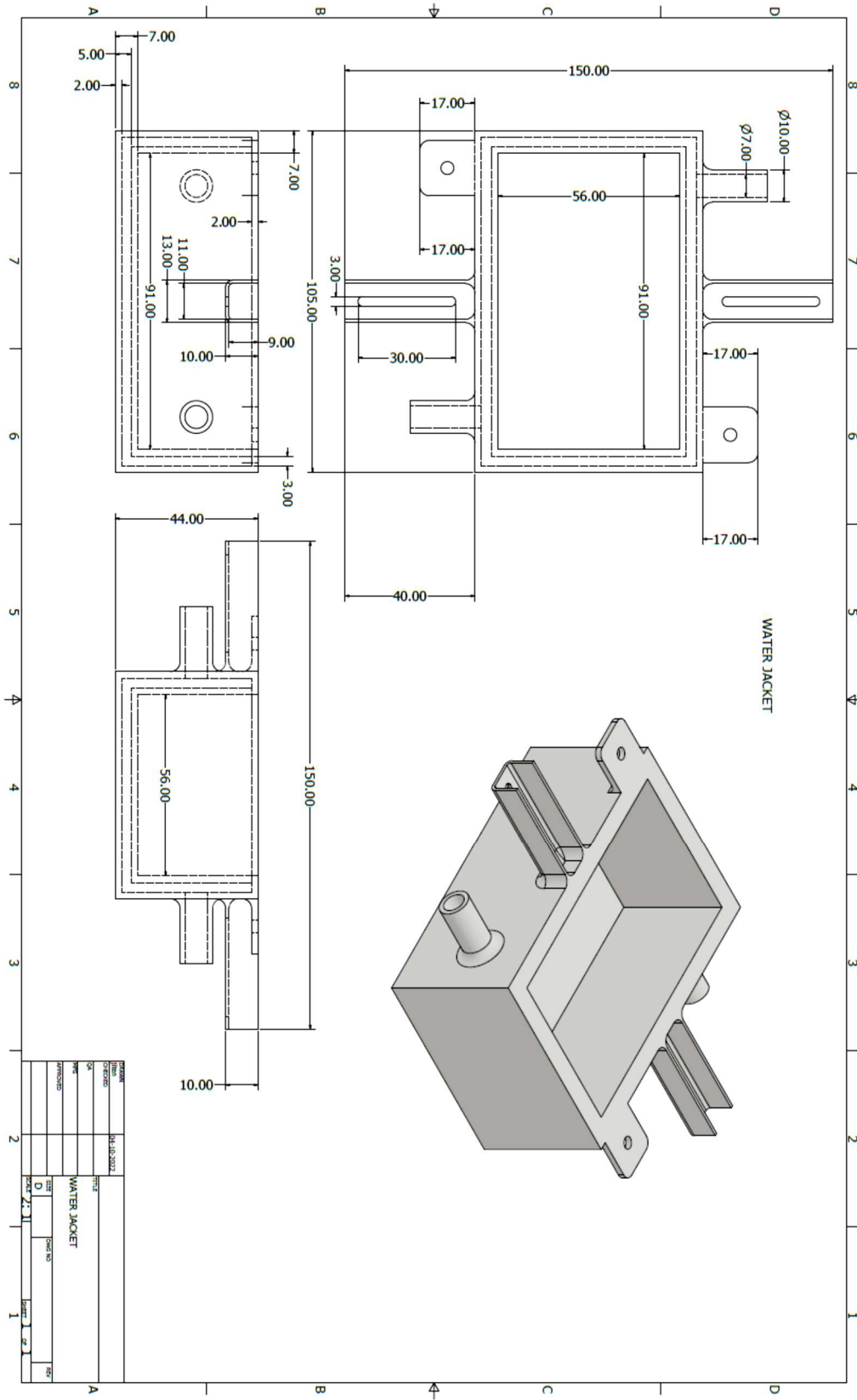
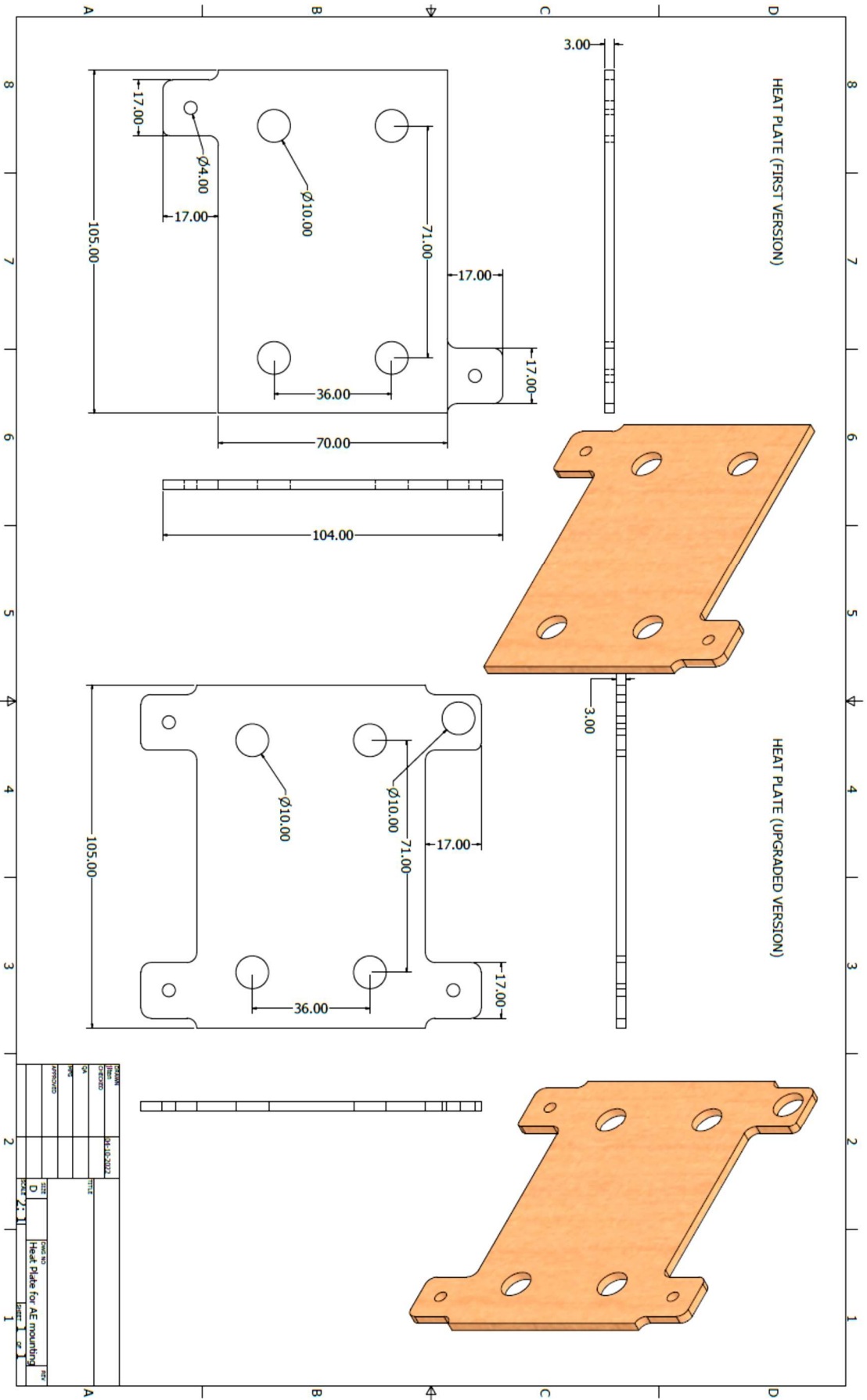


Annexure- I: CAD Drawings of parts for Portable Heating Setup

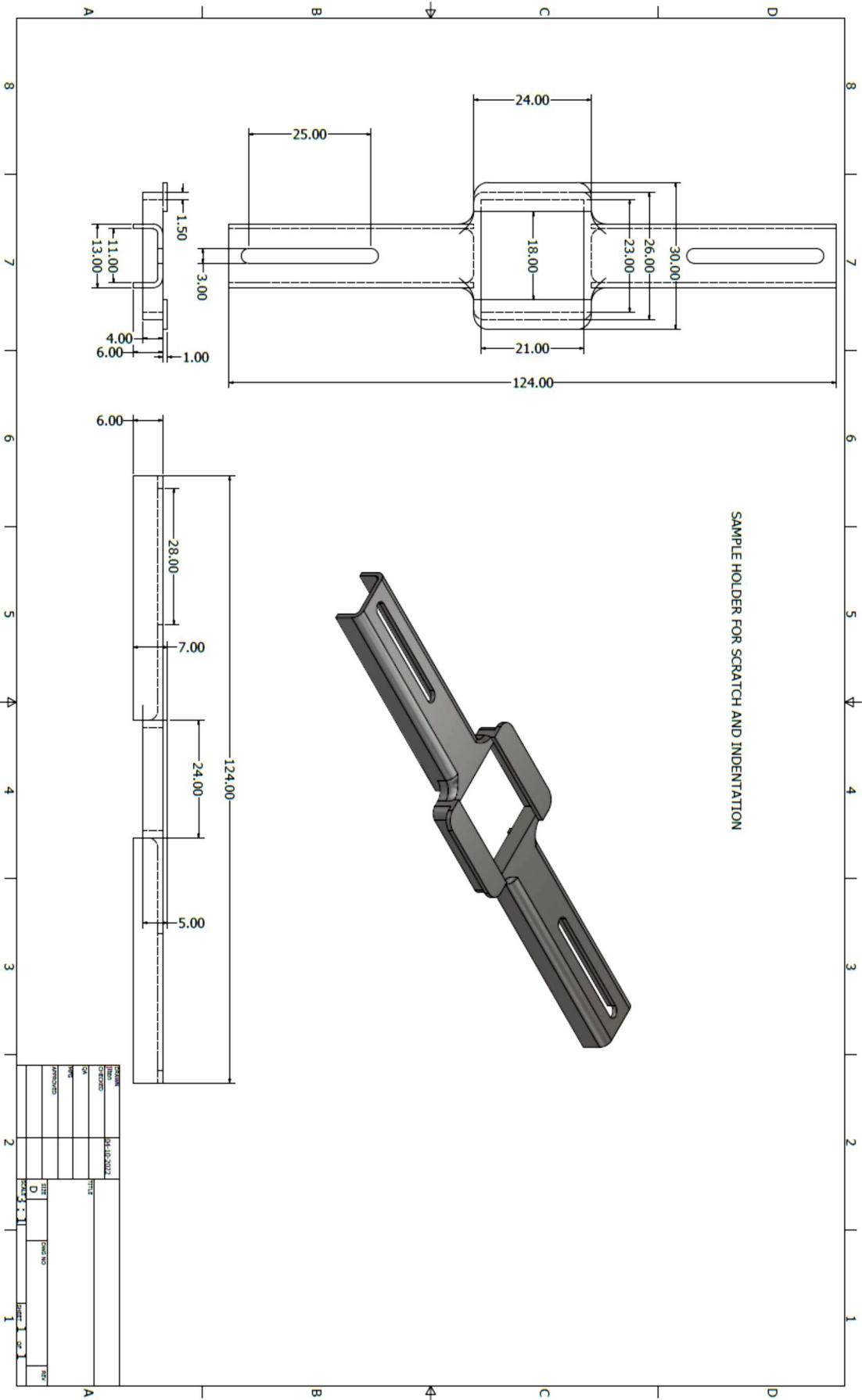


1. CAD drawing of the water jacket

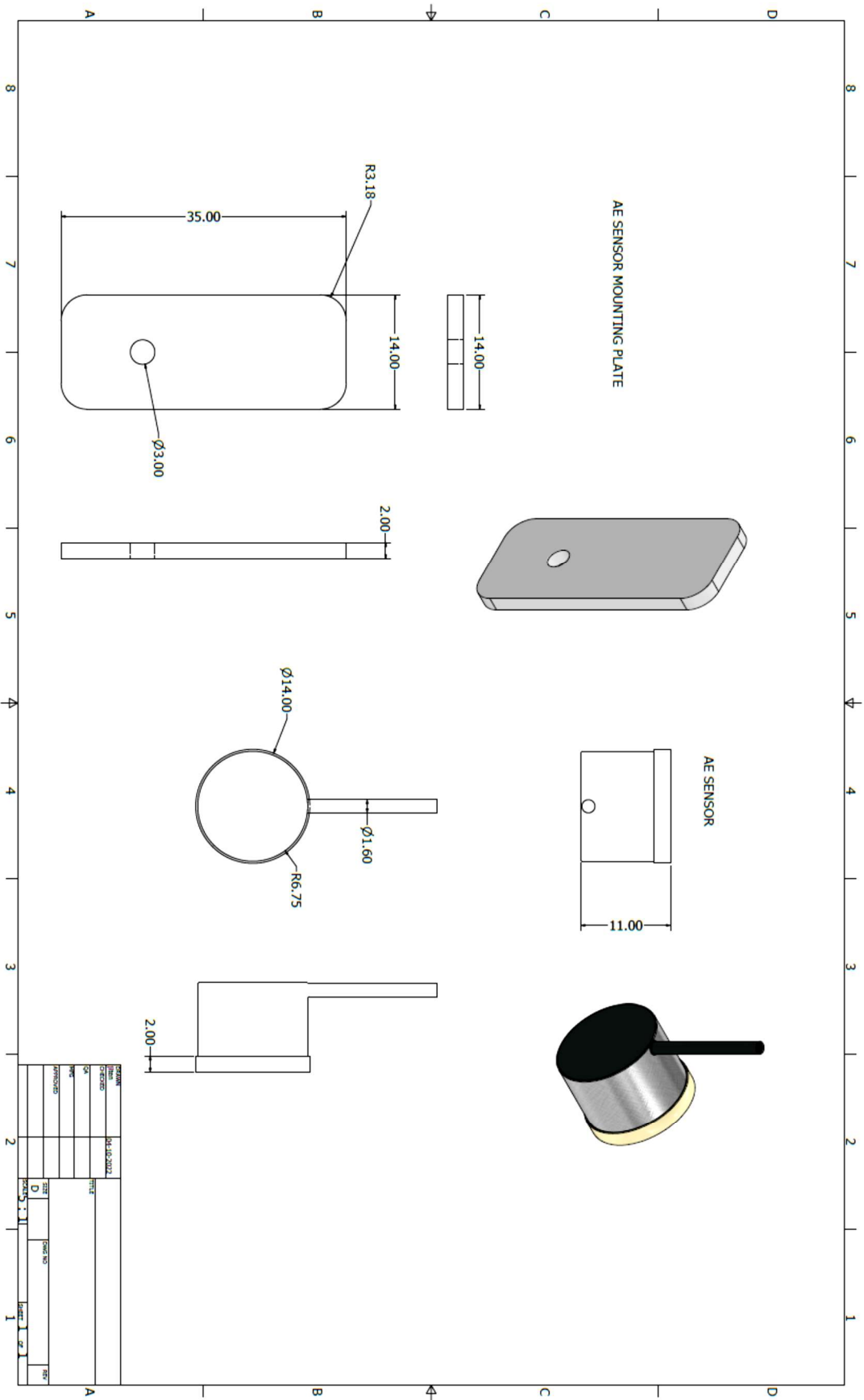
3. CAD drawing of the heat plate



4. CAD drawing of the old sample holder



6. CAD drawing of the AE sensor and it's mounting



Annexure- II: Thermal image processing of the portable heating setup

a) 1.5 Amp/ L-orientation



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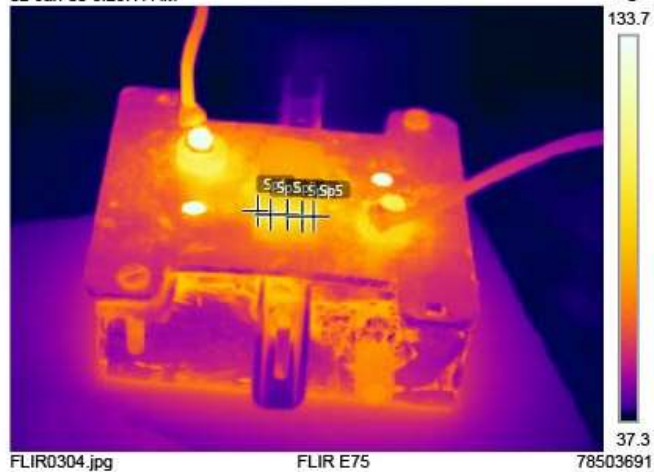
Measurements

Sp1	105.7 °C
Sp2	105.6 °C
Sp3	106.7 °C
Sp4	106.3 °C
Sp5	105.7 °C

Parameters

Emissivity	0.95
Refl. temp.	18 °C

02-Jan-00 6:29:11 AM



b) 1.5 Amp/ B-orientation



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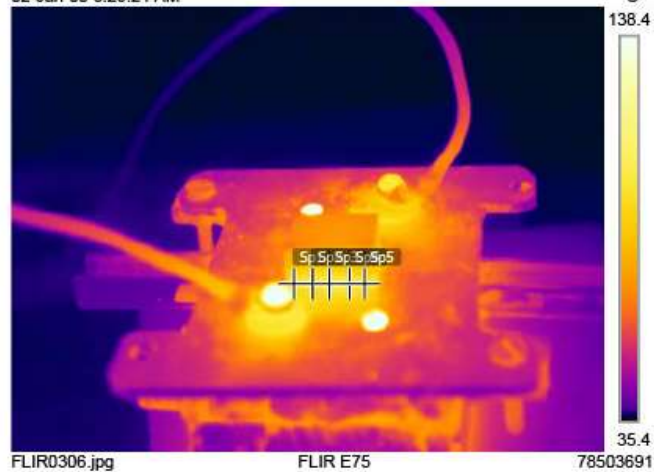
Measurements

Sp1	104.1 °C
Sp2	107.9 °C
Sp3	109.4 °C
Sp4	109.4 °C
Sp5	107.1 °C

Parameters

Emissivity	0.95
Refl. temp.	18 °C

02-Jan-00 6:29:21 AM



c) 1.5 Amp/ Top-orientation



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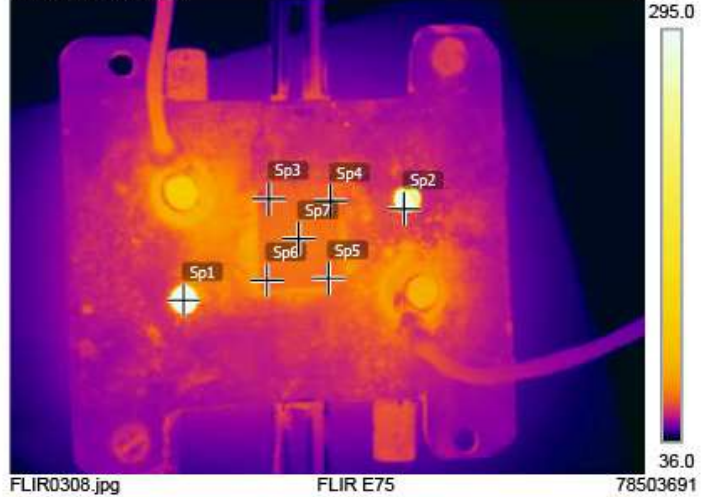
Measurements

Sp1	506.3 °C
Sp2	427.5 °C
Sp3	76.6 °C
Sp4	79.3 °C
Sp5	81.1 °C
Sp6	77.2 °C
Sp7	85.0 °C

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 6:29:39 AM



d) 2 Amp/ L-orientation



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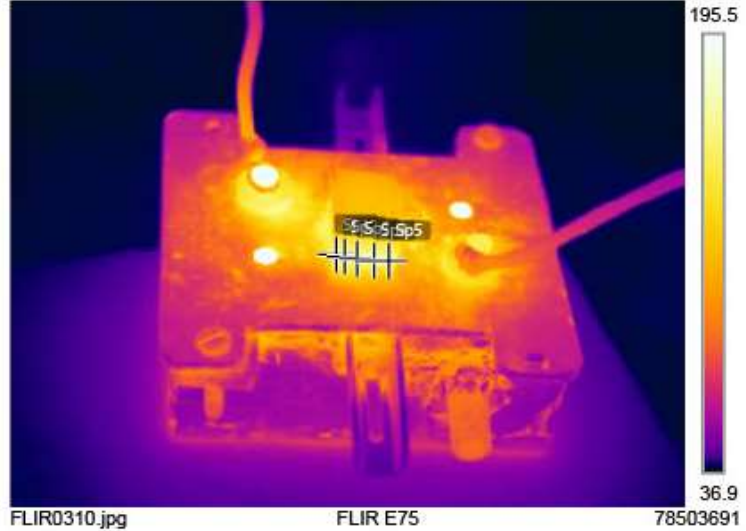
Measurements

Sp1	175.2 °C
Sp2	174.8 °C
Sp3	174.1 °C
Sp4	169.7 °C
Sp5	168.2 °C

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 6:52:13 AM



e) 2 Amp/ B-orientation



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Measurements	
Sp1	175.3 °C
Sp2	181.2 °C
Sp3	185.2 °C
Sp4	185.1 °C
Sp5	179.8 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



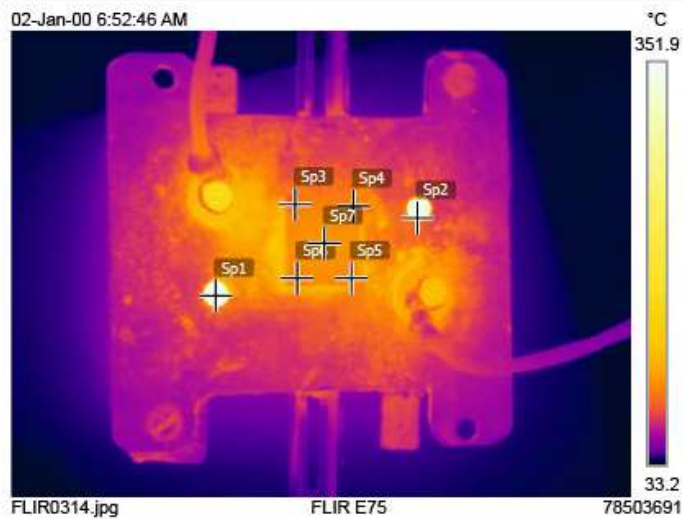
f) 2 Amp/ Top-orientation



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Measurements	
Sp1	650.7 °C
Sp2	535.4 °C
Sp3	113.8 °C
Sp4	124.1 °C
Sp5	129.3 °C
Sp6	125.7 °C
Sp7	137.7 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



g) 2.5 Amp/ L-orientation



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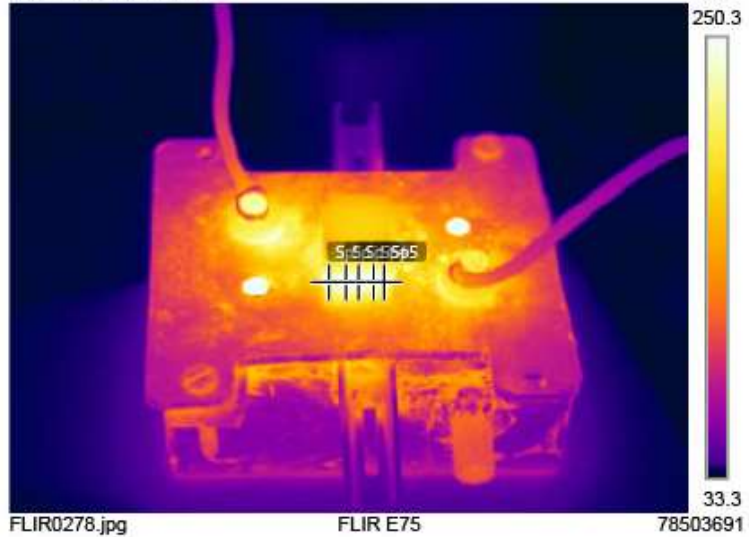
Measurements

