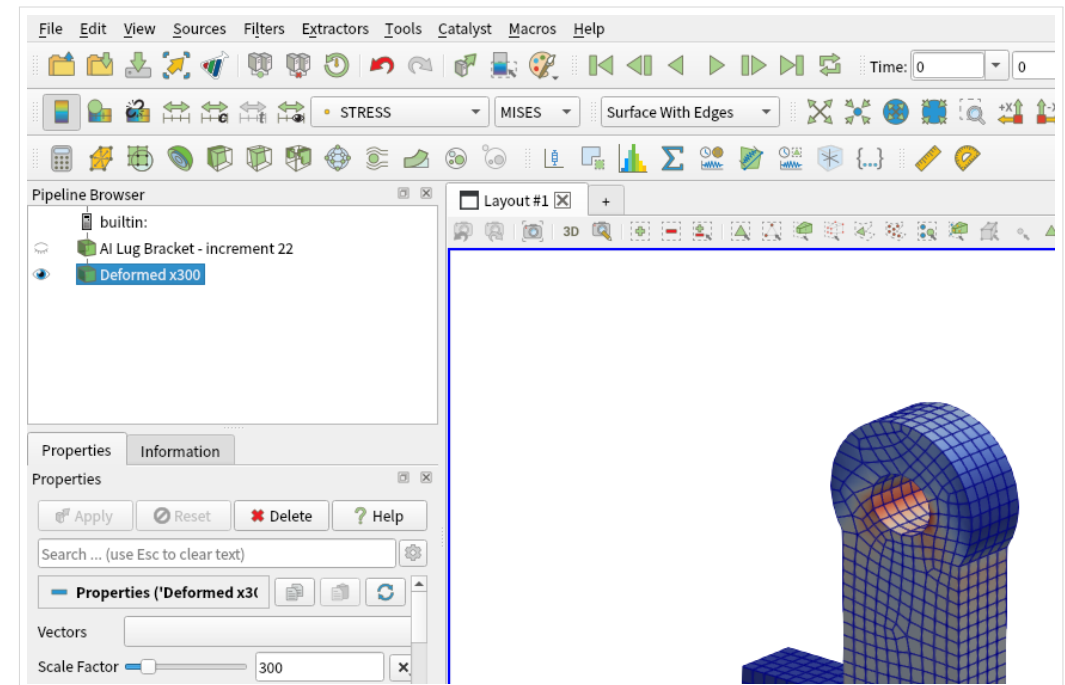


Cubit-CalculiX AI Execution Evidence Report R2

Real GUI captures, engineering results, and execution provenance



Lug bracket and sweep-based all-hex mesh in Cubit.



von Mises stress result in ParaView from CalculiX-derived VTU.

AI-operated workflow

1535 C3D8

22 increments / 44 iterations

45.0 kN balance

Geometry → ALL-HEX mesh → analysis setup → solver → monitoring → FRD/DAT → ParaView → report

Purpose: end-to-end Cubit-CalculiX workflow demonstration. Not a design certification or mesh-convergence study.

1. Execution Provenance - Connecting AI Operations to Solver Artifacts

Screenshots alone do not establish who operated the software. R2 therefore correlates timestamped journal-playback logs with the generated solver artifacts.

Time (JST)	Record	Observed action
17:55:32	final_stage1.log	AI session played 11_geometry_final.jou; geometry command sequence recorded.
17:55:58	final_stage2.log	Played 12_mesh_analysis_final.jou; sweep meshing, BC/load, step, and job creation recorded.
17:59:00	load_45kN_modify.log	Surface traction set to -45,000 N.
17:59:18	bearing_45kN_run.log	Job exported and ccx run job 1 issued.
17:59:21	solver files	.sta/.cvg/.dat/.frd created under the same job name.
17:59:47	bearing_45kN_wait.log	Solver wait operation recorded.

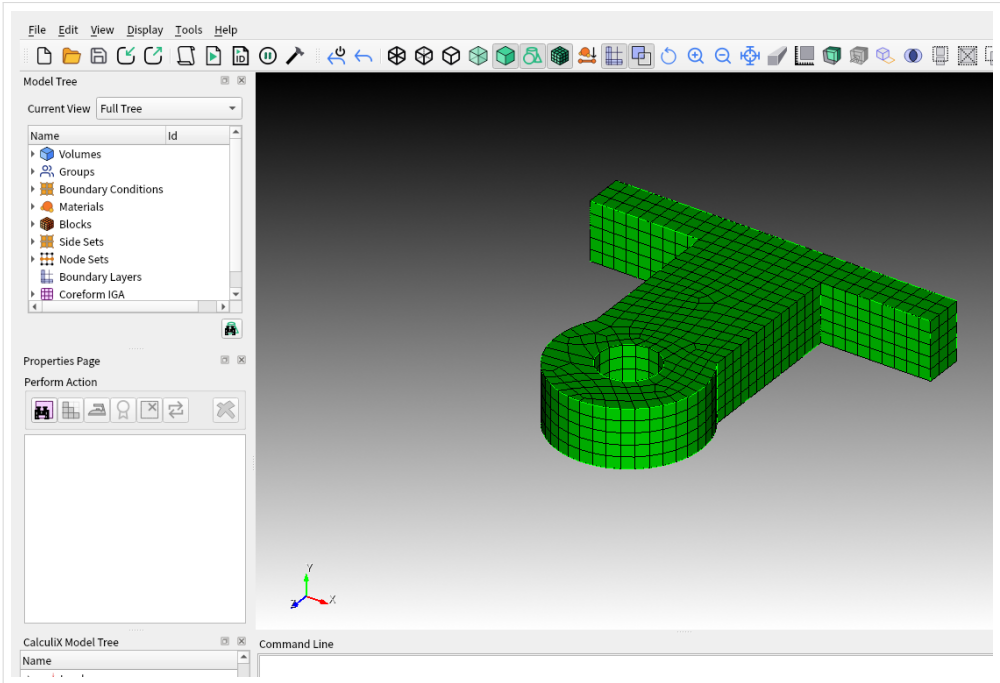
Note: the RPC-side timed out messages are command-response timeouts, not evidence of solver failure. Completion is independently established by the populated solver files and Jobs