Sp1	252.9 °C
Sp2	257.4 °C
Sp3	259.0 °C
Sp4	257.1 °C
Sp5	254.6 °C

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 3:43:18 AM



h) 2.5 Amp/ B-orientation



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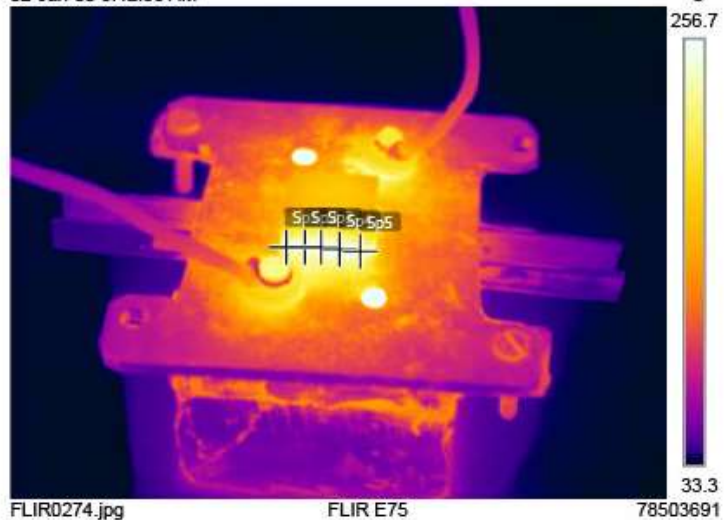
Measurements

Sp1	241.2 °C
Sp2	257.8 °C
Sp3	258.4 °C
Sp4	260.2 °C
Sp5	256.8 °C

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 3:42:55 AM



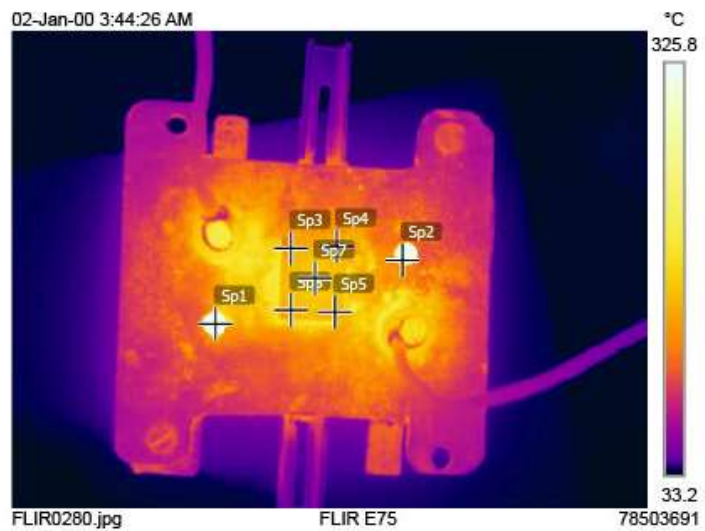
i) 2.5 Amp/ Top-orientation



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Measurements	
Sp1	660.1 °C ❌
Sp2	660.1 °C ❌
Sp3	178.3 °C
Sp4	184.1 °C
Sp5	191.1 °C
Sp6	187.7 °C
Sp7	203.6 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



j) 3 Amp/ L-orientation



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Measurements	
Sp1	361.9 °C
Sp2	371.7 °C
Sp3	373.4 °C
Sp4	359.9 °C
Sp5	361.3 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



k) 3 Amp/ B-orientation



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Measurements

Sp1	357.9 °C
Sp2	370.3 °C
Sp3	382.5 °C
Sp4	382.6 °C
Sp5	374.7 °C

Parameters

Emissivity	0.95
Refl. temp.	18 °C

02-Jan-00 4:39:20 AM



l) 3 Amp/ Top-orientation



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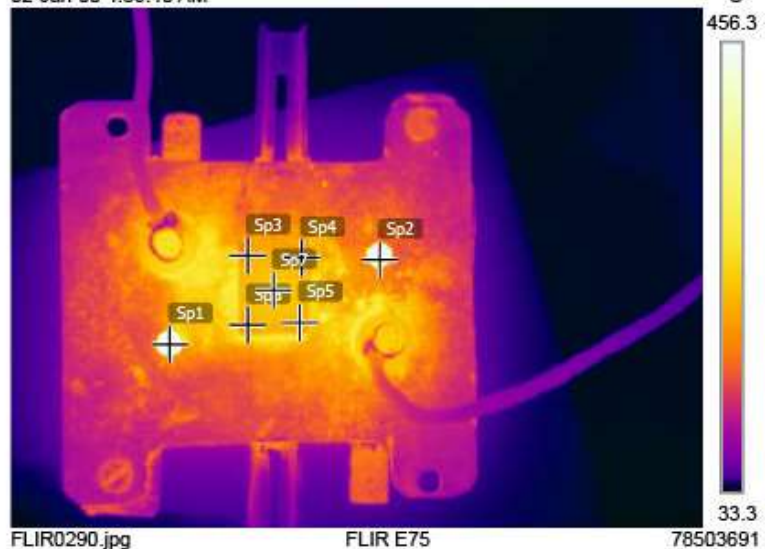
Measurements

Sp1	660.1 °C	✘
Sp2	660.1 °C	✘
Sp3	247.6 °C	
Sp4	258.6 °C	
Sp5	261.5 °C	
Sp6	246.4 °C	
Sp7	282.0 °C	

Parameters

Emissivity	0.95
Refl. temp.	18 °C

02-Jan-00 4:39:40 AM



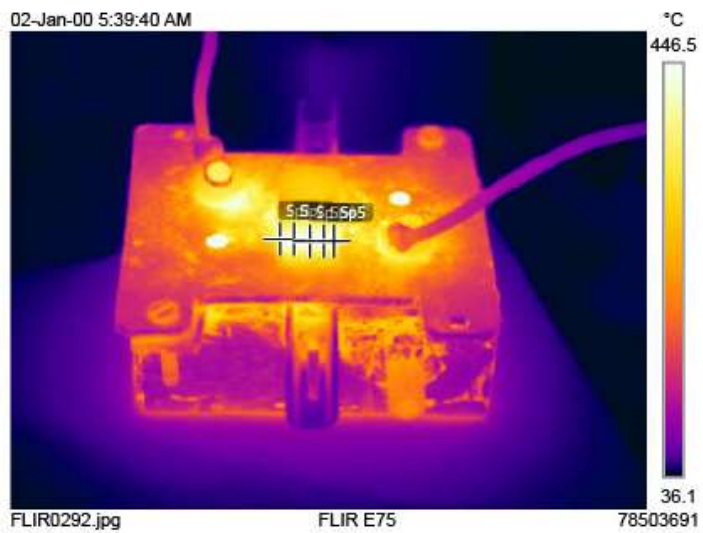
m) 3.5 Amp/ L-orientation



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Measurements	
Sp1	467.2 °C
Sp2	460.2 °C
Sp3	471.5 °C
Sp4	469.1 °C
Sp5	464.2 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



n) 3.5 Amp/ B-orientation



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Measurements	
Sp1	448.2 °C
Sp2	466.4 °C
Sp3	482.0 °C
Sp4	476.2 °C
Sp5	463.3 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



o) 3.5 Amp/ Top-orientation



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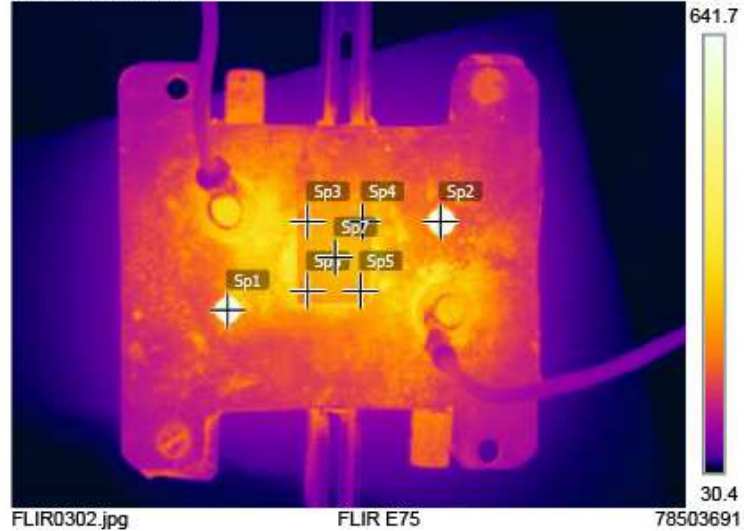
Measurements

Sp1	660.1 °C	✘
Sp2	660.1 °C	✘
Sp3	310.3 °C	
Sp4	325.7 °C	
Sp5	327.1 °C	
Sp6	306.0 °C	
Sp7	351.1 °C	

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 5:40:57 AM



p) 4 Amp/ L-orientation



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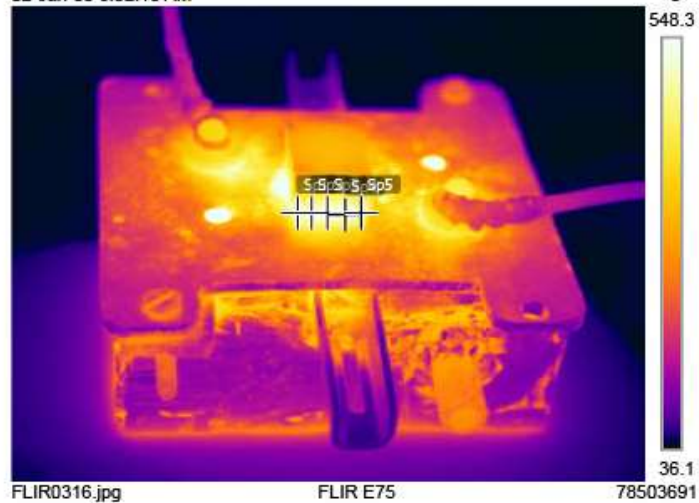
Measurements

Sp1	550.8 °C
Sp2	562.3 °C
Sp3	562.9 °C
Sp4	548.9 °C
Sp5	553.3 °C

Parameters

Emissivity	0.95
Ref. temp.	18 °C

02-Jan-00 8:02:10 AM



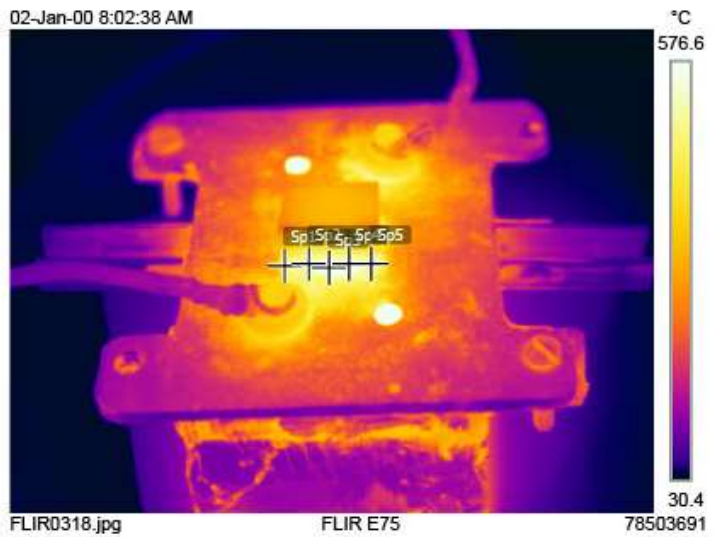
q) 4 Amp/ B-orientation



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Measurements	
Sp1	525.6 °C
Sp2	548.7 °C
Sp3	581.3 °C
Sp4	558.0 °C
Sp5	553.2 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



r) 4 Amp/ Top-orientation



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Measurements	
Sp1	660.1 °C ❌
Sp2	660.1 °C ❌
Sp3	363.6 °C
Sp4	370.4 °C
Sp5	377.1 °C
Sp6	365.5 °C
Sp7	404.5 °C

Parameters	
Emissivity	0.95
Ref. temp.	18 °C



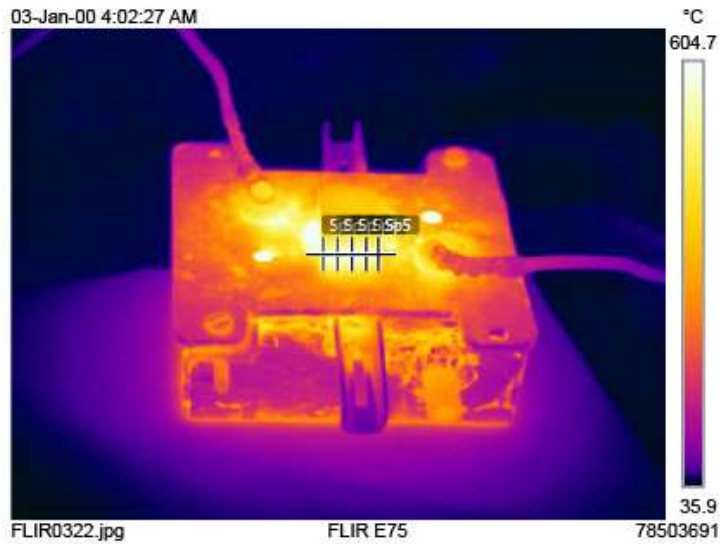
s) 4.5 Amp/ L-orientation



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Measurements	
Sp1	632.8 °C
Sp2	605.2 °C
Sp3	614.8 °C
Sp4	605.2 °C
Sp5	580.2 °C

Parameters	
Emissivity	0.95
Refl. temp.	18 °C



t) 4.5 Amp/ B-orientation



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Measurements	
Sp1	601.2 °C
Sp2	630.7 °C
Sp3	651.4 °C ⚠
Sp4	656.9 °C ⚠
Sp5	643.6 °C

Parameters	
Emissivity	0.95
Refl. temp.	18 °C



u) 4.5 Amp/ Top-orientation



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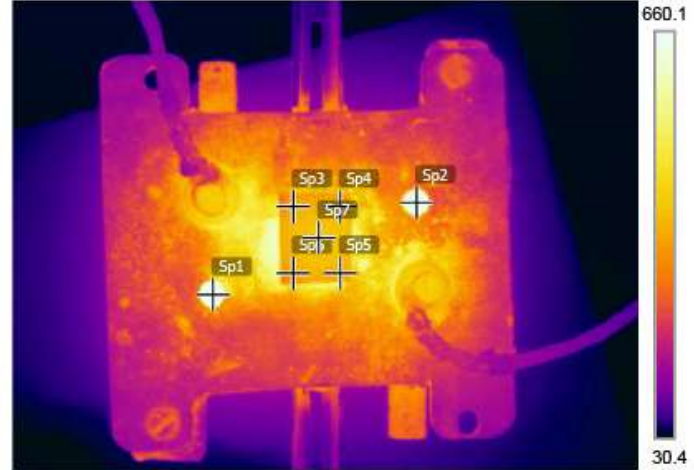
Measurements

Sp1	660.1 °C	✘
Sp2	660.1 °C	✘
Sp3	415.1 °C	
Sp4	425.5 °C	
Sp5	428.6 °C	
Sp6	406.7 °C	
Sp7	457.4 °C	

Parameters

Emissivity	0.95
Ref. temp.	18 °C

03-Jan-00 4:02:54 AM



FLIR0326.jpg

FLIR E75

78503691

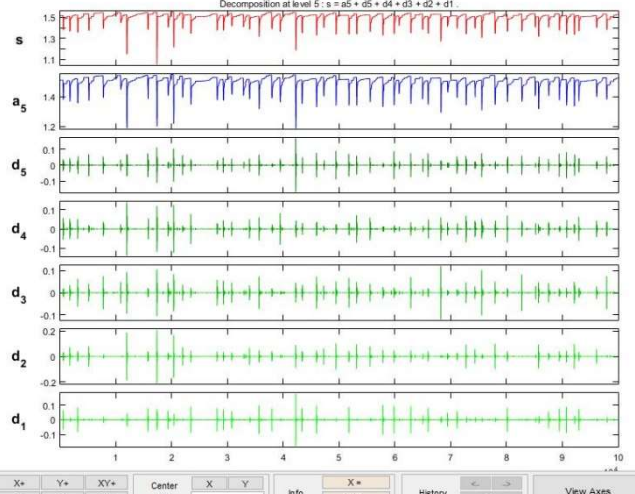
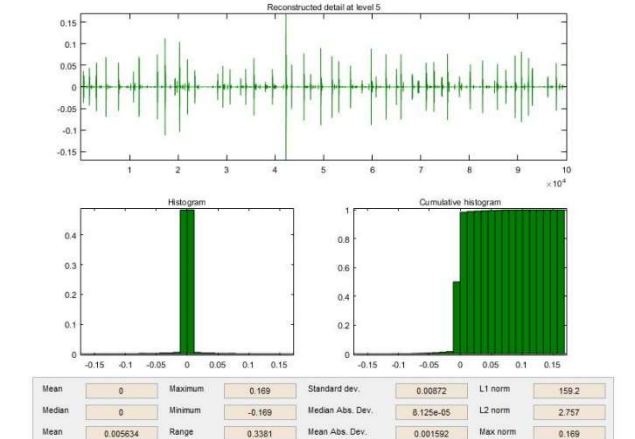
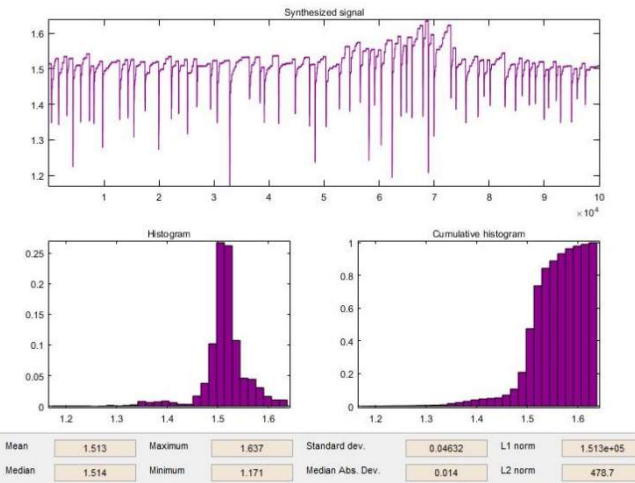
Annexure- III: Wavelet analysis for APK signal for haar wavelet analysis with 5 level decomposition and the statistical analysis of APK signal at 5th level of decomposition.