Monitor.

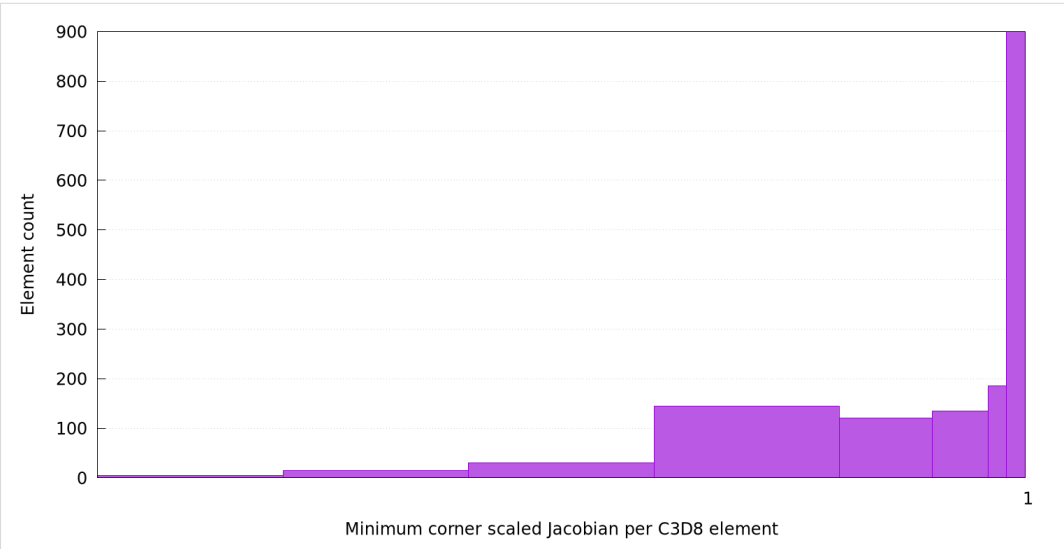
Key SHA-256 values

11_geometry_final.jou	44cf7343d51ad95ff30faa6c6980830bb70e159cbd7fb7c3e6efa545d65ca932
12_mesh_analysis_final.jou	0b96a1d438634354515fe462decc70933d3c44683c4c1f4b5e811931be69af4f
13_solve_post_final.jou	557d9c38545174ee8c30d25d102b0463b850584ffdf95a6893e2fb46c73b5436
ai_lug_bracket_bearing.inp	eff7282834440548832db2ca327746e7594c8e02d2eb20275fb33e6e3a8a6df1
ai_lug_bracket_bearing.sta	a8d0047c17b2ff71bce11fff3a59c4b436ee0cfe50f4c4473a6481ecb563f348
ai_lug_bracket_bearing.cvg	ad7da333d36d96d1979abb22592bec9f040d0a8dc98257e24b2c9ac9568e16fb