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
1	27	2	APK	Wavelets																									
2				Statistics Base Signla	<table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.05477</td> <td>Standard dev.</td><td>0.004388</td> <td>L1 norm</td><td>23.02</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.05477</td> <td>Median Abs. Dev.</td><td>8.125e-05</td> <td>L2 norm</td><td>0.6903</td> </tr> <tr> <td>Mean</td><td>-0.002159</td> <td>Range</td><td>0.1295</td> <td>Mean Abs. Dev.</td><td>0.0002268</td> <td>Max norm</td><td>0.05477</td> </tr> </table>	Mean	0	Maximum	0.05477	Standard dev.	0.004388	L1 norm	23.02	Median	0	Minimum	-0.05477	Median Abs. Dev.	8.125e-05	L2 norm	0.6903	Mean	-0.002159	Range	0.1295	Mean Abs. Dev.	0.0002268	Max norm	0.05477
Mean				0	Maximum	0.05477	Standard dev.	0.004388	L1 norm	23.02																			
Median	0	Minimum	-0.05477	Median Abs. Dev.	8.125e-05	L2 norm	0.6903																						
Mean	-0.002159	Range	0.1295	Mean Abs. Dev.	0.0002268	Max norm	0.05477																						
3	Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td><td>1.395</td> <td>Maximum</td><td>1.44</td> <td>Standard dev.</td><td>0.02003</td> <td>L1 norm</td><td>3.494e+04</td> </tr> <tr> <td>Median</td><td>1.401</td> <td>Minimum</td><td>1.268</td> <td>Median Abs. Dev.</td><td>0.0089</td> <td>L2 norm</td><td>221</td> </tr> <tr> <td>Mean</td><td>1.403</td> <td>Range</td><td>0.172</td> <td>Mean Abs. Dev.</td><td>0.01371</td> <td>Max norm</td><td>1.44</td> </tr> </table>	Mean	1.395	Maximum	1.44	Standard dev.	0.02003	L1 norm	3.494e+04	Median	1.401	Minimum	1.268	Median Abs. Dev.	0.0089	L2 norm	221	Mean	1.403	Range	0.172	Mean Abs. Dev.	0.01371	Max norm	1.44			
Mean	1.395	Maximum	1.44	Standard dev.	0.02003	L1 norm	3.494e+04																						
Median	1.401	Minimum	1.268	Median Abs. Dev.	0.0089	L2 norm	221																						
Mean	1.403	Range	0.172	Mean Abs. Dev.	0.01371	Max norm	1.44																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
4	27	2	ASL	Wavelets	<p>Decomposition at level 5: $s = a_5 + d_5 + d_4 + d_3 + d_2 + d_1$</p>																								
5				Statistics Base Signal	<p>ASL_1 (25000 values) analyzed at level 5 with haar. Components: 1 -> 25000</p> <table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.0206</td> <td>Standard dev.</td><td>0.01017</td> <td>L1 norm</td><td>218.3</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.0206</td> <td>Median Abs. Dev.</td><td>0.008294</td> <td>L2 norm</td><td>1.608</td> </tr> <tr> <td>Mean</td><td>-0.00206</td> <td>Range</td><td>0.0412</td> <td>Mean Abs. Dev.</td><td>0.008732</td> <td>Max norm</td><td>0.0206</td> </tr> </table>	Mean	0	Maximum	0.0206	Standard dev.	0.01017	L1 norm	218.3	Median	0	Minimum	-0.0206	Median Abs. Dev.	0.008294	L2 norm	1.608	Mean	-0.00206	Range	0.0412	Mean Abs. Dev.	0.008732	Max norm	0.0206
Mean				0	Maximum	0.0206	Standard dev.	0.01017	L1 norm	218.3																			
Median	0	Minimum	-0.0206	Median Abs. Dev.	0.008294	L2 norm	1.608																						
Mean	-0.00206	Range	0.0412	Mean Abs. Dev.	0.008732	Max norm	0.0206																						
6	Statistics Processed Signal	<p>ASL1_1_2 (25000 values) analyzed at level 5 with haar. Components: 1 -> 25000</p> <table border="1"> <tr> <td>Mean</td><td>0.97</td> <td>Maximum</td><td>1.03</td> <td>Standard dev.</td><td>0.02077</td> <td>L1 norm</td><td>2.425e+04</td> </tr> <tr> <td>Median</td><td>0.9648</td> <td>Minimum</td><td>0.94</td> <td>Median Abs. Dev.</td><td>0.0159</td> <td>L2 norm</td><td>153.4</td> </tr> <tr> <td>Mean</td><td>0.9475</td> <td>Range</td><td>0.0898</td> <td>Mean Abs. Dev.</td><td>0.01799</td> <td>Max norm</td><td>1.03</td> </tr> </table>	Mean	0.97	Maximum	1.03	Standard dev.	0.02077	L1 norm	2.425e+04	Median	0.9648	Minimum	0.94	Median Abs. Dev.	0.0159	L2 norm	153.4	Mean	0.9475	Range	0.0898	Mean Abs. Dev.	0.01799	Max norm	1.03			
Mean	0.97	Maximum	1.03	Standard dev.	0.02077	L1 norm	2.425e+04																						
Median	0.9648	Minimum	0.94	Median Abs. Dev.	0.0159	L2 norm	153.4																						
Mean	0.9475	Range	0.0898	Mean Abs. Dev.	0.01799	Max norm	1.03																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
7				Wavelets																									
8	27	1	APK	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.04408</td> <td>Standard dev.</td> <td>0.00326</td> <td>L1 norm</td> <td>32.57</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.04408</td> <td>Median Abs. Dev.</td> <td>8.125e-05</td> <td>L2 norm</td> <td>0.729</td> </tr> <tr> <td>Mean</td> <td>0.001469</td> <td>Range</td> <td>0.08817</td> <td>Mean Abs. Dev.</td> <td>0.0008514</td> <td>Max norm</td> <td>0.04408</td> </tr> </table>	Mean	0	Maximum	0.04408	Standard dev.	0.00326	L1 norm	32.57	Median	0	Minimum	-0.04408	Median Abs. Dev.	8.125e-05	L2 norm	0.729	Mean	0.001469	Range	0.08817	Mean Abs. Dev.	0.0008514	Max norm	0.04408
Mean	0	Maximum	0.04408	Standard dev.	0.00326	L1 norm	32.57																						
Median	0	Minimum	-0.04408	Median Abs. Dev.	8.125e-05	L2 norm	0.729																						
Mean	0.001469	Range	0.08817	Mean Abs. Dev.	0.0008514	Max norm	0.04408																						
9				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>1.367</td> <td>Maximum</td> <td>1.443</td> <td>Standard dev.</td> <td>0.02024</td> <td>L1 norm</td> <td>6.935e+04</td> </tr> <tr> <td>Median</td> <td>1.389</td> <td>Minimum</td> <td>1.185</td> <td>Median Abs. Dev.</td> <td>0.0083</td> <td>L2 norm</td> <td>310.2</td> </tr> <tr> <td>Mean</td> <td>1.395</td> <td>Range</td> <td>0.258</td> <td>Mean Abs. Dev.</td> <td>0.01285</td> <td>Max norm</td> <td>1.443</td> </tr> </table>	Mean	1.367	Maximum	1.443	Standard dev.	0.02024	L1 norm	6.935e+04	Median	1.389	Minimum	1.185	Median Abs. Dev.	0.0083	L2 norm	310.2	Mean	1.395	Range	0.258	Mean Abs. Dev.	0.01285	Max norm	1.443
Mean	1.367	Maximum	1.443	Standard dev.	0.02024	L1 norm	6.935e+04																						
Median	1.389	Minimum	1.185	Median Abs. Dev.	0.0083	L2 norm	310.2																						
Mean	1.395	Range	0.258	Mean Abs. Dev.	0.01285	Max norm	1.443																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
10				Wavelets																									
11	27	1	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.01933</td> <td>Standard dev.</td> <td>0.01018</td> <td>L1 norm</td> <td>443.1</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.01933</td> <td>Median Abs. Dev.</td> <td>0.008738</td> <td>L2 norm</td> <td>2.277</td> </tr> <tr> <td>Mean</td> <td>-0.01353</td> <td>Range</td> <td>0.03865</td> <td>Mean Abs. Dev.</td> <td>0.008862</td> <td>Max norm</td> <td>0.01933</td> </tr> </table>	Mean	0	Maximum	0.01933	Standard dev.	0.01018	L1 norm	443.1	Median	0	Minimum	-0.01933	Median Abs. Dev.	0.008738	L2 norm	2.277	Mean	-0.01353	Range	0.03865	Mean Abs. Dev.	0.008862	Max norm	0.01933
Mean	0	Maximum	0.01933	Standard dev.	0.01018	L1 norm	443.1																						
Median	0	Minimum	-0.01933	Median Abs. Dev.	0.008738	L2 norm	2.277																						
Mean	-0.01353	Range	0.03865	Mean Abs. Dev.	0.008862	Max norm	0.01933																						
12				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>0.9705</td> <td>Maximum</td> <td>1.027</td> <td>Standard dev.</td> <td>0.02132</td> <td>L1 norm</td> <td>4.853e+04</td> </tr> <tr> <td>Median</td> <td>0.9667</td> <td>Minimum</td> <td>0.9374</td> <td>Median Abs. Dev.</td> <td>0.0178</td> <td>L2 norm</td> <td>217.1</td> </tr> <tr> <td>Mean</td> <td>0.9449</td> <td>Range</td> <td>0.0898</td> <td>Mean Abs. Dev.</td> <td>0.01854</td> <td>Max norm</td> <td>1.027</td> </tr> </table>	Mean	0.9705	Maximum	1.027	Standard dev.	0.02132	L1 norm	4.853e+04	Median	0.9667	Minimum	0.9374	Median Abs. Dev.	0.0178	L2 norm	217.1	Mean	0.9449	Range	0.0898	Mean Abs. Dev.	0.01854	Max norm	1.027
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S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
13				Wavelets	 <p>Decomposition at level 5: $s = a_5 + d_5 + d_4 + d_3 + d_2 + d_1$</p>																								
14	27	0.5	APK	Statistics Base Signal	 <p>APK2_3 (100000 values) analyzed at level 5 with haar. Components: 1 -> 100000</p> <table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.169</td> <td>Standard dev.</td><td>0.00872</td> <td>L1 norm</td><td>159.2</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.169</td> <td>Median Abs. Dev.</td><td>8.125e-05</td> <td>L2 norm</td><td>2.757</td> </tr> <tr> <td>Mean</td><td>0.005634</td> <td>Range</td><td>0.3381</td> <td>Mean Abs. Dev.</td><td>0.001592</td> <td>Max norm</td><td>0.169</td> </tr> </table>	Mean	0	Maximum	0.169	Standard dev.	0.00872	L1 norm	159.2	Median	0	Minimum	-0.169	Median Abs. Dev.	8.125e-05	L2 norm	2.757	Mean	0.005634	Range	0.3381	Mean Abs. Dev.	0.001592	Max norm	0.169
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15				Statistics Processed Signal	 <p>APK2_3_2 (100000 values) analyzed at level 5 with haar. Components: 1 -> 100000</p> <table border="1"> <tr> <td>Mean</td><td>1.513</td> <td>Maximum</td><td>1.637</td> <td>Standard dev.</td><td>0.04632</td> <td>L1 norm</td><td>1.513e+05</td> </tr> <tr> <td>Median</td><td>1.514</td> <td>Minimum</td><td>1.171</td> <td>Median Abs. Dev.</td><td>0.014</td> <td>L2 norm</td><td>478.7</td> </tr> <tr> <td>Mean</td><td>1.505</td> <td>Range</td><td>0.4663</td> <td>Mean Abs. Dev.</td><td>0.02775</td> <td>Max norm</td><td>1.637</td> </tr> </table>	Mean	1.513	Maximum	1.637	Standard dev.	0.04632	L1 norm	1.513e+05	Median	1.514	Minimum	1.171	Median Abs. Dev.	0.014	L2 norm	478.7	Mean	1.505	Range	0.4663	Mean Abs. Dev.	0.02775	Max norm	1.637
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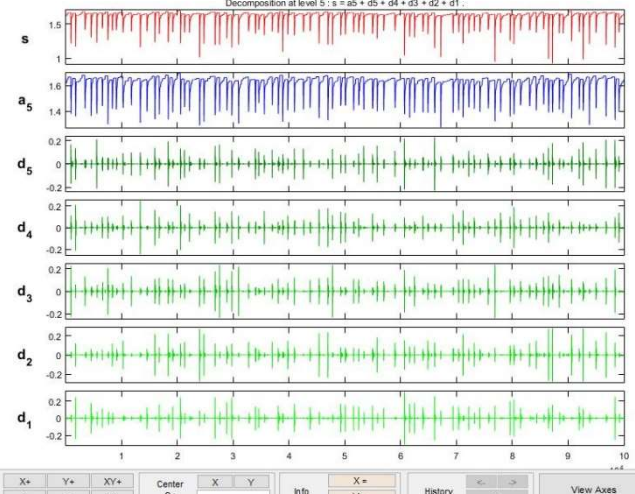
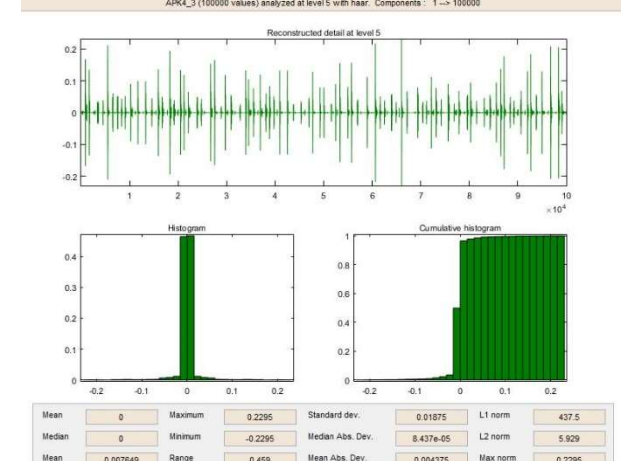
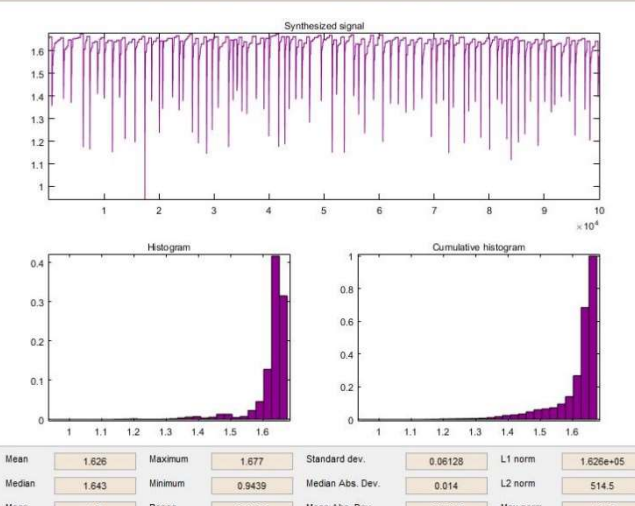
S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
16				Wavelets																									
17	27	0.5	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03068</td> <td>Standard dev.</td> <td>0.01688</td> <td>L1 norm</td> <td>1453</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03068</td> <td>Median Abs. Dev.</td> <td>0.01427</td> <td>L2 norm</td> <td>5.331</td> </tr> <tr> <td>Mean</td> <td>-0.02558</td> <td>Range</td> <td>0.06135</td> <td>Mean Abs. Dev.</td> <td>0.01453</td> <td>Max norm</td> <td>0.03068</td> </tr> </table>	Mean	0	Maximum	0.03068	Standard dev.	0.01688	L1 norm	1453	Median	0	Minimum	-0.03068	Median Abs. Dev.	0.01427	L2 norm	5.331	Mean	-0.02558	Range	0.06135	Mean Abs. Dev.	0.01453	Max norm	0.03068
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Median	0	Minimum	-0.03068	Median Abs. Dev.	0.01427	L2 norm	5.331																						
Mean	-0.02558	Range	0.06135	Mean Abs. Dev.	0.01453	Max norm	0.03068																						
18				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>0.9846</td> <td>Maximum</td> <td>1.093</td> <td>Standard dev.</td> <td>0.03543</td> <td>L1 norm</td> <td>9.846e+04</td> </tr> <tr> <td>Median</td> <td>0.9756</td> <td>Minimum</td> <td>0.9374</td> <td>Median Abs. Dev.</td> <td>0.0274</td> <td>L2 norm</td> <td>311.5</td> </tr> <tr> <td>Mean</td> <td>0.9452</td> <td>Range</td> <td>0.1555</td> <td>Mean Abs. Dev.</td> <td>0.03081</td> <td>Max norm</td> <td>1.093</td> </tr> </table>	Mean	0.9846	Maximum	1.093	Standard dev.	0.03543	L1 norm	9.846e+04	Median	0.9756	Minimum	0.9374	Median Abs. Dev.	0.0274	L2 norm	311.5	Mean	0.9452	Range	0.1555	Mean Abs. Dev.	0.03081	Max norm	1.093
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S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
19				Wavelets	<p>Decomposition at level 5: $s = a_5 + d_5 + d_4 + d_3 + d_2 + d_1$.</p>																								
20	210	2	APK	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.1434</td> <td>Standard dev.</td> <td>0.01291</td> <td>L1 norm</td> <td>75.3</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.1434</td> <td>Median Abs. Dev.</td> <td>8.430e-05</td> <td>L2 norm</td> <td>2.041</td> </tr> <tr> <td>Mean</td> <td>-0.00478</td> <td>Range</td> <td>0.2868</td> <td>Mean Abs. Dev.</td> <td>0.003012</td> <td>Max norm</td> <td>0.1434</td> </tr> </table>	Mean	0	Maximum	0.1434	Standard dev.	0.01291	L1 norm	75.3	Median	0	Minimum	-0.1434	Median Abs. Dev.	8.430e-05	L2 norm	2.041	Mean	-0.00478	Range	0.2868	Mean Abs. Dev.	0.003012	Max norm	0.1434
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21				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>1.586</td> <td>Maximum</td> <td>1.619</td> <td>Standard dev.</td> <td>0.04376</td> <td>L1 norm</td> <td>3.919e+04</td> </tr> <tr> <td>Median</td> <td>1.58</td> <td>Minimum</td> <td>1.194</td> <td>Median Abs. Dev.</td> <td>0.016</td> <td>L2 norm</td> <td>248</td> </tr> <tr> <td>Mean</td> <td>1.583</td> <td>Range</td> <td>0.425</td> <td>Mean Abs. Dev.</td> <td>0.02968</td> <td>Max norm</td> <td>1.619</td> </tr> </table>	Mean	1.586	Maximum	1.619	Standard dev.	0.04376	L1 norm	3.919e+04	Median	1.58	Minimum	1.194	Median Abs. Dev.	0.016	L2 norm	248	Mean	1.583	Range	0.425	Mean Abs. Dev.	0.02968	Max norm	1.619
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S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
22				Wavelets																									
23	210	2	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03087</td> <td>Standard dev.</td> <td>0.01699</td> <td>L1 norm</td> <td>384.8</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03087</td> <td>Median Abs. Dev.</td> <td>0.0142</td> <td>L2 norm</td> <td>2.686</td> </tr> <tr> <td>Mean</td> <td>-0.005144</td> <td>Range</td> <td>0.06173</td> <td>Mean Abs. Dev.</td> <td>0.01459</td> <td>Max norm</td> <td>0.03087</td> </tr> </table>	Mean	0	Maximum	0.03087	Standard dev.	0.01699	L1 norm	384.8	Median	0	Minimum	-0.03087	Median Abs. Dev.	0.0142	L2 norm	2.686	Mean	-0.005144	Range	0.06173	Mean Abs. Dev.	0.01459	Max norm	0.03087
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24				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>0.9885</td> <td>Maximum</td> <td>1.078</td> <td>Standard dev.</td> <td>0.035</td> <td>L1 norm</td> <td>2.466e+04</td> </tr> <tr> <td>Median</td> <td>0.9775</td> <td>Minimum</td> <td>0.94</td> <td>Median Abs. Dev.</td> <td>0.0267</td> <td>L2 norm</td> <td>156.1</td> </tr> <tr> <td>Mean</td> <td>0.9469</td> <td>Range</td> <td>0.1376</td> <td>Mean Abs. Dev.</td> <td>0.03657</td> <td>Max norm</td> <td>1.078</td> </tr> </table>	Mean	0.9885	Maximum	1.078	Standard dev.	0.035	L1 norm	2.466e+04	Median	0.9775	Minimum	0.94	Median Abs. Dev.	0.0267	L2 norm	156.1	Mean	0.9469	Range	0.1376	Mean Abs. Dev.	0.03657	Max norm	1.078
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S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
25				Wavelets																									
26	210	1	APK	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.2298</td> <td>Standard dev.</td><td>0.01528</td> <td>L1 norm</td><td>172.1</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.2298</td> <td>Median Abs. Dev.</td><td>8.125e-05</td> <td>L2 norm</td><td>3.418</td> </tr> <tr> <td>Mean</td><td>-0.00766</td> <td>Range</td><td>0.4596</td> <td>Mean Abs. Dev.</td><td>0.003442</td> <td>Max norm</td><td>0.2298</td> </tr> </table>	Mean	0	Maximum	0.2298	Standard dev.	0.01528	L1 norm	172.1	Median	0	Minimum	-0.2298	Median Abs. Dev.	8.125e-05	L2 norm	3.418	Mean	-0.00766	Range	0.4596	Mean Abs. Dev.	0.003442	Max norm	0.2298
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27			APK	Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td><td>1.595</td> <td>Maximum</td><td>1.652</td> <td>Standard dev.</td><td>0.05353</td> <td>L1 norm</td><td>7.976e+04</td> </tr> <tr> <td>Median</td><td>1.611</td> <td>Minimum</td><td>1.132</td> <td>Median Abs. Dev.</td><td>0.0146</td> <td>L2 norm</td><td>356.9</td> </tr> <tr> <td>Mean</td><td>1.626</td> <td>Range</td><td>0.5204</td> <td>Mean Abs. Dev.</td><td>0.03219</td> <td>Max norm</td><td>1.652</td> </tr> </table>	Mean	1.595	Maximum	1.652	Standard dev.	0.05353	L1 norm	7.976e+04	Median	1.611	Minimum	1.132	Median Abs. Dev.	0.0146	L2 norm	356.9	Mean	1.626	Range	0.5204	Mean Abs. Dev.	0.03219	Max norm	1.652
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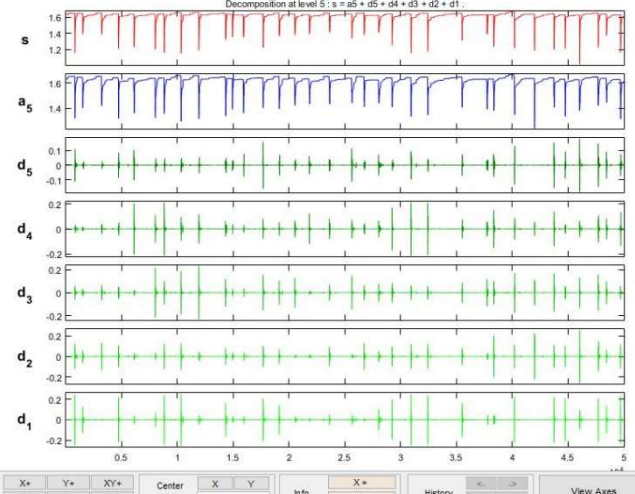
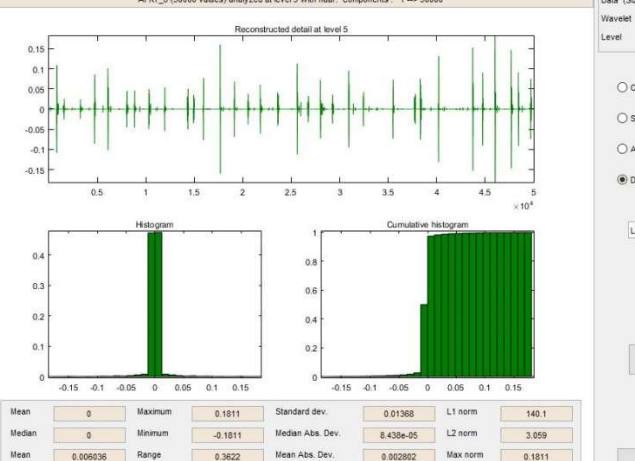
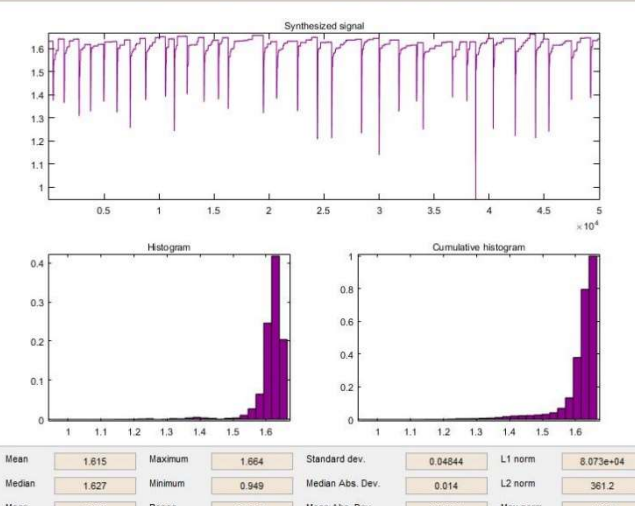
S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																																										
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29	210	1	ASL	Statistics Base Signal	<table border="1"> <thead> <tr> <th colspan="6">ASL3_6 (50000 values) analyzed at level 5 with haar. Components : 1 -> 50000</th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03132</td> <td>Standard dev.</td> <td>0.01693</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03132</td> <td>Median Abs. Dev.</td> <td>0.01385</td> </tr> <tr> <td>Mean</td> <td>-0.065219</td> <td>Range</td> <td>0.06263</td> <td>Mean Abs. Dev.</td> <td>0.01448</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>L1 norm</td> <td>723.1</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>L2 norm</td> <td>3.787</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Max norm</td> <td>0.03132</td> </tr> </tbody> </table>	ASL3_6 (50000 values) analyzed at level 5 with haar. Components : 1 -> 50000						Mean	0	Maximum	0.03132	Standard dev.	0.01693	Median	0	Minimum	-0.03132	Median Abs. Dev.	0.01385	Mean	-0.065219	Range	0.06263	Mean Abs. Dev.	0.01448					L1 norm	723.1					L2 norm	3.787					Max norm	0.03132
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30				Statistics Processed Signal	<table border="1"> <thead> <tr> <th colspan="6">ASL3_e_2 (50000 values) analyzed at level 5 with haar. Components : 1 -> 50000</th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>0.9853</td> <td>Maximum</td> <td>1.076</td> <td>Standard dev.</td> <td>0.03461</td> </tr> <tr> <td>Median</td> <td>0.9783</td> <td>Minimum</td> <td>0.938</td> <td>Median Abs. Dev.</td> <td>0.0261</td> </tr> <tr> <td>Mean</td> <td>0.9495</td> <td>Range</td> <td>0.1377</td> <td>Mean Abs. Dev.</td> <td>0.03018</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>L1 norm</td> <td>4.927e+04</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>L2 norm</td> <td>220.5</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Max norm</td> <td>1.076</td> </tr> </tbody> </table>	ASL3_e_2 (50000 values) analyzed at level 5 with haar. Components : 1 -> 50000						Mean	0.9853	Maximum	1.076	Standard dev.	0.03461	Median	0.9783	Minimum	0.938	Median Abs. Dev.	0.0261	Mean	0.9495	Range	0.1377	Mean Abs. Dev.	0.03018					L1 norm	4.927e+04					L2 norm	220.5					Max norm	1.076
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32	210	0.5	APK	Statistics Base Signal	 <table border="1" data-bbox="758 1422 1340 1478"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.2295</td> <td>Standard dev.</td><td>0.01875</td> <td>L1 norm</td><td>437.5</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.2295</td> <td>Median Abs. Dev.</td><td>8.437e-05</td> <td>L2 norm</td><td>5.929</td> </tr> <tr> <td>Mean</td><td>0.007649</td> <td>Range</td><td>0.459</td> <td>Mean Abs. Dev.</td><td>0.004375</td> <td>Max norm</td><td>0.2295</td> </tr> </table>	Mean	0	Maximum	0.2295	Standard dev.	0.01875	L1 norm	437.5	Median	0	Minimum	-0.2295	Median Abs. Dev.	8.437e-05	L2 norm	5.929	Mean	0.007649	Range	0.459	Mean Abs. Dev.	0.004375	Max norm	0.2295
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Median	0	Minimum	-0.2295	Median Abs. Dev.	8.437e-05	L2 norm	5.929																						
Mean	0.007649	Range	0.459	Mean Abs. Dev.	0.004375	Max norm	0.2295																						
33			APK	Statistics Processed Signal	 <table border="1" data-bbox="758 1960 1340 2016"> <tr> <td>Mean</td><td>1.626</td> <td>Maximum</td><td>1.677</td> <td>Standard dev.</td><td>0.06128</td> <td>L1 norm</td><td>1.626e+05</td> </tr> <tr> <td>Median</td><td>1.643</td> <td>Minimum</td><td>0.9439</td> <td>Median Abs. Dev.</td><td>0.014</td> <td>L2 norm</td><td>514.5</td> </tr> <tr> <td>Mean</td><td>1.64</td> <td>Range</td><td>0.7326</td> <td>Mean Abs. Dev.</td><td>0.03496</td> <td>Max norm</td><td>1.677</td> </tr> </table>	Mean	1.626	Maximum	1.677	Standard dev.	0.06128	L1 norm	1.626e+05	Median	1.643	Minimum	0.9439	Median Abs. Dev.	0.014	L2 norm	514.5	Mean	1.64	Range	0.7326	Mean Abs. Dev.	0.03496	Max norm	1.677
Mean	1.626	Maximum	1.677	Standard dev.	0.06128	L1 norm	1.626e+05																						
Median	1.643	Minimum	0.9439	Median Abs. Dev.	0.014	L2 norm	514.5																						
Mean	1.64	Range	0.7326	Mean Abs. Dev.	0.03496	Max norm	1.677																						