2. Geometry / ALL-HEX Mesh and Quality



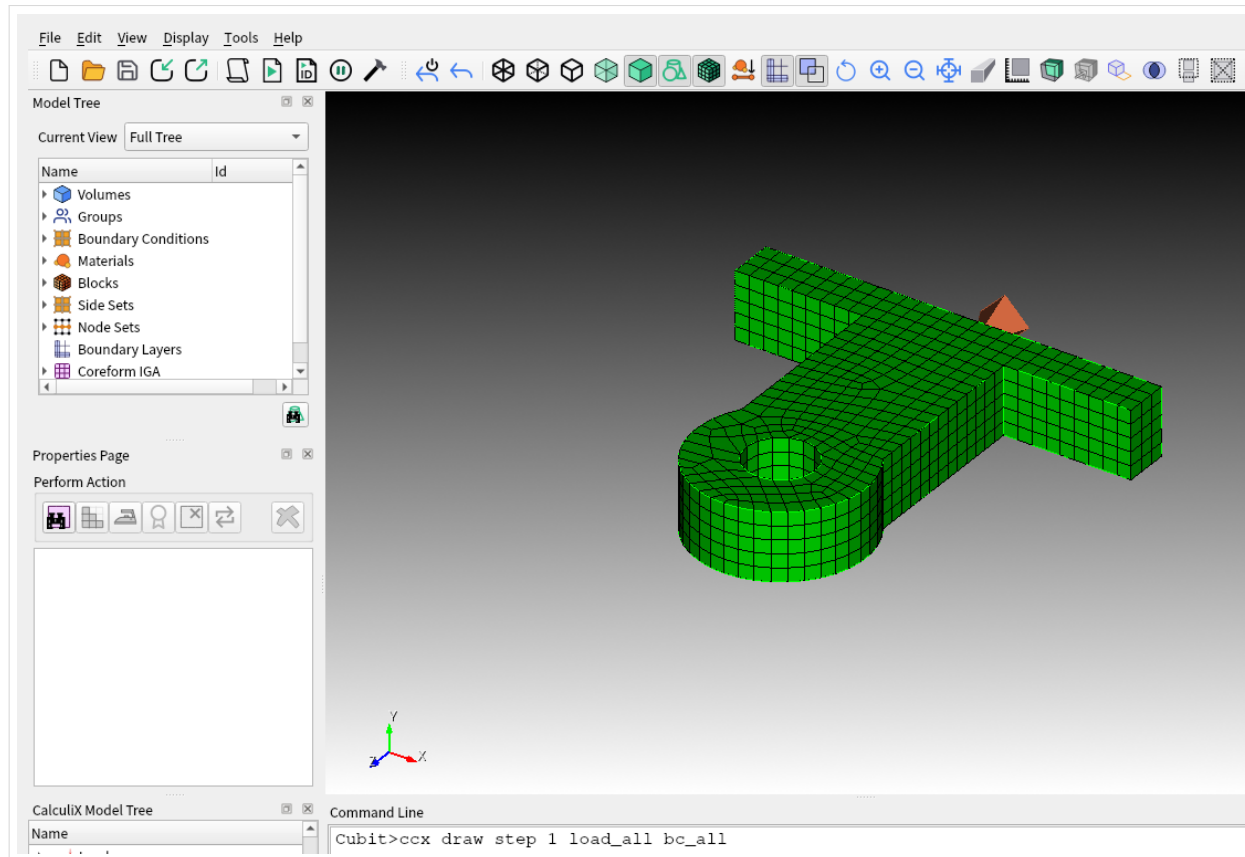
Cubit sweep mesh.	Element composition:	1535 C3D8, 0 TET, 0 PYRAMID.
Solid elements		1535
C3D8 / HEX8		1535
TET / PYRAMID		0 / 0
Nominal mesh size		5 mm



Distribution of minimum corner scaled Jacobian per element, independently computed from the exported C3D8 nodal geometry. This is not Cubit's internal quality-command output.	
Minimum	0.565
5th percentile	0.815
Mean	0.966
Median	0.993
Elements < 0.5	0 / 1535
Negative	0 / 1535

This geometric check supplements the all-hex element-count evidence and confirms that no exported C3D8 element is inverted.

3. Cubit-CalculiX Analysis Setup



CalculiX Model Tree, boundary/load representation, and command history.

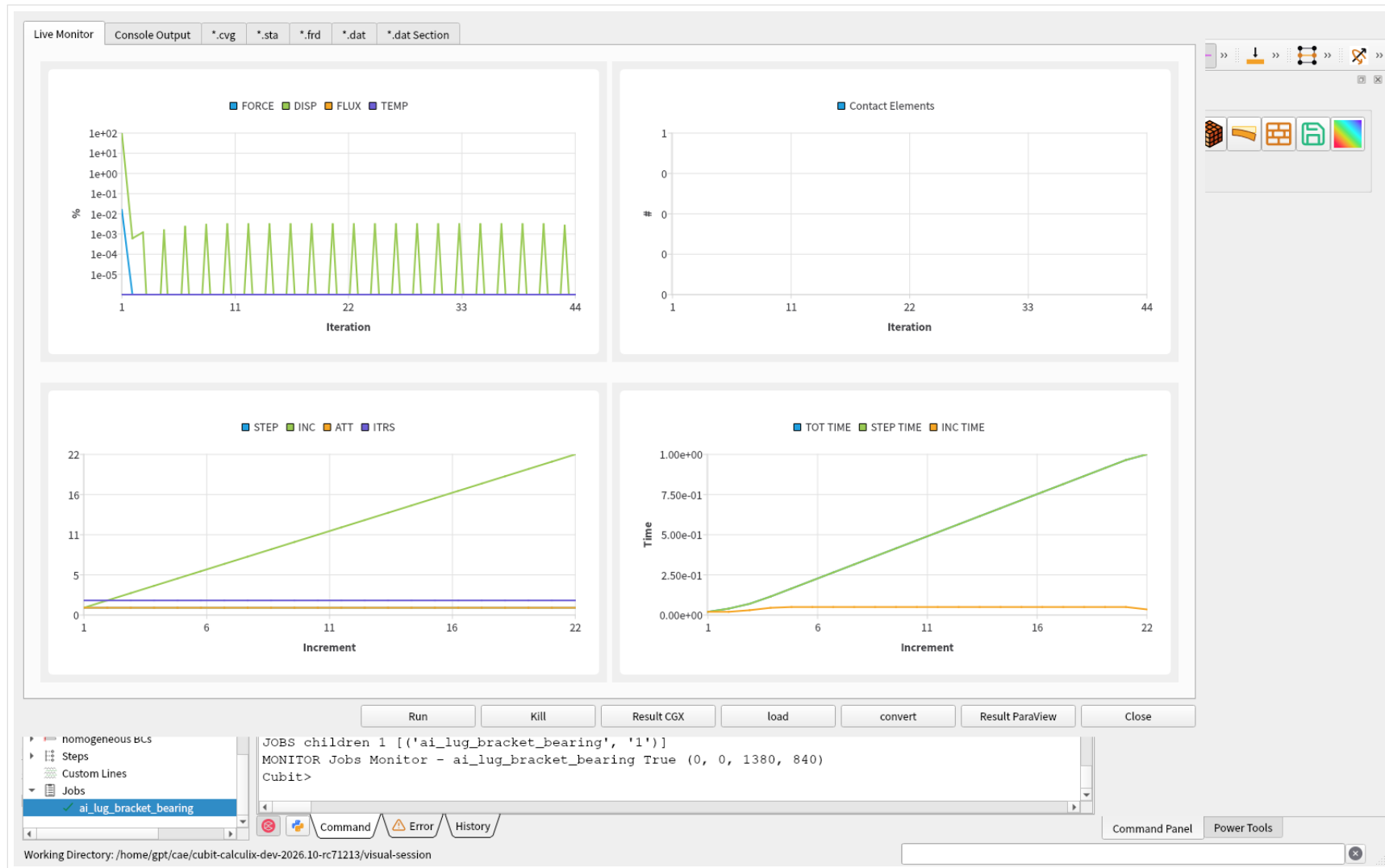
Cubit-

Analysis definition

Material	$E = 210000 \text{ MPa}$, $\nu = 0.30$
BC	Base fixed in X/Y/Z
Load	Equivalent bore bearing traction; resultant 45 kN in -Z
Step	Static, NLGEOM=YES
Increment	initial 0.02, max 0.05
Solver	CalculiX / PARDISO
Job	ai_lug_bracket_bearing
Scope	

This tutorial applies an equivalent bearing traction to the bore. It is not an explicit pin-hole contact model.

4. Jobs Monitor - Solver History



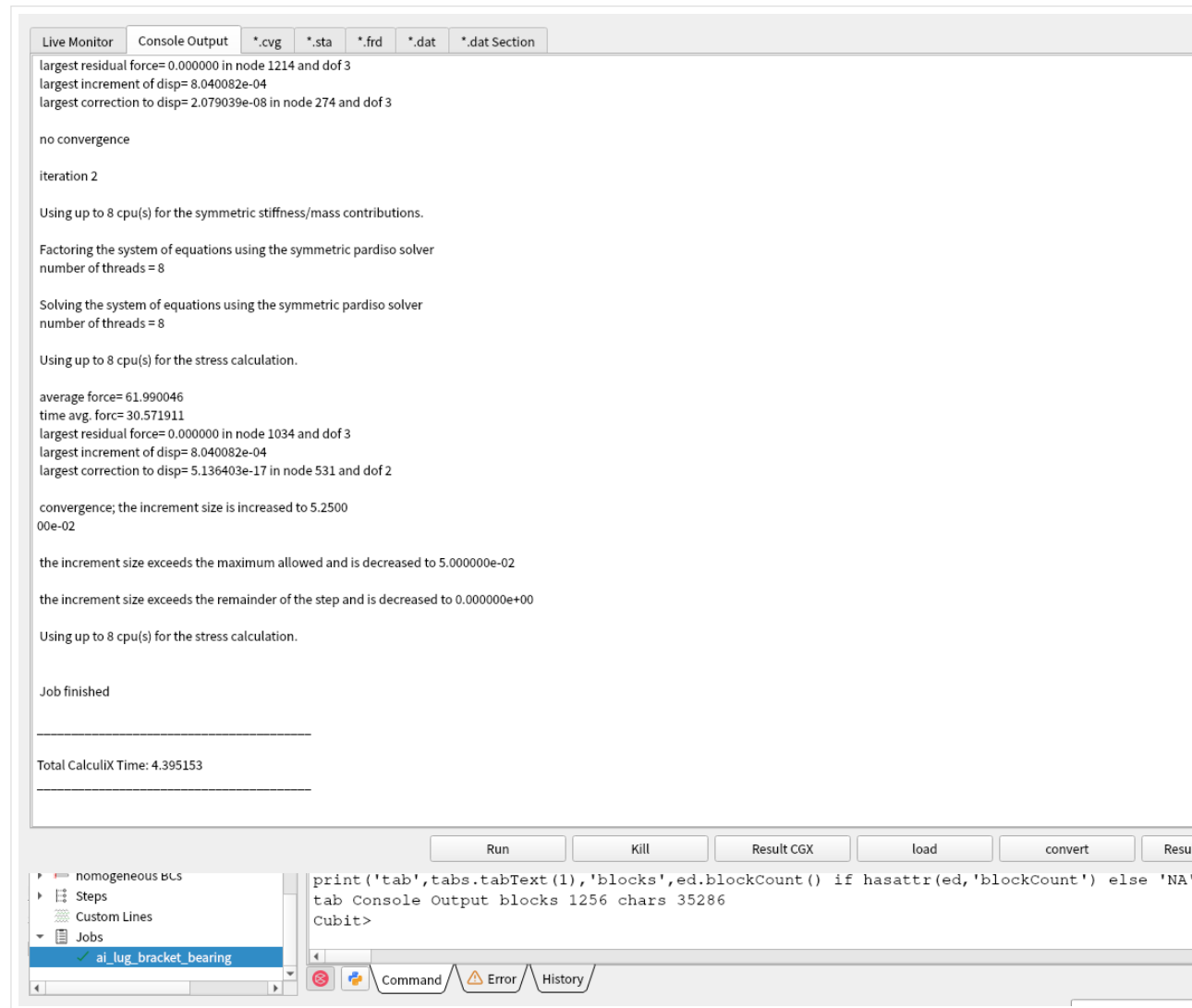
Full Jobs Monitor capture. FORCE / DISP, increment, and step-time data are shown for the same job without cropping the right-hand UI.