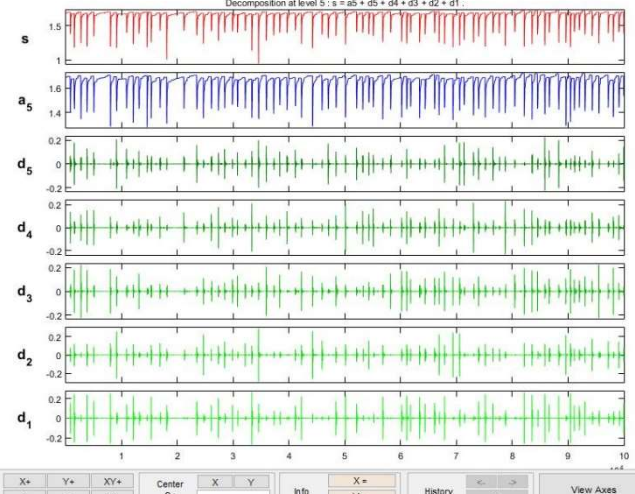
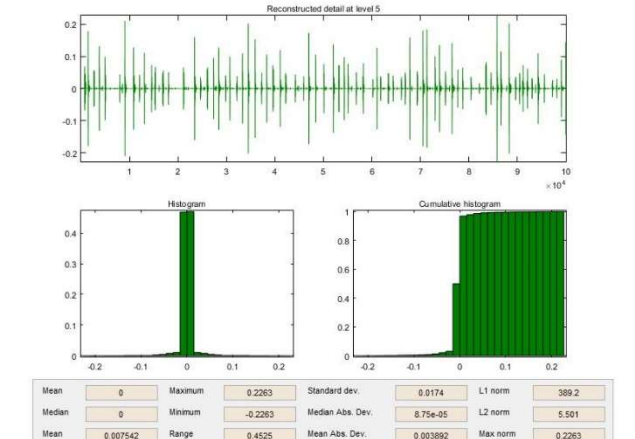
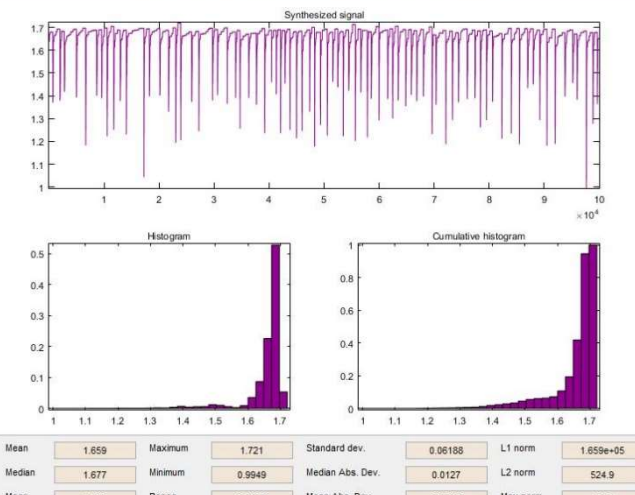
S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
34				Wavelets																									
35	210	0.5	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03259</td> <td>Standard dev.</td> <td>0.01717</td> <td>L1 norm</td> <td>1479</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03259</td> <td>Median Abs. Dev.</td> <td>0.01477</td> <td>L2 norm</td> <td>5.431</td> </tr> <tr> <td>Mean</td> <td>-0.005432</td> <td>Range</td> <td>0.06518</td> <td>Mean Abs. Dev.</td> <td>0.01479</td> <td>Max norm</td> <td>0.03259</td> </tr> </table>	Mean	0	Maximum	0.03259	Standard dev.	0.01717	L1 norm	1479	Median	0	Minimum	-0.03259	Median Abs. Dev.	0.01477	L2 norm	5.431	Mean	-0.005432	Range	0.06518	Mean Abs. Dev.	0.01479	Max norm	0.03259
Mean	0	Maximum	0.03259	Standard dev.	0.01717	L1 norm	1479																						
Median	0	Minimum	-0.03259	Median Abs. Dev.	0.01477	L2 norm	5.431																						
Mean	-0.005432	Range	0.06518	Mean Abs. Dev.	0.01479	Max norm	0.03259																						
36				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>0.9878</td> <td>Maximum</td> <td>1.097</td> <td>Standard dev.</td> <td>0.0363</td> <td>L1 norm</td> <td>9.878e+04</td> </tr> <tr> <td>Median</td> <td>0.9782</td> <td>Minimum</td> <td>0.9387</td> <td>Median Abs. Dev.</td> <td>0.0268</td> <td>L2 norm</td> <td>312.6</td> </tr> <tr> <td>Mean</td> <td>0.9466</td> <td>Range</td> <td>0.1586</td> <td>Mean Abs. Dev.</td> <td>0.03154</td> <td>Max norm</td> <td>1.097</td> </tr> </table>	Mean	0.9878	Maximum	1.097	Standard dev.	0.0363	L1 norm	9.878e+04	Median	0.9782	Minimum	0.9387	Median Abs. Dev.	0.0268	L2 norm	312.6	Mean	0.9466	Range	0.1586	Mean Abs. Dev.	0.03154	Max norm	1.097
Mean	0.9878	Maximum	1.097	Standard dev.	0.0363	L1 norm	9.878e+04																						
Median	0.9782	Minimum	0.9387	Median Abs. Dev.	0.0268	L2 norm	312.6																						
Mean	0.9466	Range	0.1586	Mean Abs. Dev.	0.03154	Max norm	1.097																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
37				Wavelets	<p>Decomposition at level 5: $s = a_5 + d_5 + d_4 + d_3 + d_2 + d_1$.</p>																								
38	420	2	APK	Statistics Base Signal	<p>APK7_1 (25000 values) analyzed at level 5 with haar. Components: 1 → 25000</p> <table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.2438</td> <td>Standard dev.</td><td>0.01472</td> <td>L1 norm</td><td>61.39</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.2438</td> <td>Median Abs. Dev.</td><td>8.125e-05</td> <td>L2 norm</td><td>2.329</td> </tr> <tr> <td>Mean</td><td>0.008126</td> <td>Range</td><td>0.4875</td> <td>Mean Abs. Dev.</td><td>0.002455</td> <td>Max norm</td><td>0.2438</td> </tr> </table>	Mean	0	Maximum	0.2438	Standard dev.	0.01472	L1 norm	61.39	Median	0	Minimum	-0.2438	Median Abs. Dev.	8.125e-05	L2 norm	2.329	Mean	0.008126	Range	0.4875	Mean Abs. Dev.	0.002455	Max norm	0.2438
Mean	0	Maximum	0.2438	Standard dev.	0.01472	L1 norm	61.39																						
Median	0	Minimum	-0.2438	Median Abs. Dev.	8.125e-05	L2 norm	2.329																						
Mean	0.008126	Range	0.4875	Mean Abs. Dev.	0.002455	Max norm	0.2438																						
39			APK	Statistics Processed Signal	<p>APK7_1,2 (25000 values) analyzed at level 5 with haar. Components: 1 → 25000</p> <table border="1"> <tr> <td>Mean</td><td>1.593</td> <td>Maximum</td><td>1.633</td> <td>Standard dev.</td><td>0.04909</td> <td>L1 norm</td><td>3.984e+04</td> </tr> <tr> <td>Median</td><td>1.605</td> <td>Minimum</td><td>1.167</td> <td>Median Abs. Dev.</td><td>0.0057</td> <td>L2 norm</td><td>252.1</td> </tr> <tr> <td>Mean</td><td>1.609</td> <td>Range</td><td>0.4657</td> <td>Mean Abs. Dev.</td><td>0.02301</td> <td>Max norm</td><td>1.633</td> </tr> </table>	Mean	1.593	Maximum	1.633	Standard dev.	0.04909	L1 norm	3.984e+04	Median	1.605	Minimum	1.167	Median Abs. Dev.	0.0057	L2 norm	252.1	Mean	1.609	Range	0.4657	Mean Abs. Dev.	0.02301	Max norm	1.633
Mean	1.593	Maximum	1.633	Standard dev.	0.04909	L1 norm	3.984e+04																						
Median	1.605	Minimum	1.167	Median Abs. Dev.	0.0057	L2 norm	252.1																						
Mean	1.609	Range	0.4657	Mean Abs. Dev.	0.02301	Max norm	1.633																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
40				Wavelets																									
41	420	2	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.04021</td> <td>Standard dev.</td> <td>0.02134</td> <td>L1 norm</td> <td>477.5</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.04021</td> <td>Median Abs. Dev.</td> <td>0.01892</td> <td>L2 norm</td> <td>3.374</td> </tr> <tr> <td>Mean</td> <td>-0.01743</td> <td>Range</td> <td>0.08043</td> <td>Mean Abs. Dev.</td> <td>0.0191</td> <td>Max norm</td> <td>0.04021</td> </tr> </table>	Mean	0	Maximum	0.04021	Standard dev.	0.02134	L1 norm	477.5	Median	0	Minimum	-0.04021	Median Abs. Dev.	0.01892	L2 norm	3.374	Mean	-0.01743	Range	0.08043	Mean Abs. Dev.	0.0191	Max norm	0.04021
Mean	0	Maximum	0.04021	Standard dev.	0.02134	L1 norm	477.5																						
Median	0	Minimum	-0.04021	Median Abs. Dev.	0.01892	L2 norm	3.374																						
Mean	-0.01743	Range	0.08043	Mean Abs. Dev.	0.0191	Max norm	0.04021																						
42				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>1.02</td> <td>Maximum</td> <td>1.132</td> <td>Standard dev.</td> <td>0.04604</td> <td>L1 norm</td> <td>2.551e+04</td> </tr> <tr> <td>Median</td> <td>1.018</td> <td>Minimum</td> <td>0.9521</td> <td>Median Abs. Dev.</td> <td>0.0402</td> <td>L2 norm</td> <td>161.5</td> </tr> <tr> <td>Mean</td> <td>0.9611</td> <td>Range</td> <td>0.1803</td> <td>Mean Abs. Dev.</td> <td>0.0405</td> <td>Max norm</td> <td>1.132</td> </tr> </table>	Mean	1.02	Maximum	1.132	Standard dev.	0.04604	L1 norm	2.551e+04	Median	1.018	Minimum	0.9521	Median Abs. Dev.	0.0402	L2 norm	161.5	Mean	0.9611	Range	0.1803	Mean Abs. Dev.	0.0405	Max norm	1.132
Mean	1.02	Maximum	1.132	Standard dev.	0.04604	L1 norm	2.551e+04																						
Median	1.018	Minimum	0.9521	Median Abs. Dev.	0.0402	L2 norm	161.5																						
Mean	0.9611	Range	0.1803	Mean Abs. Dev.	0.0405	Max norm	1.132																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
43				Wavelets																									
44	420	1	APK	Statistics Base Signal	 <table border="1" data-bbox="726 1411 1364 1478"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.1811</td> <td>Standard dev.</td><td>0.01368</td> <td>L1 norm</td><td>140.1</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.1811</td> <td>Median Abs. Dev.</td><td>8.438e-05</td> <td>L2 norm</td><td>3.059</td> </tr> <tr> <td>Mean</td><td>0.008038</td> <td>Range</td><td>0.3622</td> <td>Mean Abs. Dev.</td><td>0.002802</td> <td>Max norm</td><td>0.1811</td> </tr> </table>	Mean	0	Maximum	0.1811	Standard dev.	0.01368	L1 norm	140.1	Median	0	Minimum	-0.1811	Median Abs. Dev.	8.438e-05	L2 norm	3.059	Mean	0.008038	Range	0.3622	Mean Abs. Dev.	0.002802	Max norm	0.1811
Mean	0	Maximum	0.1811	Standard dev.	0.01368	L1 norm	140.1																						
Median	0	Minimum	-0.1811	Median Abs. Dev.	8.438e-05	L2 norm	3.059																						
Mean	0.008038	Range	0.3622	Mean Abs. Dev.	0.002802	Max norm	0.1811																						
45				Statistics Processed Signal	 <table border="1" data-bbox="726 1948 1364 2016"> <tr> <td>Mean</td><td>1.615</td> <td>Maximum</td><td>1.664</td> <td>Standard dev.</td><td>0.04844</td> <td>L1 norm</td><td>8.073e+04</td> </tr> <tr> <td>Median</td><td>1.627</td> <td>Minimum</td><td>0.949</td> <td>Median Abs. Dev.</td><td>0.014</td> <td>L2 norm</td><td>361.2</td> </tr> <tr> <td>Mean</td><td>1.629</td> <td>Range</td><td>0.7154</td> <td>Mean Abs. Dev.</td><td>0.0261</td> <td>Max norm</td><td>1.664</td> </tr> </table>	Mean	1.615	Maximum	1.664	Standard dev.	0.04844	L1 norm	8.073e+04	Median	1.627	Minimum	0.949	Median Abs. Dev.	0.014	L2 norm	361.2	Mean	1.629	Range	0.7154	Mean Abs. Dev.	0.0261	Max norm	1.664
Mean	1.615	Maximum	1.664	Standard dev.	0.04844	L1 norm	8.073e+04																						
Median	1.627	Minimum	0.949	Median Abs. Dev.	0.014	L2 norm	361.2																						
Mean	1.629	Range	0.7154	Mean Abs. Dev.	0.0261	Max norm	1.664																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
46				Wavelets																									
47	420	1	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03767</td> <td>Standard dev.</td> <td>0.0211</td> <td>L1 norm</td> <td>922.6</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03767</td> <td>Median Abs. Dev.</td> <td>0.01845</td> <td>L2 norm</td> <td>4.717</td> </tr> <tr> <td>Mean</td> <td>-0.02888</td> <td>Range</td> <td>0.07534</td> <td>Mean Abs. Dev.</td> <td>0.01845</td> <td>Max norm</td> <td>0.03767</td> </tr> </table>	Mean	0	Maximum	0.03767	Standard dev.	0.0211	L1 norm	922.6	Median	0	Minimum	-0.03767	Median Abs. Dev.	0.01845	L2 norm	4.717	Mean	-0.02888	Range	0.07534	Mean Abs. Dev.	0.01845	Max norm	0.03767
Mean	0	Maximum	0.03767	Standard dev.	0.0211	L1 norm	922.6																						
Median	0	Minimum	-0.03767	Median Abs. Dev.	0.01845	L2 norm	4.717																						
Mean	-0.02888	Range	0.07534	Mean Abs. Dev.	0.01845	Max norm	0.03767																						
48				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>1.007</td> <td>Maximum</td> <td>1.12</td> <td>Standard dev.</td> <td>0.04336</td> <td>L1 norm</td> <td>5.036e+04</td> </tr> <tr> <td>Median</td> <td>0.9979</td> <td>Minimum</td> <td>0.947</td> <td>Median Abs. Dev.</td> <td>0.0351</td> <td>L2 norm</td> <td>225.4</td> </tr> <tr> <td>Mean</td> <td>0.9557</td> <td>Range</td> <td>0.1733</td> <td>Mean Abs. Dev.</td> <td>0.03791</td> <td>Max norm</td> <td>1.12</td> </tr> </table>	Mean	1.007	Maximum	1.12	Standard dev.	0.04336	L1 norm	5.036e+04	Median	0.9979	Minimum	0.947	Median Abs. Dev.	0.0351	L2 norm	225.4	Mean	0.9557	Range	0.1733	Mean Abs. Dev.	0.03791	Max norm	1.12
Mean	1.007	Maximum	1.12	Standard dev.	0.04336	L1 norm	5.036e+04																						
Median	0.9979	Minimum	0.947	Median Abs. Dev.	0.0351	L2 norm	225.4																						
Mean	0.9557	Range	0.1733	Mean Abs. Dev.	0.03791	Max norm	1.12																						

S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
49				Wavelets	 <p>Decomposition at level 5: $s = a_5 + d_5 + d_4 + d_3 + d_2 + d_1$.</p>																								
50	420	0.5	APK	Statistics Base Signal	 <p>APK3_3 (100000 values) analyzed at level 5 with haar. Components: 1 -> 100000</p> <table border="1"> <tr> <td>Mean</td><td>0</td> <td>Maximum</td><td>0.2263</td> <td>Standard dev.</td><td>0.0174</td> <td>L1 norm</td><td>389.2</td> </tr> <tr> <td>Median</td><td>0</td> <td>Minimum</td><td>-0.2283</td> <td>Median Abs. Dev.</td><td>8.75e-05</td> <td>L2 norm</td><td>5.501</td> </tr> <tr> <td>Mean Abs. Dev.</td><td>0.007542</td> <td>Range</td><td>0.4525</td> <td>Mean Abs. Dev.</td><td>0.003892</td> <td>Max norm</td><td>0.2263</td> </tr> </table>	Mean	0	Maximum	0.2263	Standard dev.	0.0174	L1 norm	389.2	Median	0	Minimum	-0.2283	Median Abs. Dev.	8.75e-05	L2 norm	5.501	Mean Abs. Dev.	0.007542	Range	0.4525	Mean Abs. Dev.	0.003892	Max norm	0.2263
Mean	0	Maximum	0.2263	Standard dev.	0.0174	L1 norm	389.2																						
Median	0	Minimum	-0.2283	Median Abs. Dev.	8.75e-05	L2 norm	5.501																						
Mean Abs. Dev.	0.007542	Range	0.4525	Mean Abs. Dev.	0.003892	Max norm	0.2263																						
51			APK	Statistics Processed Signal	 <p>APK3_2 (100000 values) analyzed at level 5 with haar. Components: 1 -> 100000</p> <table border="1"> <tr> <td>Mean</td><td>1.659</td> <td>Maximum</td><td>1.721</td> <td>Standard dev.</td><td>0.06188</td> <td>L1 norm</td><td>1.659e+05</td> </tr> <tr> <td>Median</td><td>1.677</td> <td>Minimum</td><td>0.9949</td> <td>Median Abs. Dev.</td><td>0.0127</td> <td>L2 norm</td><td>524.9</td> </tr> <tr> <td>Mean Abs. Dev.</td><td>1.685</td> <td>Range</td><td>0.7262</td> <td>Mean Abs. Dev.</td><td>0.03469</td> <td>Max norm</td><td>1.721</td> </tr> </table>	Mean	1.659	Maximum	1.721	Standard dev.	0.06188	L1 norm	1.659e+05	Median	1.677	Minimum	0.9949	Median Abs. Dev.	0.0127	L2 norm	524.9	Mean Abs. Dev.	1.685	Range	0.7262	Mean Abs. Dev.	0.03469	Max norm	1.721
Mean	1.659	Maximum	1.721	Standard dev.	0.06188	L1 norm	1.659e+05																						
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S. No.	Temperature (°C)	Scratch Speed (mm/sec)	Signal Type	Details	Results																								
52				Wavelets																									
53	420	0.5	ASL	Statistics Base Signal	<table border="1"> <tr> <td>Mean</td> <td>0</td> <td>Maximum</td> <td>0.03484</td> <td>Standard dev.</td> <td>0.02041</td> <td>L1 norm</td> <td>1815</td> </tr> <tr> <td>Median</td> <td>0</td> <td>Minimum</td> <td>-0.03484</td> <td>Median Abs. Dev.</td> <td>0.01946</td> <td>L2 norm</td> <td>6.455</td> </tr> <tr> <td>Mean</td> <td>-0.02671</td> <td>Range</td> <td>0.06968</td> <td>Mean Abs. Dev.</td> <td>0.01815</td> <td>Max norm</td> <td>0.03484</td> </tr> </table>	Mean	0	Maximum	0.03484	Standard dev.	0.02041	L1 norm	1815	Median	0	Minimum	-0.03484	Median Abs. Dev.	0.01946	L2 norm	6.455	Mean	-0.02671	Range	0.06968	Mean Abs. Dev.	0.01815	Max norm	0.03484
Mean	0	Maximum	0.03484	Standard dev.	0.02041	L1 norm	1815																						
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Mean	-0.02671	Range	0.06968	Mean Abs. Dev.	0.01815	Max norm	0.03484																						
54				Statistics Processed Signal	<table border="1"> <tr> <td>Mean</td> <td>1.029</td> <td>Maximum</td> <td>1.139</td> <td>Standard dev.</td> <td>0.04461</td> <td>L1 norm</td> <td>1.029e+05</td> </tr> <tr> <td>Median</td> <td>1.021</td> <td>Minimum</td> <td>0.9629</td> <td>Median Abs. Dev.</td> <td>0.0376</td> <td>L2 norm</td> <td>325.6</td> </tr> <tr> <td>Mean</td> <td>0.9776</td> <td>Range</td> <td>0.1765</td> <td>Mean Abs. Dev.</td> <td>0.0393</td> <td>Max norm</td> <td>1.139</td> </tr> </table>	Mean	1.029	Maximum	1.139	Standard dev.	0.04461	L1 norm	1.029e+05	Median	1.021	Minimum	0.9629	Median Abs. Dev.	0.0376	L2 norm	325.6	Mean	0.9776	Range	0.1765	Mean Abs. Dev.	0.0393	Max norm	1.139
Mean	1.029	Maximum	1.139	Standard dev.	0.04461	L1 norm	1.029e+05																						
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Mean	0.9776	Range	0.1765	Mean Abs. Dev.	0.0393	Max norm	1.139																						

Annexure- IV: Detailed report of stress analysis on heat plate

Stress Analysis Report 200N (Note: This report is generated by Autodesk Inventor)



Analyzed File:	Scratch Attachment for stress.iam
Autodesk Inventor Version:	2019.4 (Build 234330000, 330)
Creation Date:	11-07-2019, 16:12
Study Author:	Jitendra
Summary:	

Project Info (iProperties)

Summary

Author	JITENDRA
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Project

Part Number	Scratch Attachment for stress
Designer	JITENDRA
Cost	₹ 0.00
Date Created	24-04-2018

☐ Status

Design Status	WorkInProgress
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☐ Physical

Mass	0.0607182 kg
Area	15738.5 mm ²
Volume	7589.78 mm ³
Center of Gravity	x=-16.7353 mm y=33.2558 mm z=0.00723153 mm

Note: Physical values could be different from Physical values used by FEA reported below.