22 accepted increments

44 Newton iterations

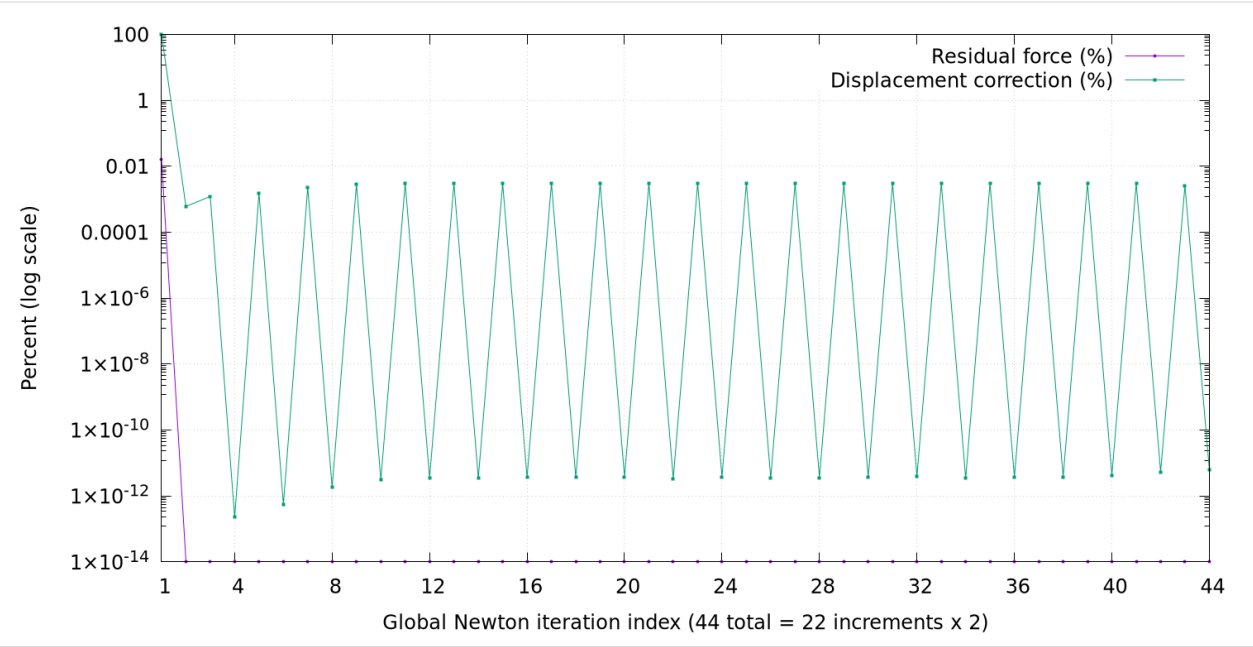
final step time 1.0

5. CalculiX Console



Jobs Monitor console showing PARDISO solve activity, Newton iterations, Job finished, and Total CalculiX Time = 4.395153 s. The 22 increments should not be interpreted as difficult convergence. The maximum increment size was limited to 0.05, and every accepted increment converged in two Newton iterations.

6. Convergence - Reconciled with Authoritative .cvg/.sta



Regenerated only from the 44 data rows in the authoritative ai_lug_bracket_bearing.cvg. The x-axis is global Newton iteration 1–44. The earlier approximately 200-iteration plot is retired in R2.

Live Monitor	Console Output	*.cvg	*.sta	*.frd	*.dat	*.dat Section
1	2	1	2	0	0.0000E+00	0.2253E-12 0.0000E+00 0.0000E+00
1	3	1	1	0	0.0000E+00	0.1519E-02 0.0000E+00 0.0000E+00
1	3	1	2	0	0.0000E+00	0.5405E-12 0.0000E+00 0.0000E+00
1	4	1	1	0	0.0000E+00	0.2279E-02 0.0000E+00 0.0000E+00
1	4	1	2	0	0.0000E+00	0.1825E-11 0.0000E+00 0.0000E+00
1	5	1	1	0	0.0000E+00	0.2887E-02 0.0000E+00 0.0000E+00
1	5	1	2	0	0.0000E+00	0.1078E-11 0.0000E+00 0.0000E+00
1	6	1	1	0	0.0000E+00	0.3039E-02 0.0000E+00 0.0000E+00
1	6	1	2	0	0.0000E+00	0.3537E-11 0.0000E+00 0.0000E+00
1	7	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	7	1	2	0	0.0000E+00	0.3516E-11 0.0000E+00 0.0000E+00
1	8	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	8	1	2	0	0.0000E+00	0.3678E-11 0.0000E+00 0.0000E+00
1	9	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	9	1	2	0	0.0000E+00	0.3655E-11 0.0000E+00 0.0000E+00
1	10	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	10	1	2	0	0.0000E+00	0.3819E-11 0.0000E+00 0.0000E+00
1	11	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	11	1	2	0	0.0000E+00	0.3594E-11 0.0000E+00 0.0000E+00
1	12	1	1	0	0.0000E+00	0.3040E-02 0.0000E+00 0.0000E+00
1	12	1	2	0	0.0000E+00	0.3822E-11 0.0000E+00 0.0000E+00
1	13	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	13	1	2	0	0.0000E+00	0.3524E-11 0.0000E+00 0.0000E+00
1	14	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	14	1	2	0	0.0000E+00	0.3601E-11 0.0000E+00 0.0000E+00
1	15	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	15	1	2	0	0.0000E+00	0.3715E-11 0.0000E+00 0.0000E+00
1	16	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	16	1	2	0	0.0000E+00	0.3975E-11 0.0000E+00 0.0000E+00
1	17	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	17	1	2	0	0.0000E+00	0.3439E-11 0.0000E+00 0.0000E+00
1	18	1	1	0	0.0000E+00	0.3041E-02 0.0000E+00 0.0000E+00
1	18	1	2	0	0.0000E+00	0.3729E-11 0.0000E+00 0.0000E+00
1	19	1	1	0	0.0000E+00	0.3042E-02 0.0000E+00 0.0000E+00
1	19	1	2	0	0.0000E+00	0.3775E-11 0.0000E+00 0.0000E+00
1	20	1	1	0	0.0000E+00	0.3042E-02 0.0000E+00 0.0000E+00
1	20	1	2	0	0.0000E+00	0.4288E-11 0.0000E+00 0.0000E+00
1	21	1	1	0	0.0000E+00	0.3043E-02 0.0000E+00 0.0000E+00

crements × 2 iterations = 44 rows.

Jobs Monitor *.cvg: 22 in-

Live Monitor	Console Output	*.cvg	*.sta	*.frd	*.dat	*.dat Section
SUMMARY OF JOB INFORMATION						
STEP	INC	ATT	ITRS	TOT TIME	STEP TIME	INC TIME
1	1	1	2	0.200000E-01	0.200000E-01	0.200000E-01
1	2	1	2	0.400000E-01	0.400000E-01	0.200000E-01
1	3	1	2	0.700000E-01	0.700000E-01	0.300000E-01
1	4	1	2	0.115000E+00	0.115000E+00	0.450000E-01
1	5	1	2	0.165000E+00	0.165000E+00	0.500000E-01
1	6	1	2	0.215000E+00	0.215000E+00	0.500000E-01
1	7	1	2	0.265000E+00	0.265000E+00	0.500000E-01
1	8	1	2	0.315000E+00	0.315000E+00	0.500000E-01
1	9	1	2	0.365000E+00	0.365000E+00	0.500000E-01
1	10	1	2	0.415000E+00	0.415000E+00	0.500000E-01
1	11	1	2	0.465000E+00	0.465000E+00	0.500000E-01
1	12	1	2	0.515000E+00	0.515000E+00	0.500000E-01
1	13	1	2	0.565000E+00	0.565000E+00	0.500000E-01
1	14	1	2	0.615000E+00	0.615000E+00	0.500000E-01
1	15	1	2	0.665000E+00	0.665000E+00	0.500000E-01
1	16	1	2	0.715000E+00	0.715000E+00	0.500000E-01
1	17	1	2	0.765000E+00	0.765000E+00	0.500000E-01
1	18	1	2	0.815000E+00	0.815000E+00	0.500000E-01
1	19	1	2	0.865000E+00	0.865000E+00	0.500000E-01
1	20	1	2	0.915000E+00	0.915000E+00	0.500000E-01
1	21	1	2	0.965000E+00	0.965000E+00	0.500000E-01
1	22	1	2	0.100000E+01	0.100000E+01	0.350000E-01

cepted increments; final step time = 1.0.

Jobs Monitor *.sta: 22 ac-

7. FRD / DAT - Results Inside the Plugin

Live Monitor

Console Output

*.cvlg

*.sta

*.frd

*.dat

*.dat Section

Result Blocks

Components

Increments

Filter by s

DISP

STRESS

TOSTRAIN

FORC

ERROR

all

SXX

SYX

SZZ

SXY

SYZ

SZX

MISES

PS1

PS2

PS3

worstPS

maxShear

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

none

Filter by I

Node ID

Re

	Node ID	Increment	Time	MISES
1	1	22	1	58.9214
2	2	22	1	69.2847
3	3	22	1	56.342
4	4	22	1	43.3603
5	5	22	1	45.7754
6	6	22	1	45.0673
7	7	22	1	55.6718
8	8	22	1	75.7165
9	9	22	1	76.4807
10	10	22	1	55.3099

*. frd: STRESS → MISES → increment 22, with a populated node-result table.