☐ Static Analysis:1

General objective and settings:

Design Objective	Single Point
Study Type	Static Analysis
Last Modification Date	11-07-2019, 15:57
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

Mesh settings:

Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.2
Grading Factor	1.5
Max. Turn Angle	60 deg
Create Curved Mesh Elements	No
Use part based measure for Assembly mesh	Yes

Material(s)

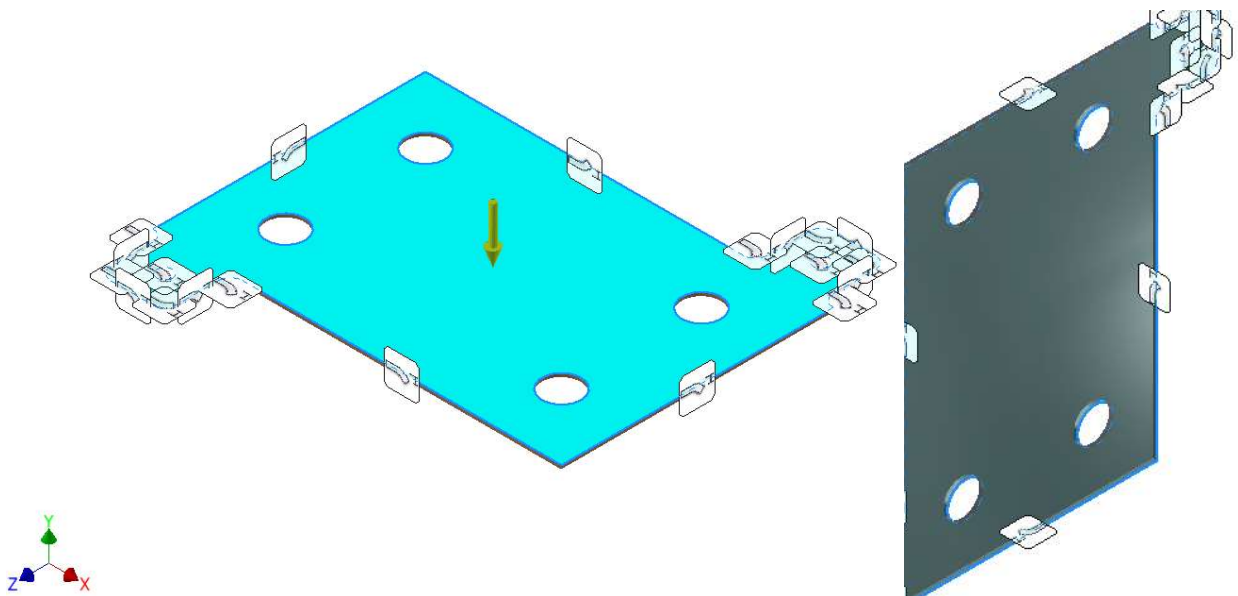
Name	Stainless Steel, Austenitic	
General	Mass Density	8 g/cm ³
	Yield Strength	228 MPa
	Ultimate Tensile Strength	540 MPa
Stress	Young's Modulus	190.3 GPa
	Poisson's Ratio	0.305 ul
	Shear Modulus	72.9119 GPa
Part Name(s)	Heat Plate	

▣ **Operating conditions**

▣ **Force:1**

Load Type	Force
Magnitude	44.962 lbf
Vector X	0.000 lbf
Vector Y	-44.962 lbf
Vector Z	0.000 lbf

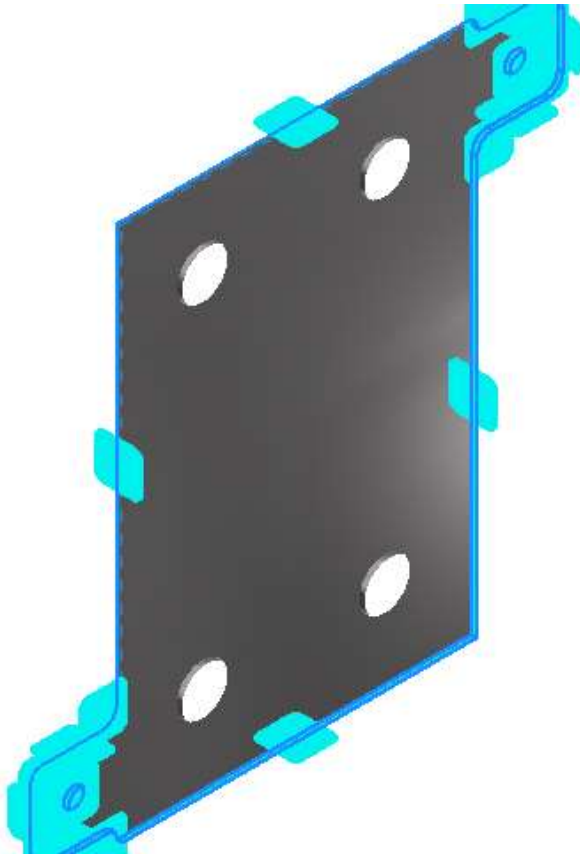
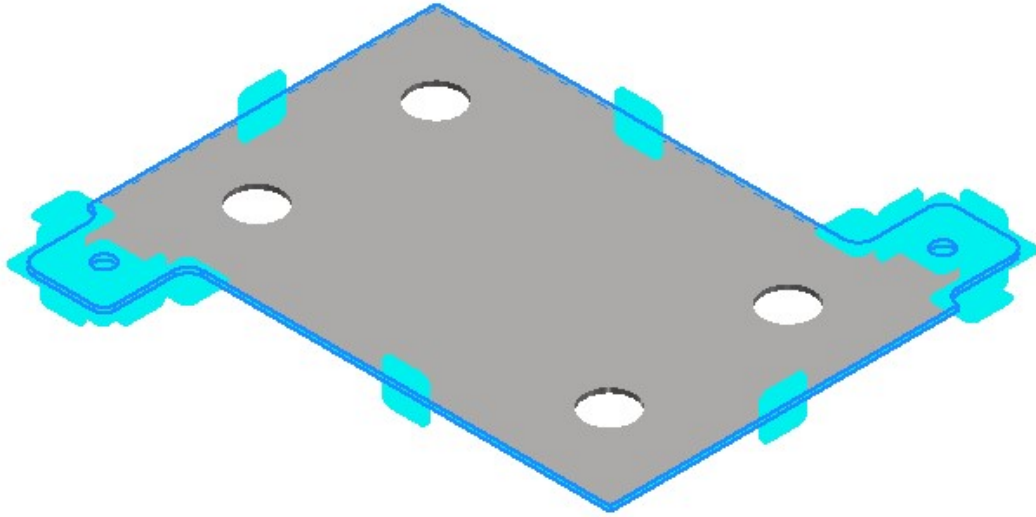
▣ **Selected Face(s)**



▣ **Fixed Constraint:1**

Constraint Type	Fixed Constraint
-----------------	------------------

☐ Selected Face(s)



☐ **Results**

☐ **Reaction Force and Moment on Constraints**

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	200 N	0 N	0 N m	0 N m
		200 N		0 N m
		0 N		0 N m

☐ **Result Summary**

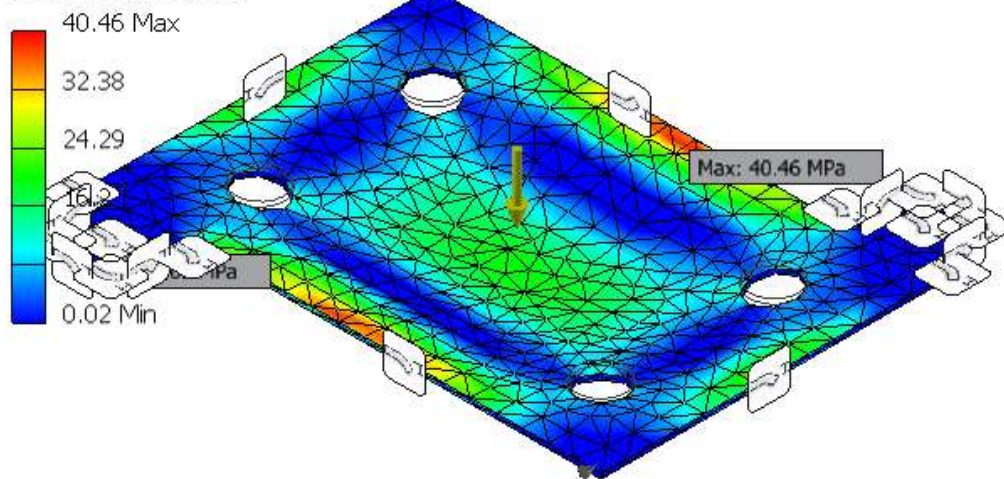
Name	Minimum	Maximum
Volume	7589.78 mm ³	
Mass	0.0607182 kg	
Von Mises Stress	0.021309 MPa	40.4649 MPa
1st Principal Stress	-24.8808 MPa	57.2949 MPa
3rd Principal Stress	-57.7463 MPa	24.8806 MPa
Displacement	0 mm	0.0761672 mm
Safety Factor	5.63451 ul	15 ul
Stress XX	-39.9286 MPa	39.2448 MPa
Stress XY	-2.69974 MPa	2.75202 MPa

Stress XZ	-8.7888 MPa	8.75648 MPa
Stress YY	-25.1434 MPa	25.0636 MPa
Stress YZ	-4.69029 MPa	6.63851 MPa
Stress ZZ	-57.294 MPa	57.112 MPa
X Displacement	-0.00121748 mm	0.00121854 mm
Y Displacement	-0.0761672 mm	0.00000556027 mm
Z Displacement	-0.0017024 mm	0.00170175 mm
Equivalent Strain	0.000000132963 ul	0.000192566 ul
1st Principal Strain	-0.0000000166644 ul	0.000221853 ul
3rd Principal Strain	-0.000223577 ul	0.0000000466191 ul
Strain XX	-0.000153953 ul	0.000154316 ul
Strain XY	-0.0000185137 ul	0.0000188723 ul
Strain XZ	-0.00006027 ul	0.0000600484 ul
Strain YY	-0.0000992487 ul	0.000100517 ul
Strain YZ	-0.0000321641 ul	0.0000455242 ul
Strain ZZ	-0.000220721 ul	0.000221782 ul

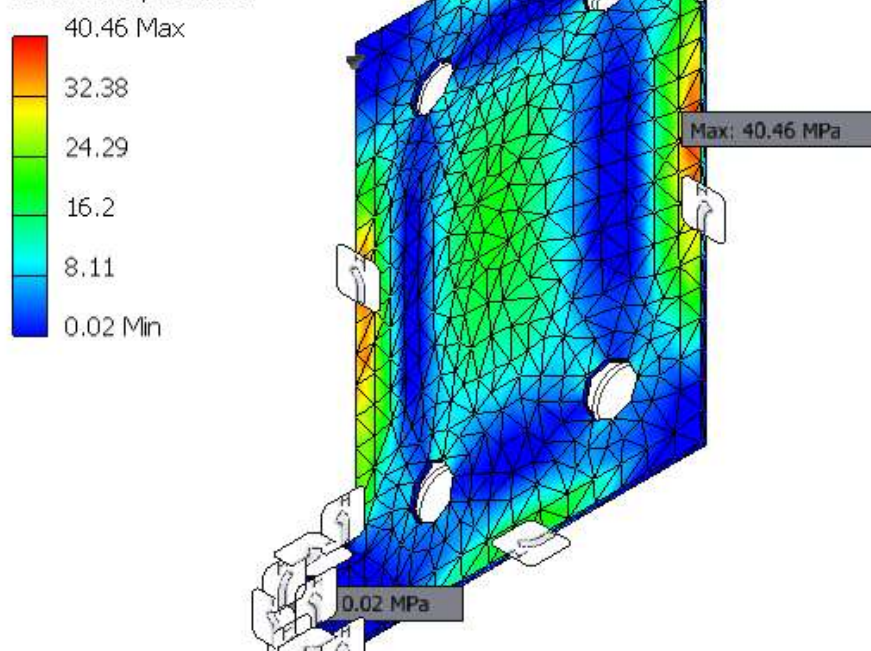
Figures

Von Mises Stress

Nodes:7082
Elements:3675
Type: Von Mises Stress
Unit: MPa
11-07-2019, 16:12:45

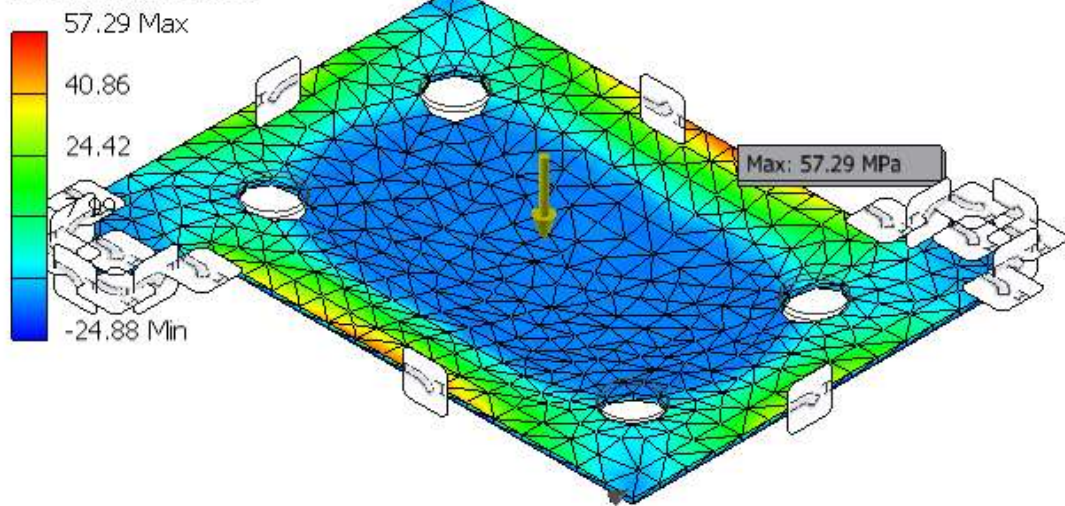


Nodes:7082
Elements:3675
Type: Von Mises Stress
Unit: MPa
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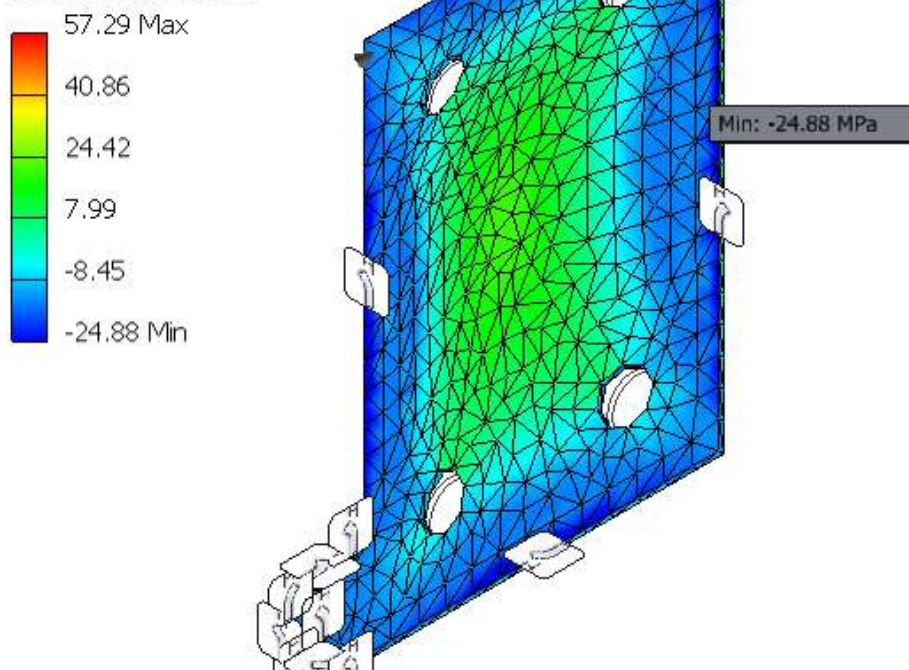


1st Principal Stress

Nodes:7082
Elements:3675
Type: 1st Principal Stress
Unit: MPa
11-07-2019, 16:12:46

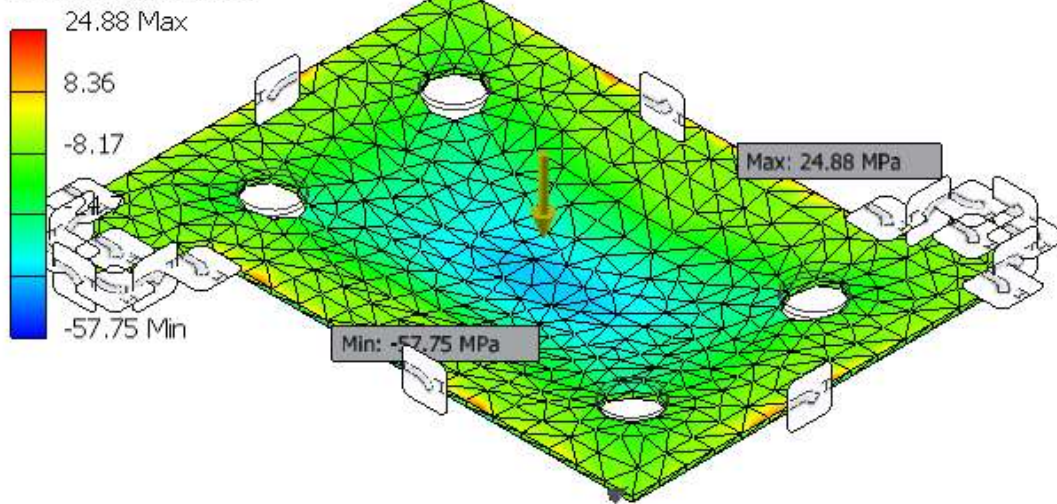


Nodes:7082
Elements:3675
Type: 1st Principal Stress
Unit: MPa
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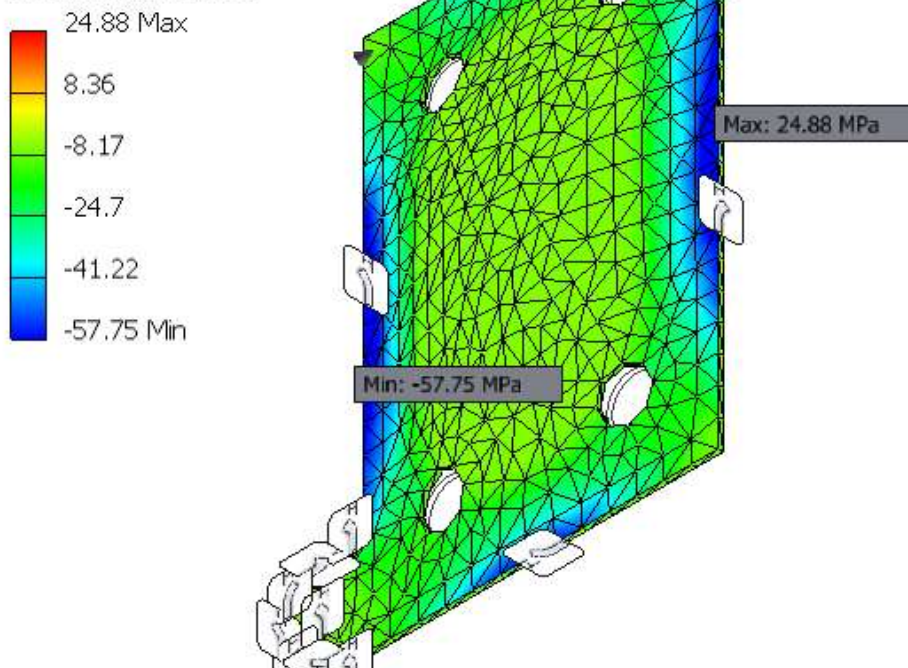


▣ 3rd Principal Stress

Nodes:7082
Elements:3675
Type: 3rd Principal Stress
Unit: MPa
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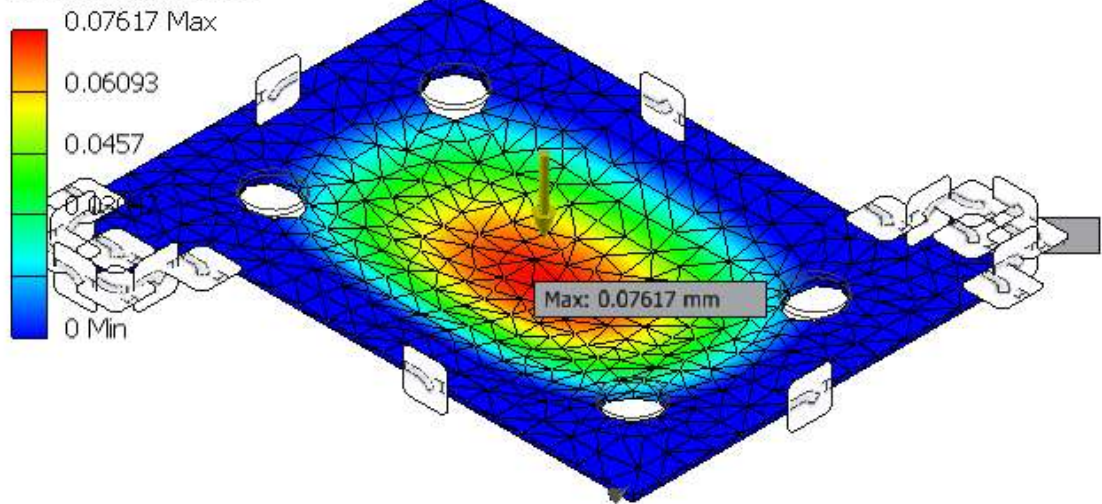


Nodes:7082
Elements:3675
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Unit: MPa
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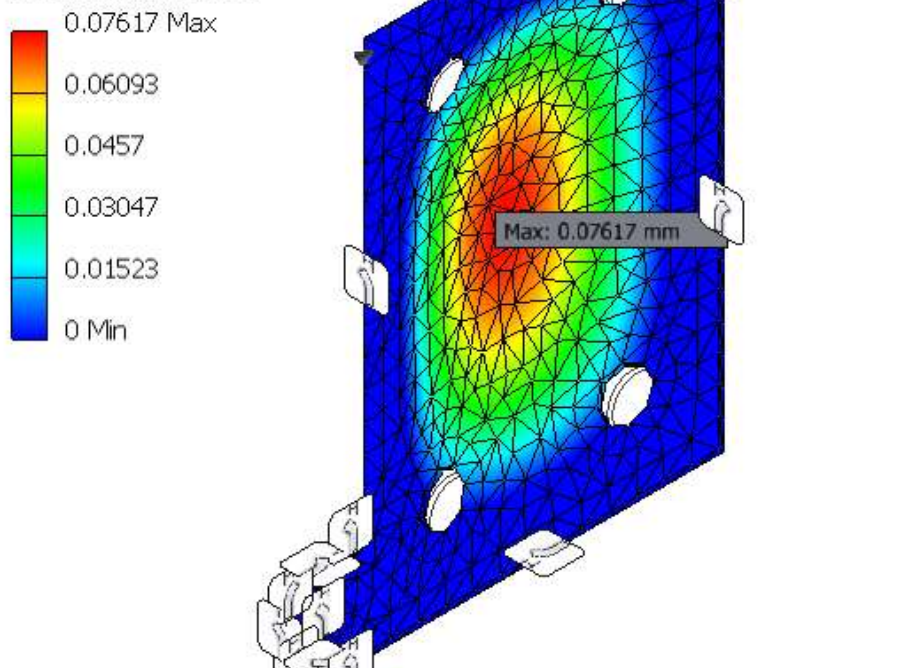


Displacement

Nodes:7082
Elements:3675
Type: Displacement
Unit: mm
11-07-2019, 16:12:49



Nodes:7082
Elements:3675
Type: Displacement
Unit: mm
11-07-2019, 16:12:49



☐ Safety Factor

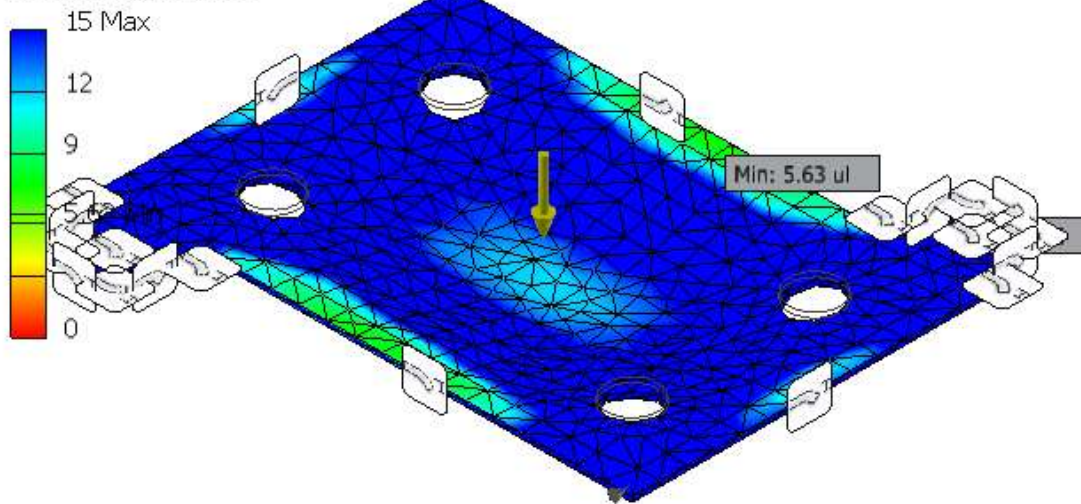
Nodes:7082

Elements:3675

Type: Safety Factor

Unit: ul

11-07-2019, 16:12:49



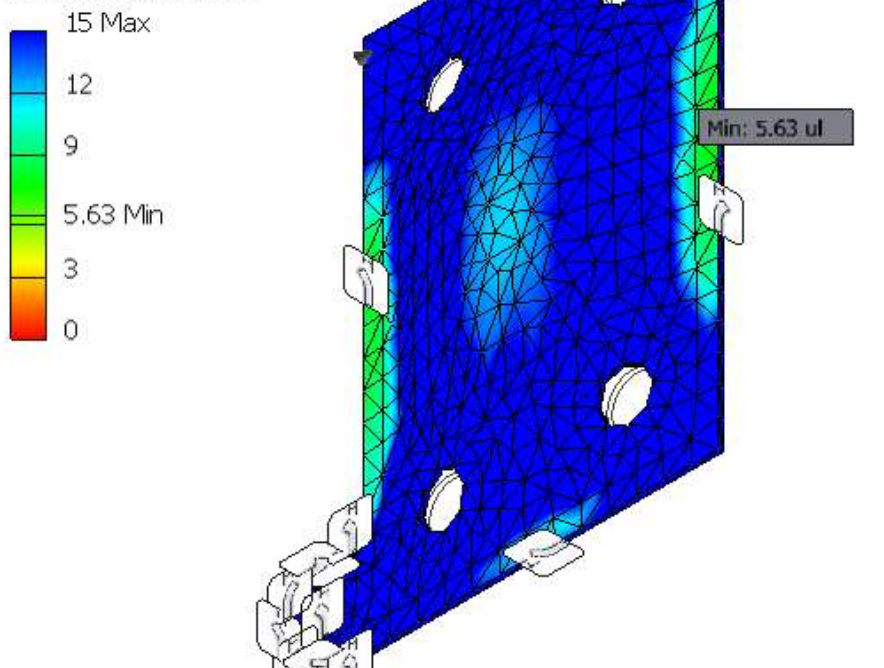
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Elements:3675

Type: Safety Factor

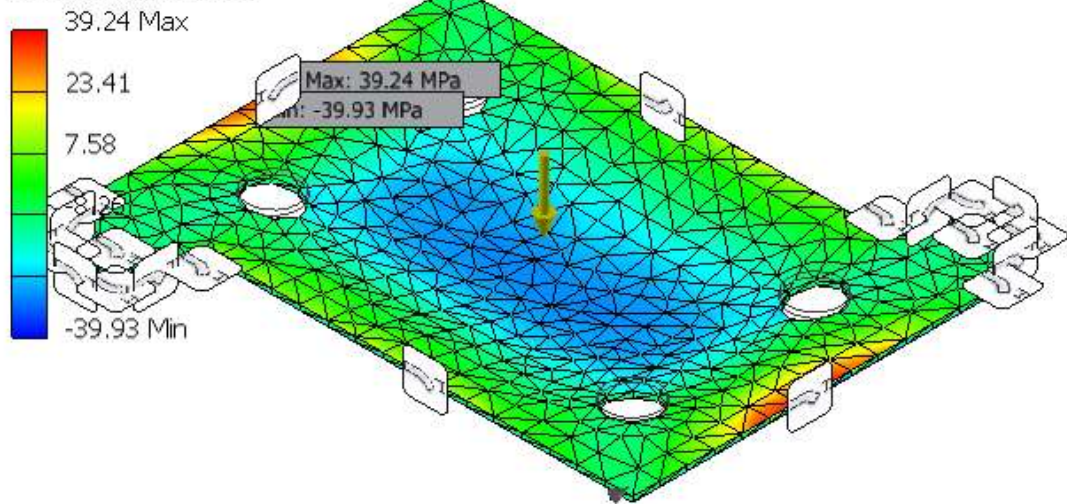
Unit: ul

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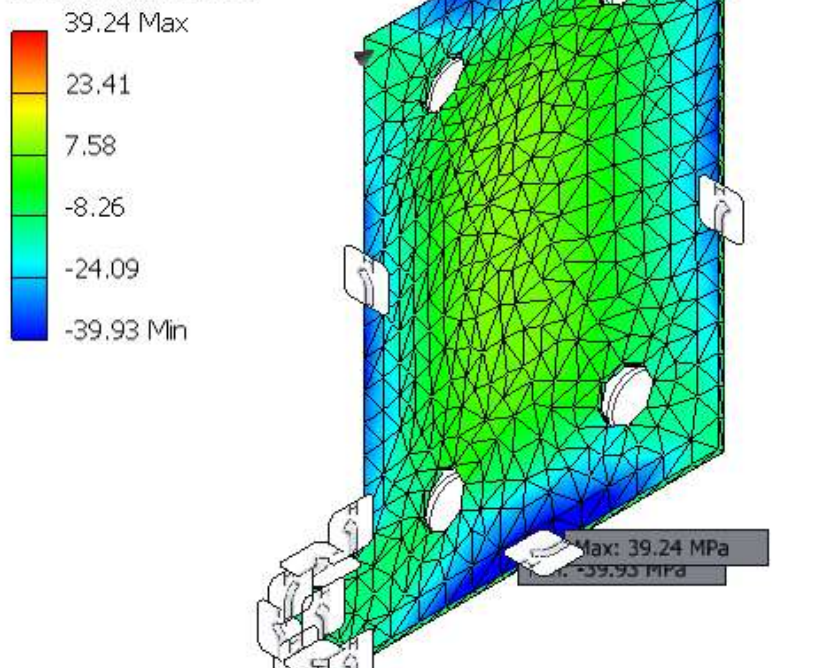


Stress XX

Nodes:7082
Elements:3675
Type: Stress XX
Unit: MPa
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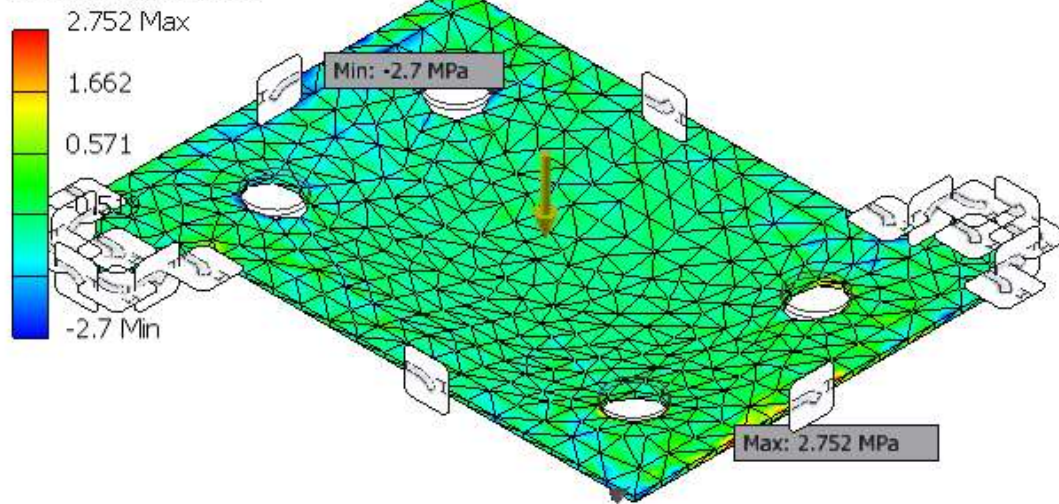


Nodes:7082
Elements:3675
Type: Stress XX
Unit: MPa
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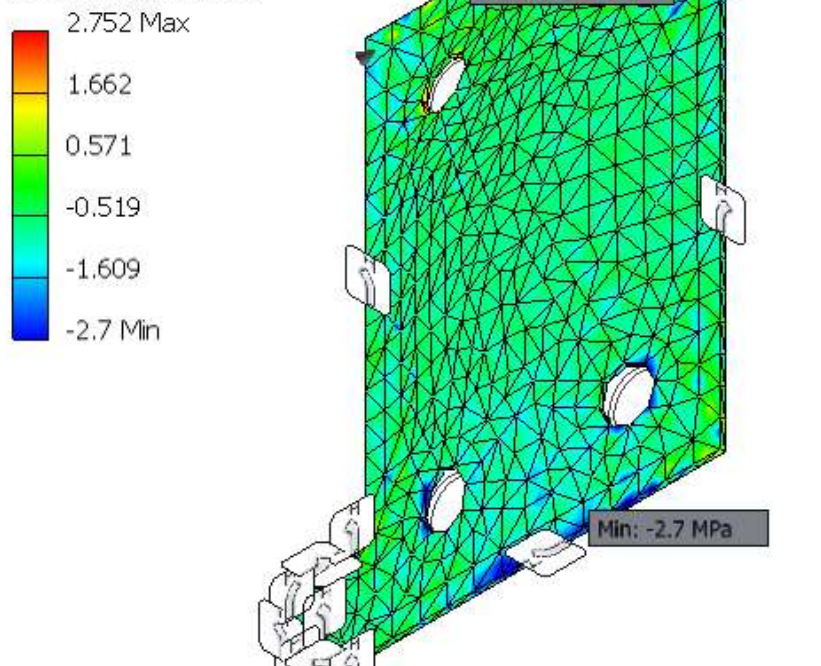


▣ Stress XY

Nodes:7082
Elements:3675
Type: Stress XY
Unit: MPa
11-07-2019, 16:12:47

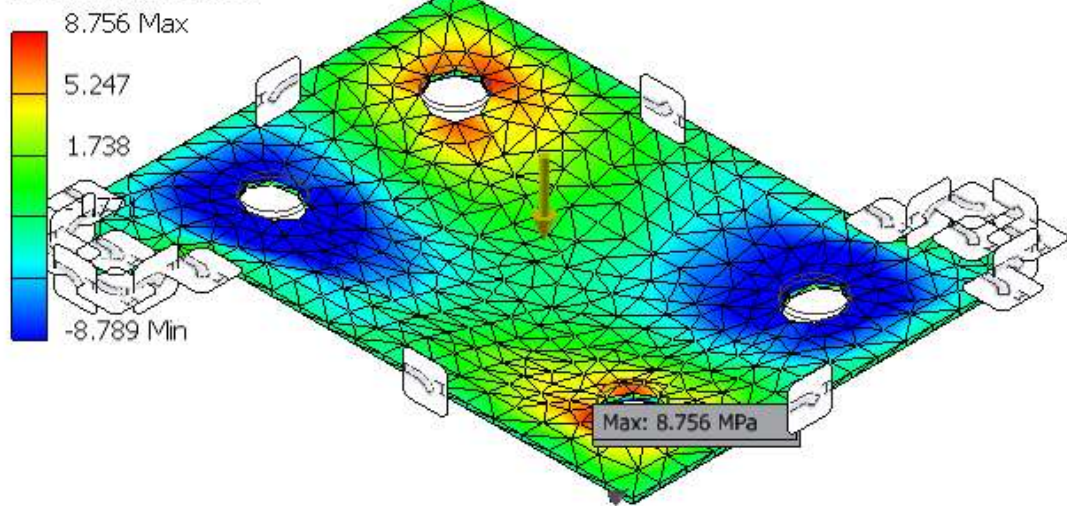


Nodes:7082
Elements:3675
Type: Stress XY
Unit: MPa
11-07-2019, 16:12:47

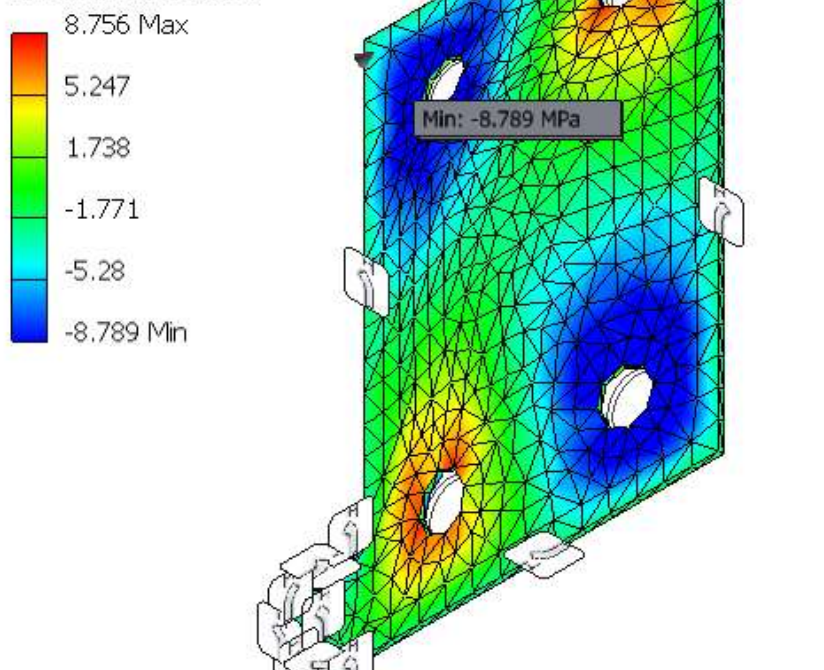


Stress XZ

Nodes:7082
Elements:3675
Type: Stress XZ
Unit: MPa
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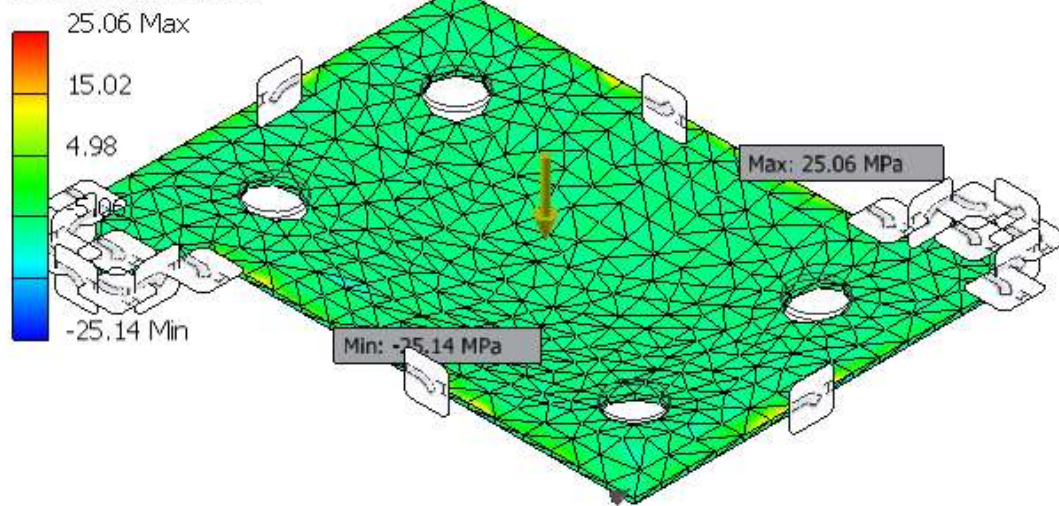


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Elements:3675
Type: Stress XZ
Unit: MPa
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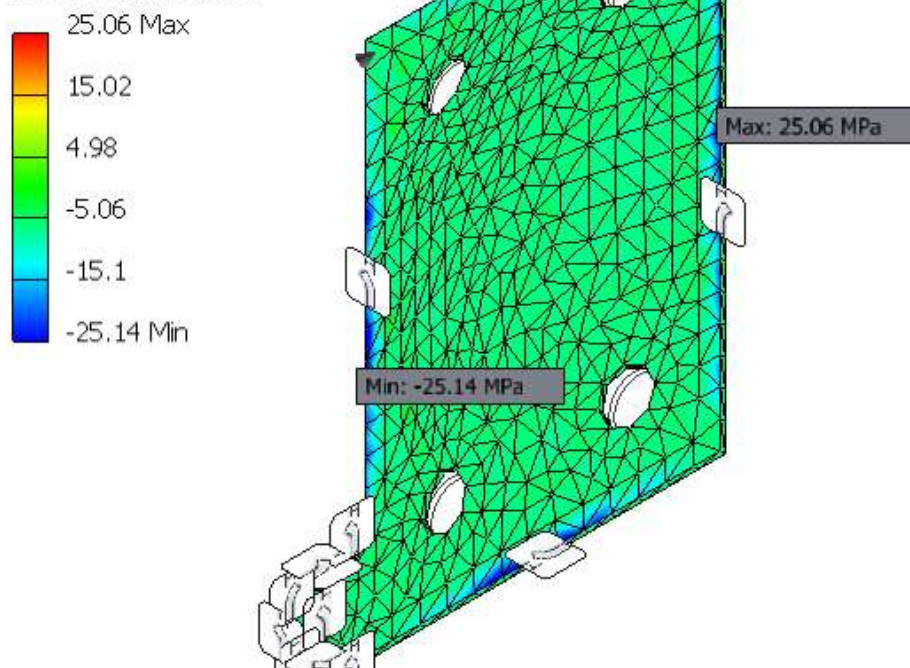