Applied resultant = -45.0 kN

Live Monitor

Console Output

*.cvlg

*.sta

*.frd

*.dat

*.dat Section

Result Sets

Result Blocks

Components

Times

BRACKET_BASE

ip_BRACKET

displacements

forces

stresses

strains

all

fx

fy

fz

0.215000

0.265000

0.315000

0.365000

0.415000

0.465000

0.515000

0.565000

0.615000

0.665000

0.715000

0.765000

0.815000

0.865000

0.915000

0.965000

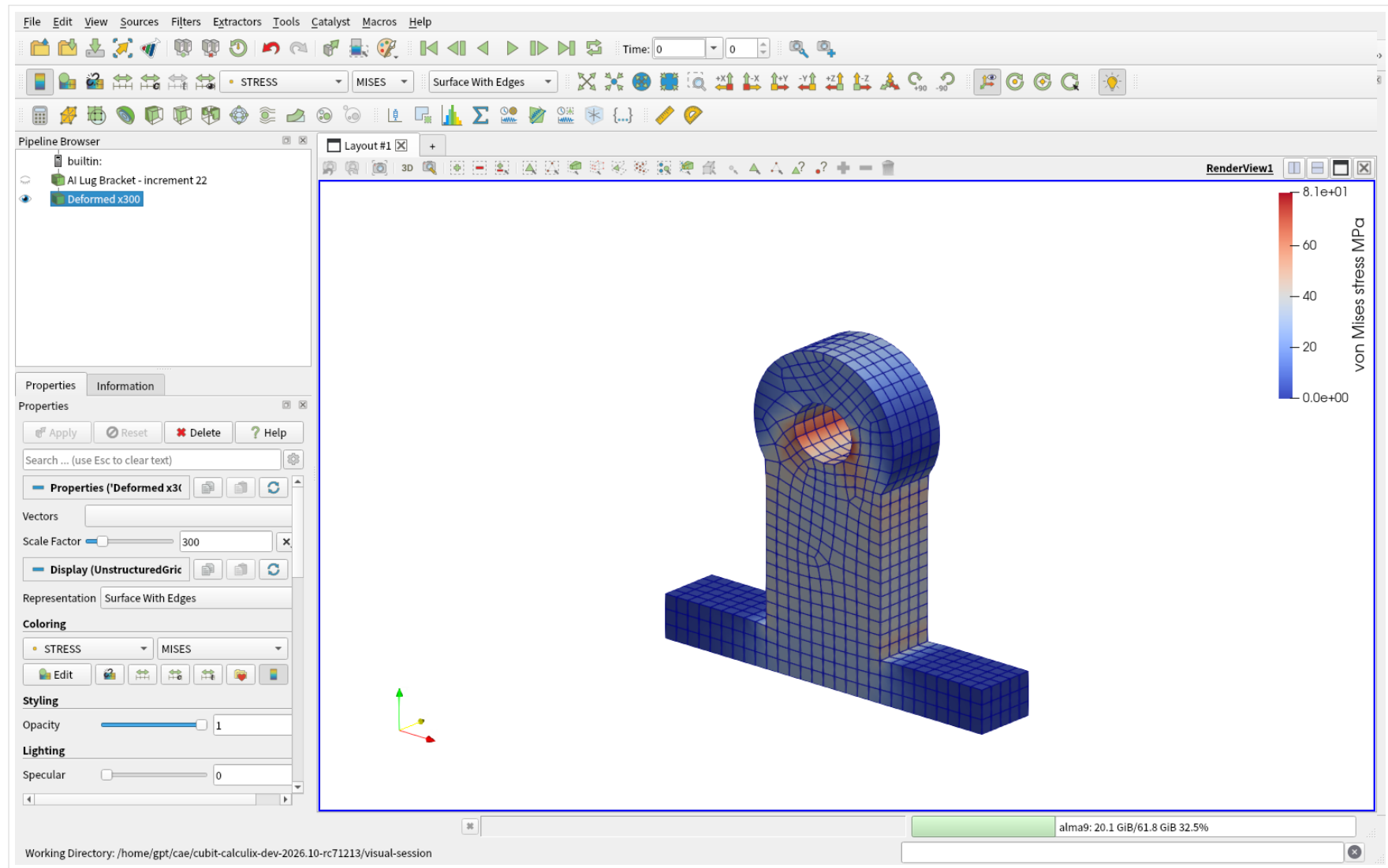
1.000000

	Node ID	Time	fx	fy	fz
1	804	1	-8.86794	-0.71362	16.705090
2	805	1	-8.83685	-0.210401	16.814200
3	806	1	-8.83685	0.210401	16.814200
4	807	1	-8.86794	0.71362	16.705090
5	809	1	-5.27544	2.830333	7.042628
6	810	1	-8.13404	1.577736	4.290368
7	811	1	-11.6395	1.588823	4.894042
8	812	1	-18.3468	2.925559	9.093540
9	813	1	-31.2023	7.487015	21.552000
10	814	1	-54.4739	19.779170	53.103710

*. dat: BRACKET_BASE force history, with final reaction values in the table.