▣ Stress YY

Nodes:7082
Elements:3675
Type: Stress YY
Unit: MPa
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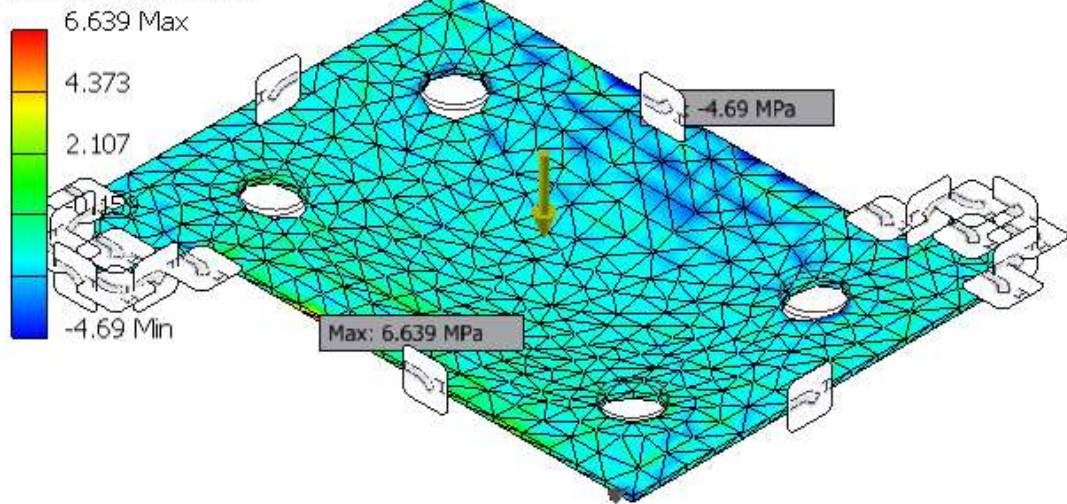


Nodes:7082
Elements:3675
Type: Stress YY
Unit: MPa
11-07-2019, 16:12:47

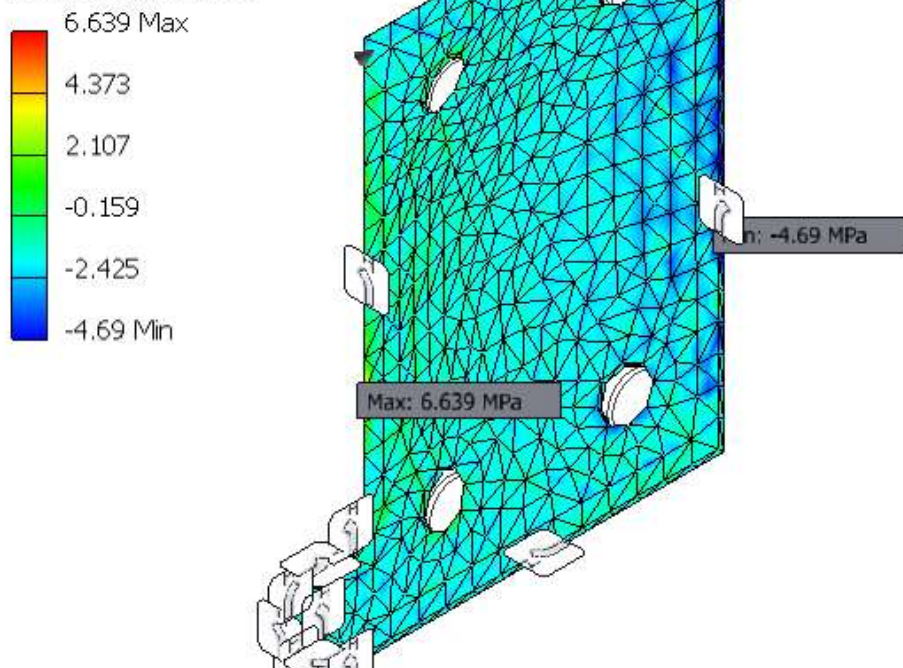


Stress YZ

Nodes:7082
Elements:3675
Type: Stress YZ
Unit: MPa
11-07-2019, 16:12:48

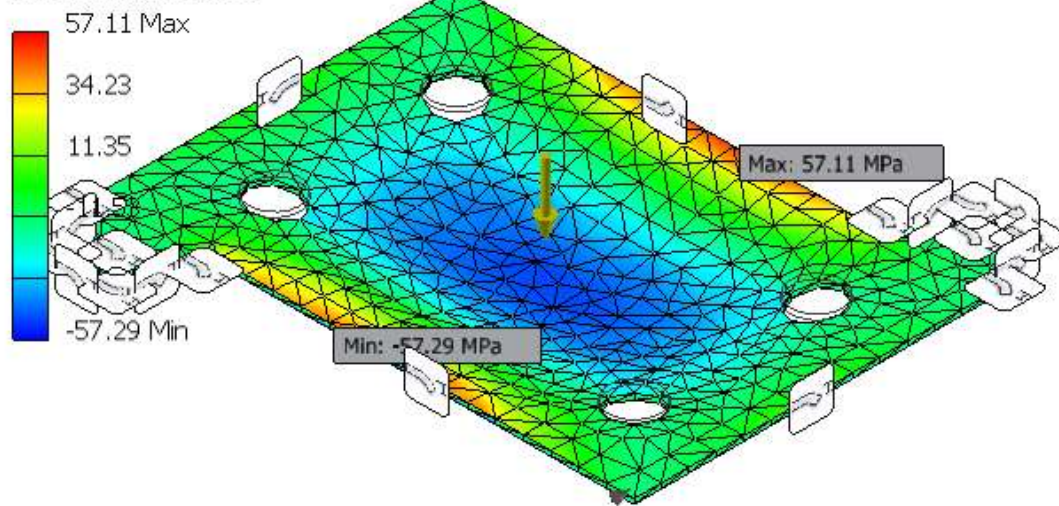


Nodes:7082
Elements:3675
Type: Stress YZ
Unit: MPa
11-07-2019, 16:12:48

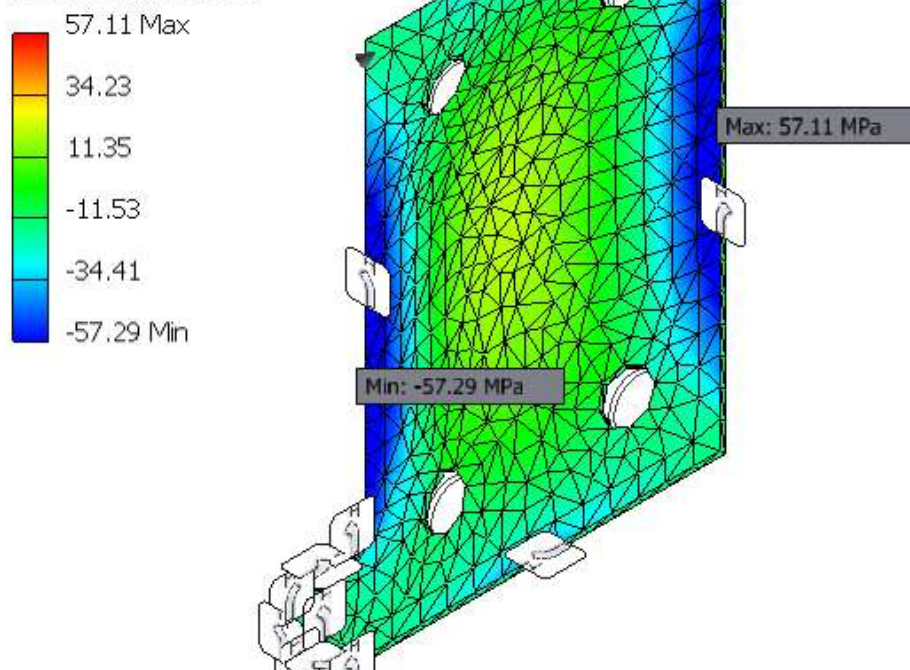


▣ Stress ZZ

Nodes:7082
Elements:3675
Type: Stress ZZ
Unit: MPa
11-07-2019, 16:12:48

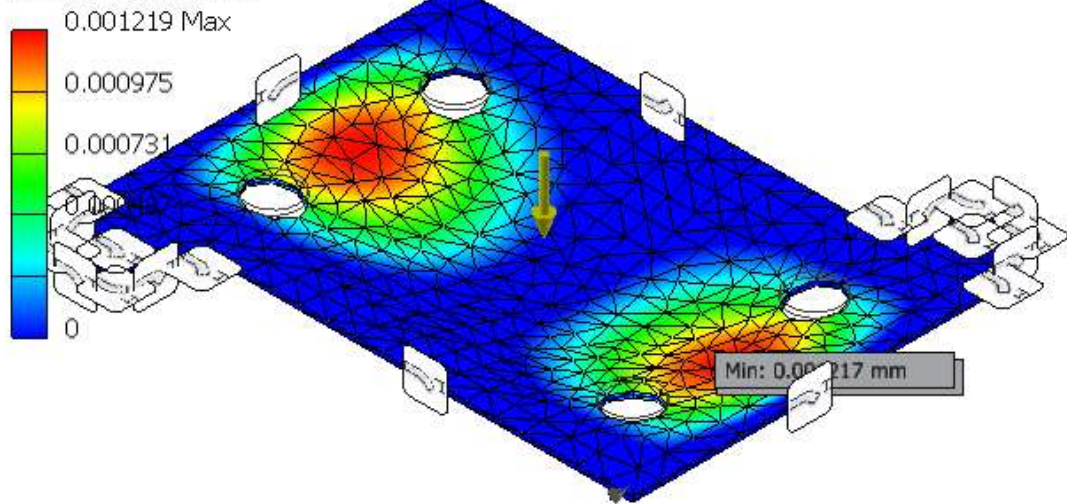


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Elements:3675
Type: Stress ZZ
Unit: MPa
11-07-2019, 16:12:48