Base reaction = +45.0 kN

8. ParaView - von Mises Stress



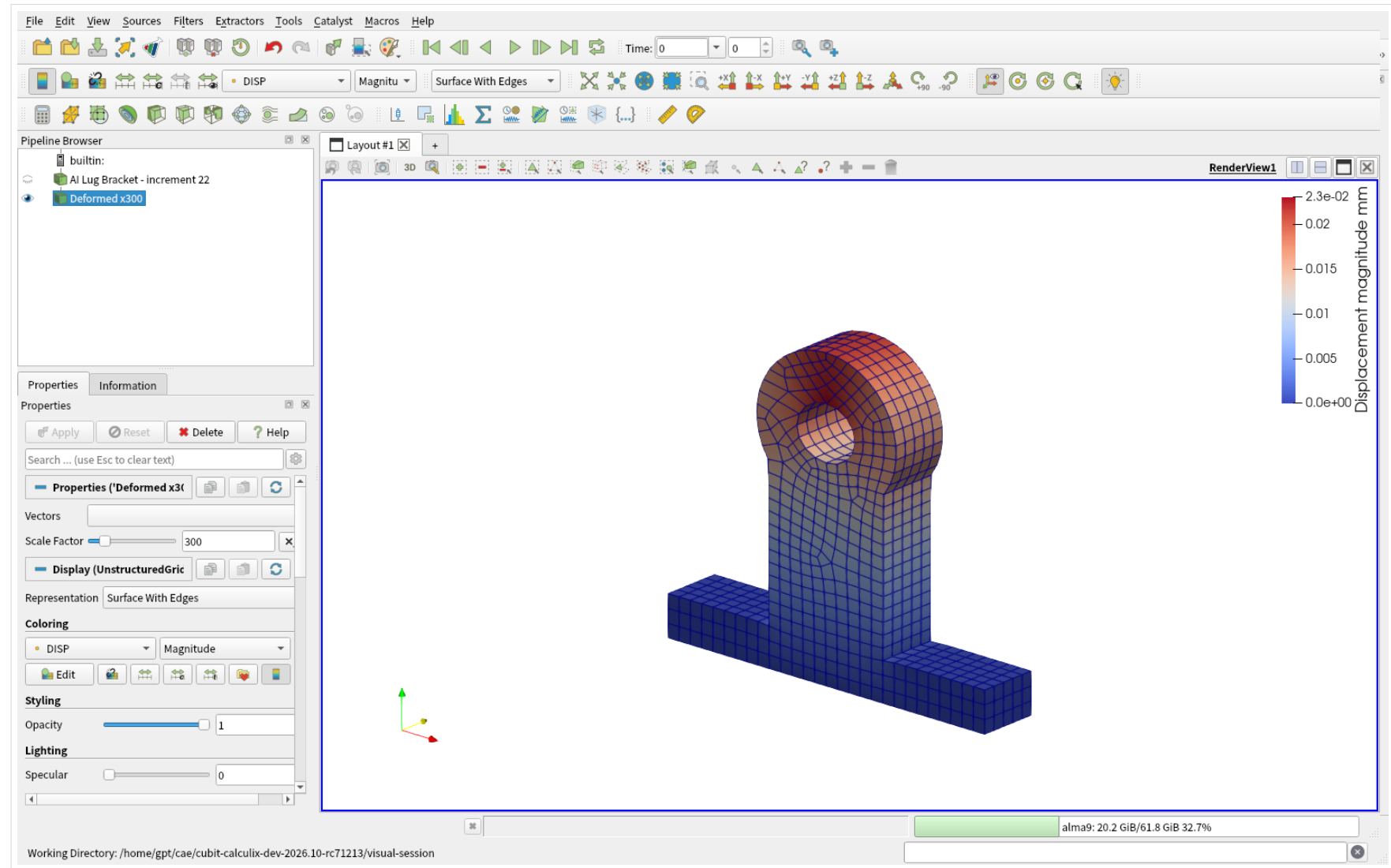
ParaView application view with Pipeline Browser, increment 22, STRESS/MISES, Surface With Edges, and scalar bar visible together.

81.0 MPa max von Mises

VTU increment 22

display deformation ×300

9. ParaView - Displacement



DISP/Magnitude, mesh edges, deformation display, and scalar bar.

0.0230 mm max displacement

45.0 kN applied

45.0 kN reaction

10. Reproducibility / Evidence Chain

AI session → journal playback → Cubit geometry → sweep mesh → Cubit-CalculiX setup → CalculiX → FRD/DAT → VTU → ParaView → report

Stage		Evidence	Status
AI-operation	prove-nance	Timestamped playback/run/wait logs + journal SHA-256	PASS
Geometry / mesh		Cubit capture; 1535 C3D8; 0 TET/PYRAMID	PASS
Mesh quality		Exported C3D8 corner scaled Jacobian min 0.565	PASS
FE definition		Cubit-CalculiX Model Tree + BC/load setup	PASS
Solver		.sta/.cvg; 22 increments / 44 iterations	PASS
Force balance		45.0 kN applied vs 45.0 kN reaction	PASS
Postprocess		FRD/DAT plugin + ParaView stress/displacement	PASS

Authoritative journal chain

11_geometry_final.jou → 12_mesh_analysis_final.jou → 13_solve_post_final.jou R2 does not use “real screenshot” as proof of AI authorship. Authorship/provenance is supported by the continuity of execution logs, timestamps, hashes, and solver artifacts.

11. Final Assessment and Analysis Limitations

Cubit-CalculiX AI workflow: demonstrated

1535

C3D8

0.565

min scaled J

44

iterations

45.0

kN reaction

81.0

MPa Mises

What this report establishes

- AI-session journals/logs can be correlated with solver artifacts across Cubit → CalculiX → ParaView.
- The exported topology is all-hex and the C3D8 geometry passes an independent scaled-Jacobian check.
- Solver history, force balance, FRD/DAT, and ParaView contours are mutually consistent for the same job.

What this report does not establish

- It is not a design certification, mesh-convergence study, plasticity validation, pin-contact solution, or contact-pressure validation.
- With a nominal 5 mm mesh and first-order fully integrated C3D8 elements, bending stiffness and bore-edge stress concentration are not claimed to be converged. The reported 81.0 MPa and 0.0230 mm are workflow-demonstration results.