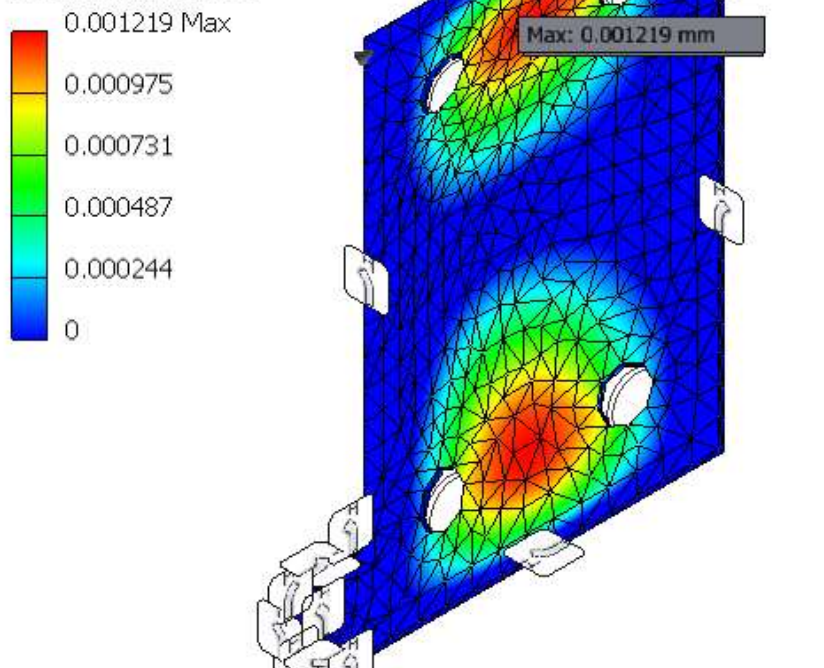


☐ X Displacement

Nodes:7082
Elements:3675
Type: X Displacement
Unit: mm
11-07-2019, 16:12:49

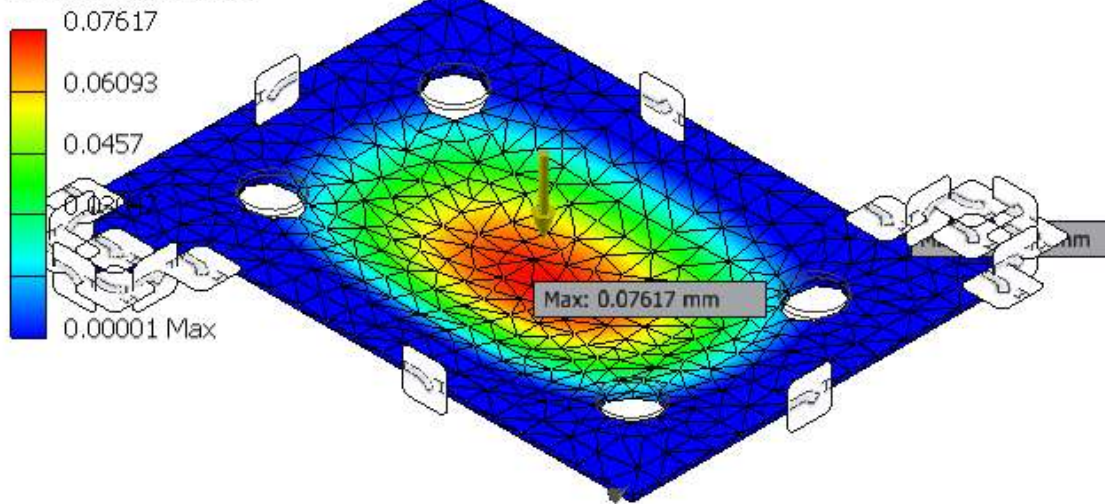


Nodes:7082
Elements:3675
Type: X Displacement
Unit: mm
11-07-2019, 16:12:49

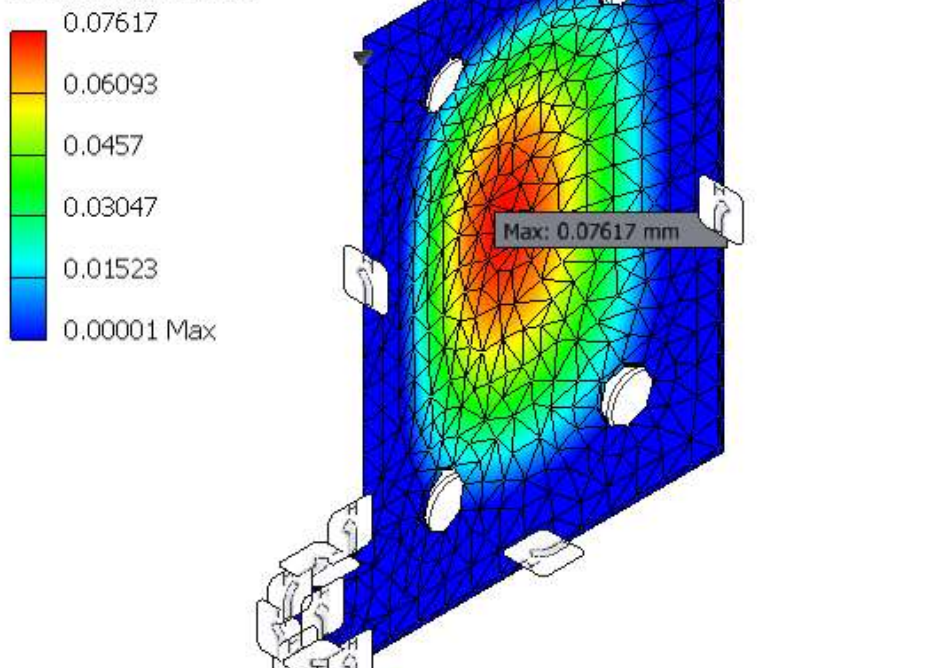


▣ Y Displacement

Nodes:7082
Elements:3675
Type: Y Displacement
Unit: mm
11-07-2019, 16:12:50

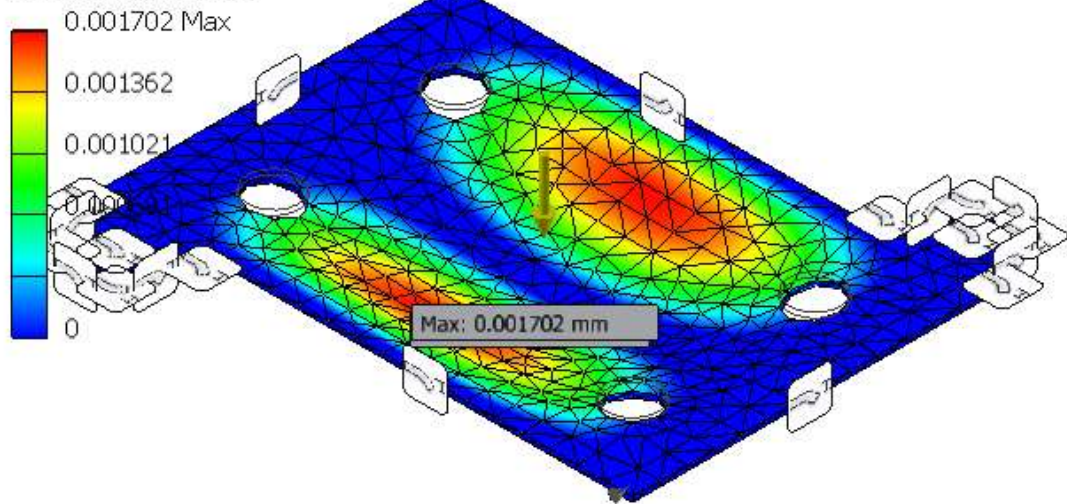


Nodes:7082
Elements:3675
Type: Y Displacement
Unit: mm
11-07-2019, 16:12:50

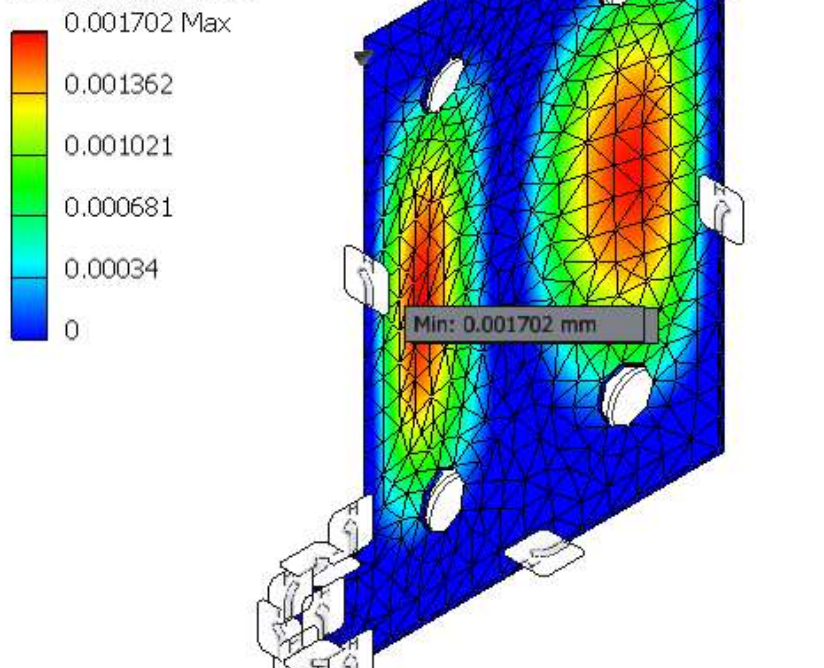


▣ Z Displacement

Nodes:7082
Elements:3675
Type: Z Displacement
Unit: mm
11-07-2019, 16:12:50

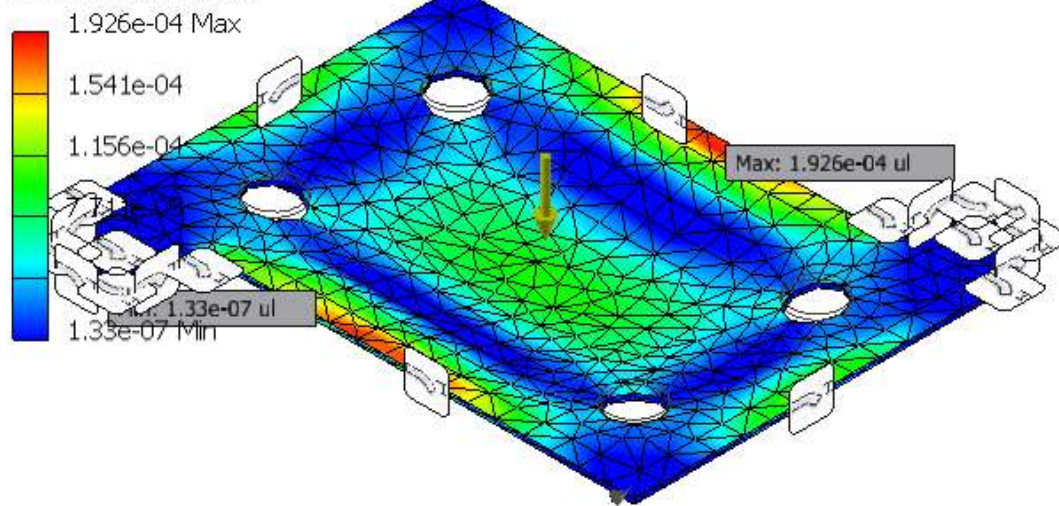


Nodes:7082
Elements:3675
Type: Z Displacement
Unit: mm
11-07-2019, 16:12:50

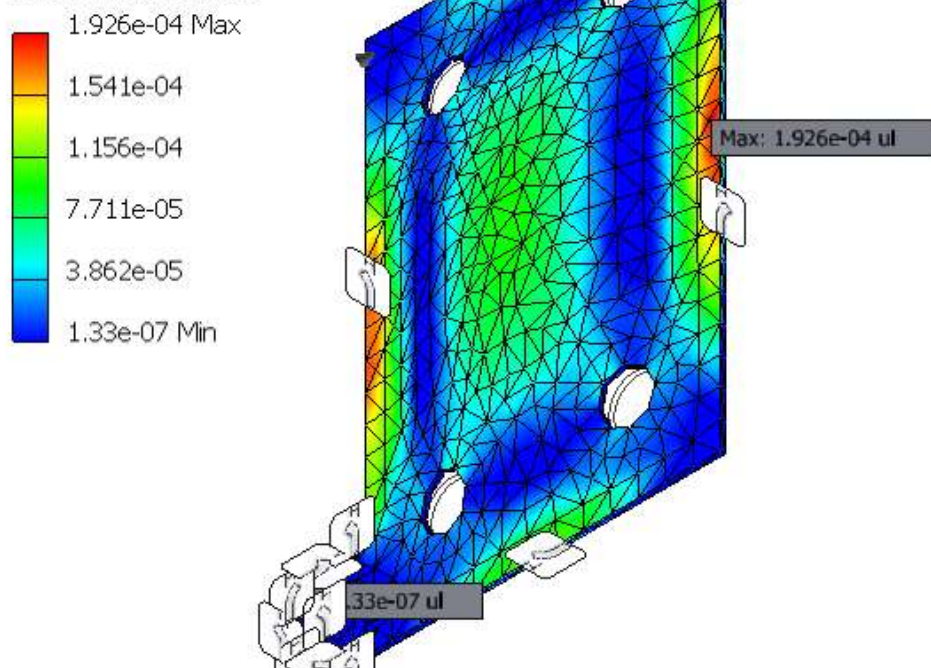


▣ Equivalent Strain

Nodes:7082
Elements:3675
Type: Equivalent Strain
Unit: ul
11-07-2019, 16:12:50

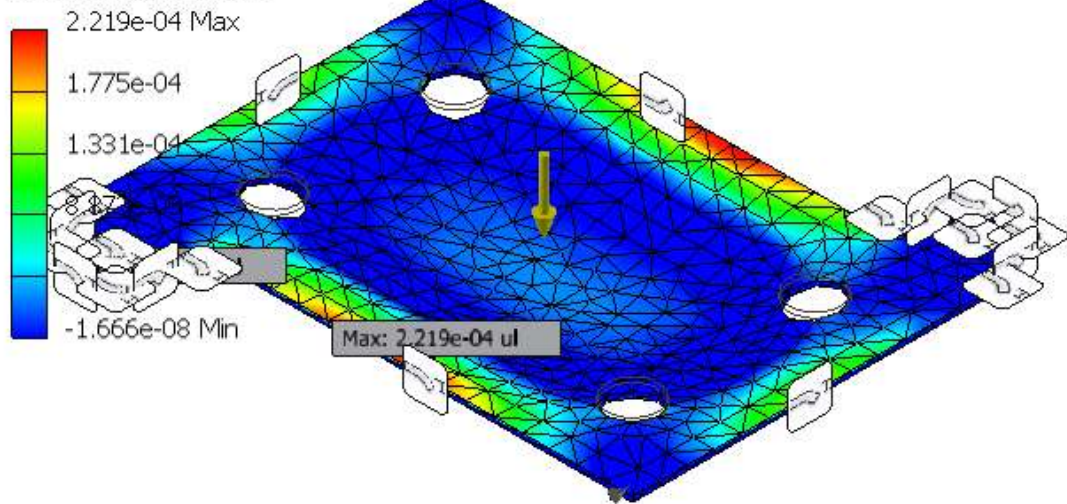


Nodes:7082
Elements:3675
Type: Equivalent Strain
Unit: ul
11-07-2019, 16:12:50

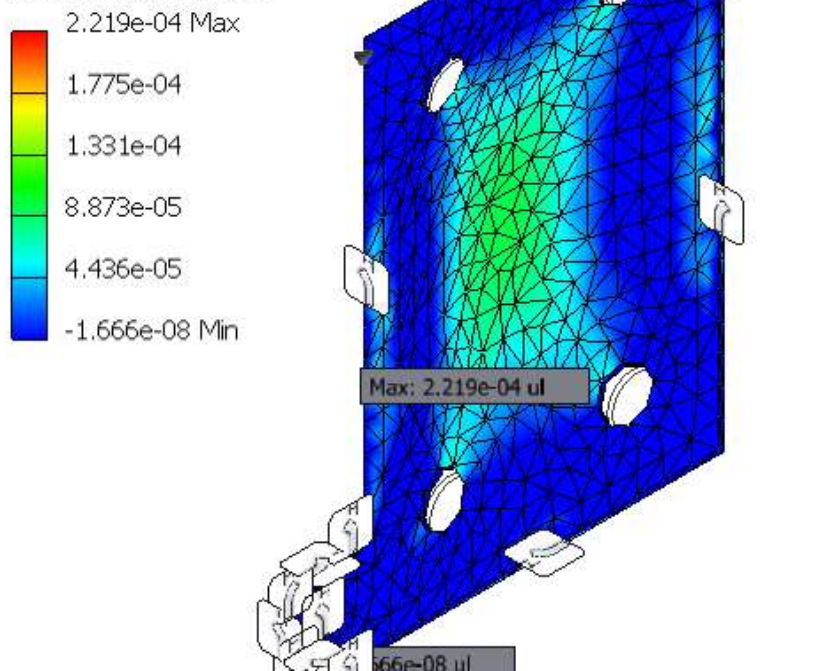


1st Principal Strain

Nodes:7082
Elements:3675
Type: 1st Principal Strain
Unit: ul
11-07-2019, 16:12:51

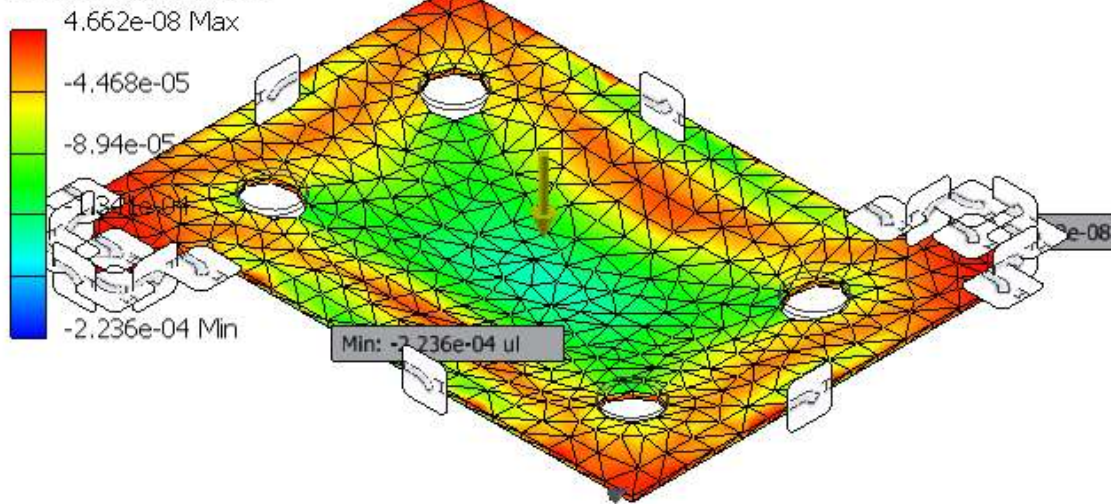


Nodes:7082
Elements:3675
Type: 1st Principal Strain
Unit: ul
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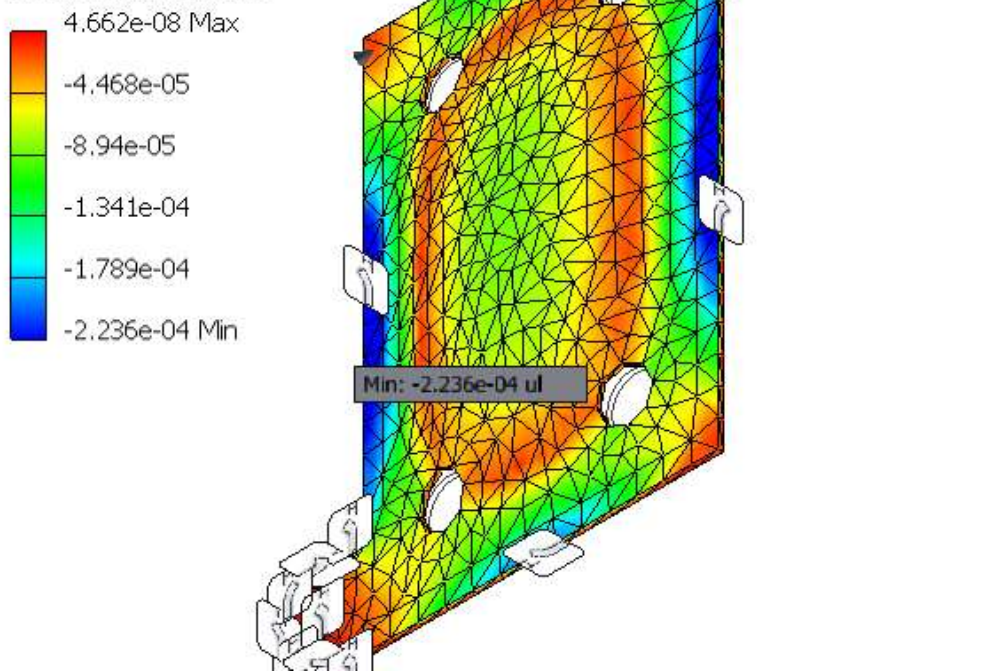


▣ 3rd Principal Strain

Nodes:7082
Elements:3675
Type: 3rd Principal Strain
Unit: ul
11-07-2019, 16:12:51

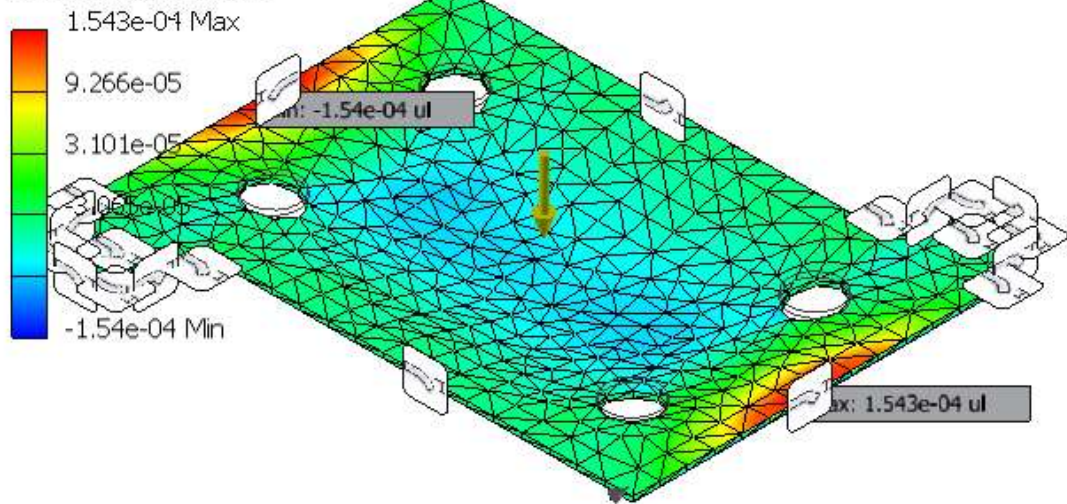


Nodes:7082
Elements:3675
Type: 3rd Principal Strain
Unit: ul
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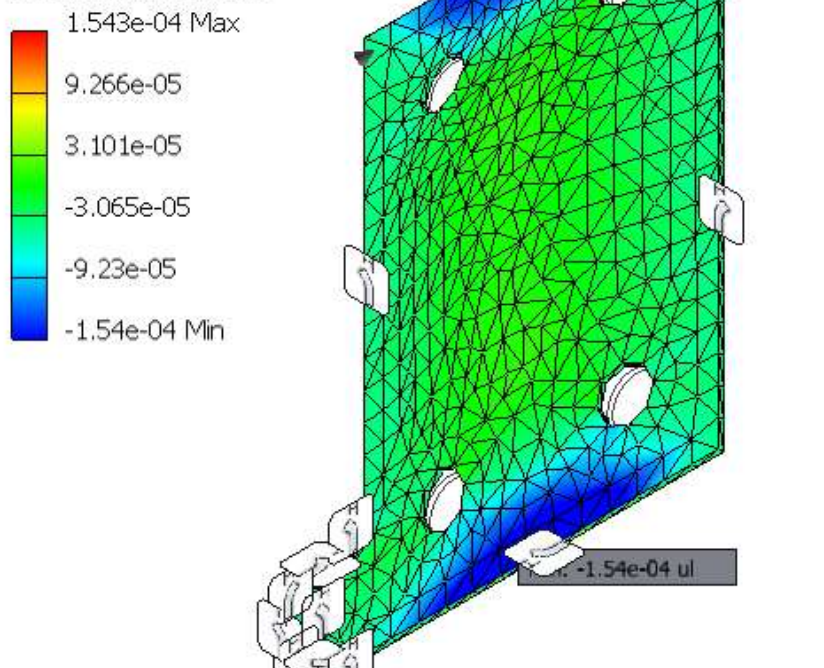


Strain XX

Nodes:7082
Elements:3675
Type: Strain XX
Unit: ul
11-07-2019, 16:12:51



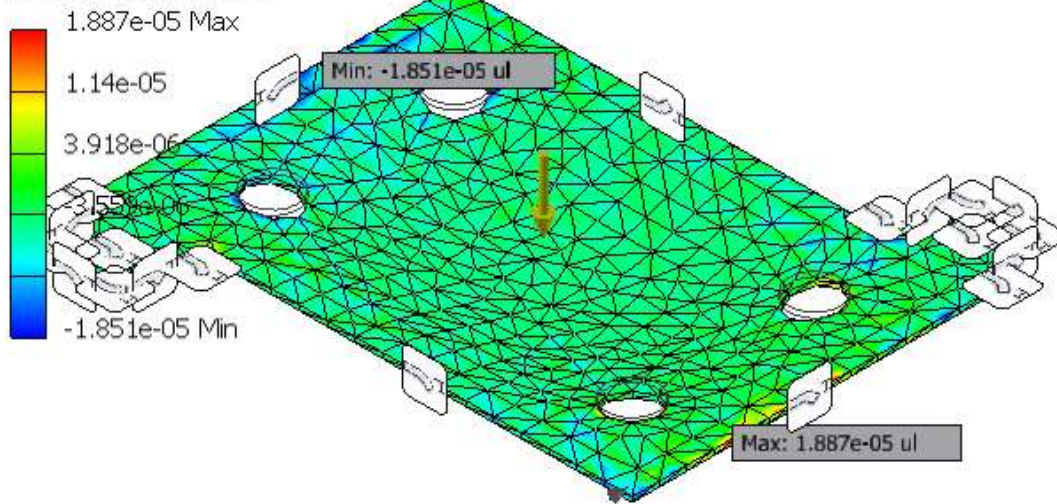
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Type: Strain XX
Unit: ul
11-07-2019, 16:12:51



▣ Strain XY

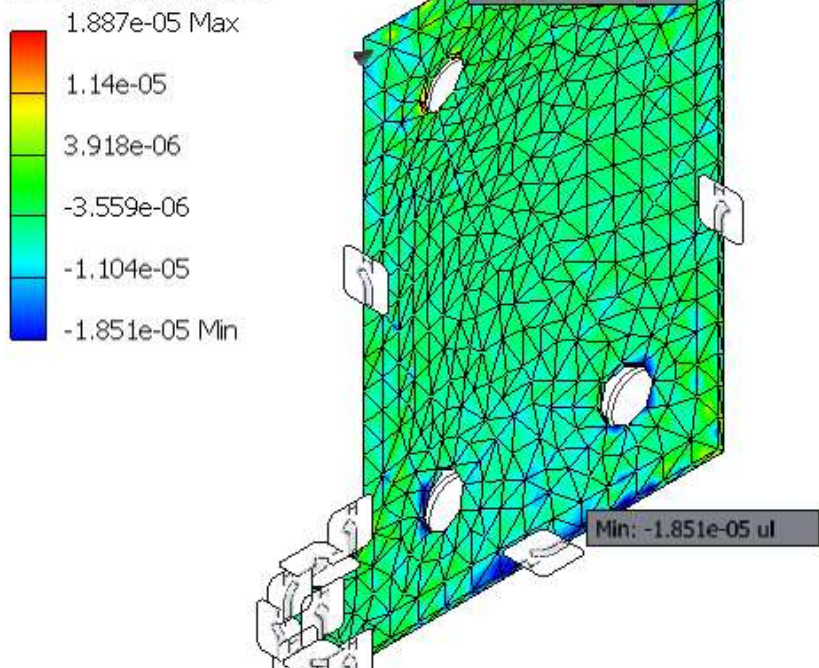
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Elements:3675
Type: Strain XY
Unit: ul

11-07-2019, 16:12:52



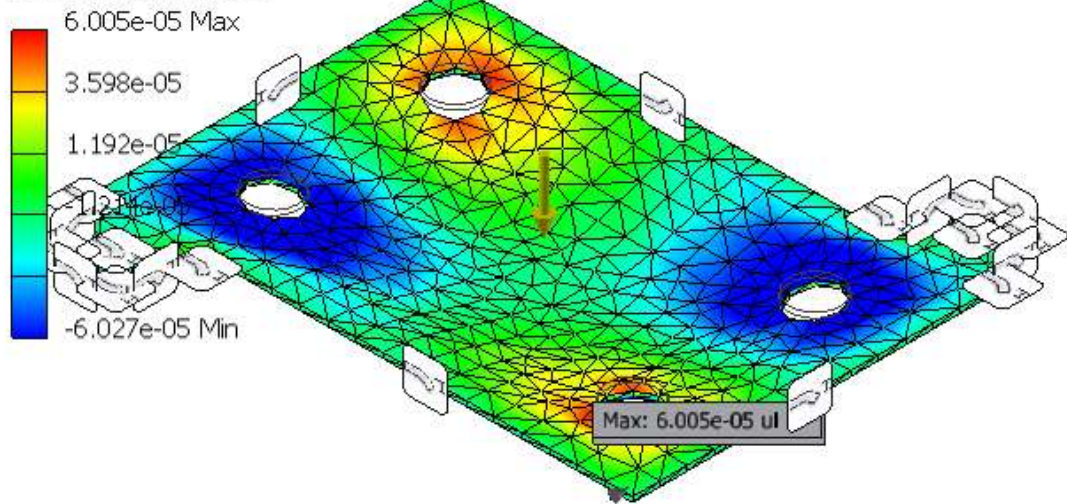
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Elements:3675
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Unit: ul

11-07-2019, 16:12:52

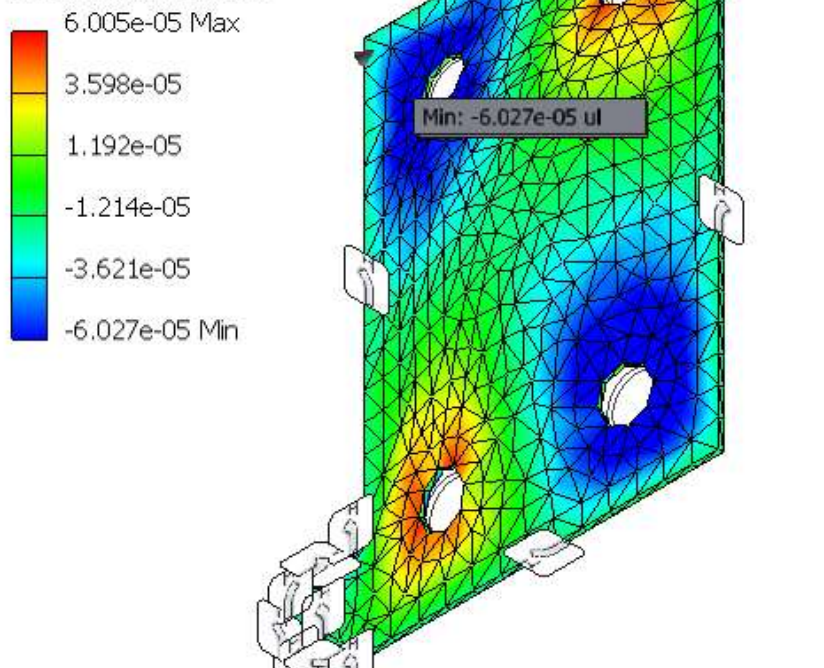


Strain XZ

Nodes:7082
Elements:3675
Type: Strain XZ
Unit: ul
11-07-2019, 16:12:52



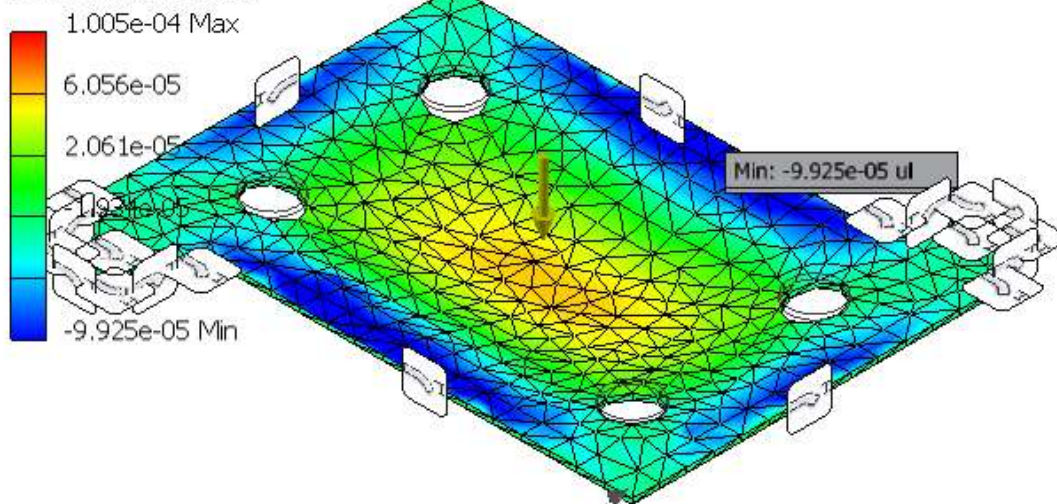
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▣ Strain YY

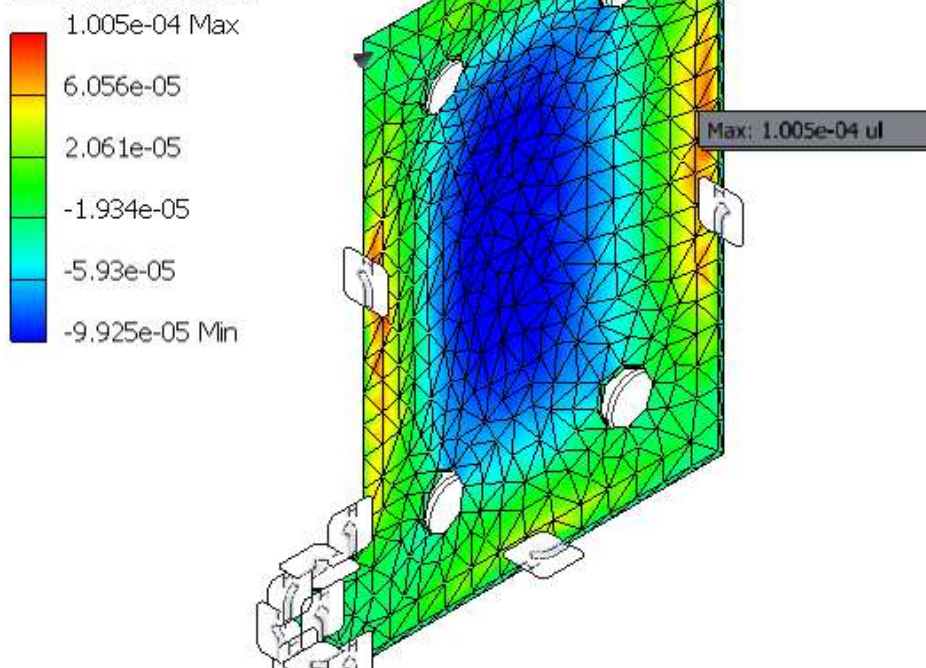
Nodes:7082
Elements:3675
Type: Strain YY
Unit: ul

11-07-2019, 16:12:53



Nodes:7082
Elements:3675
Type: Strain YY
Unit: ul

11-07-2019, 16:12:53



Strain YZ

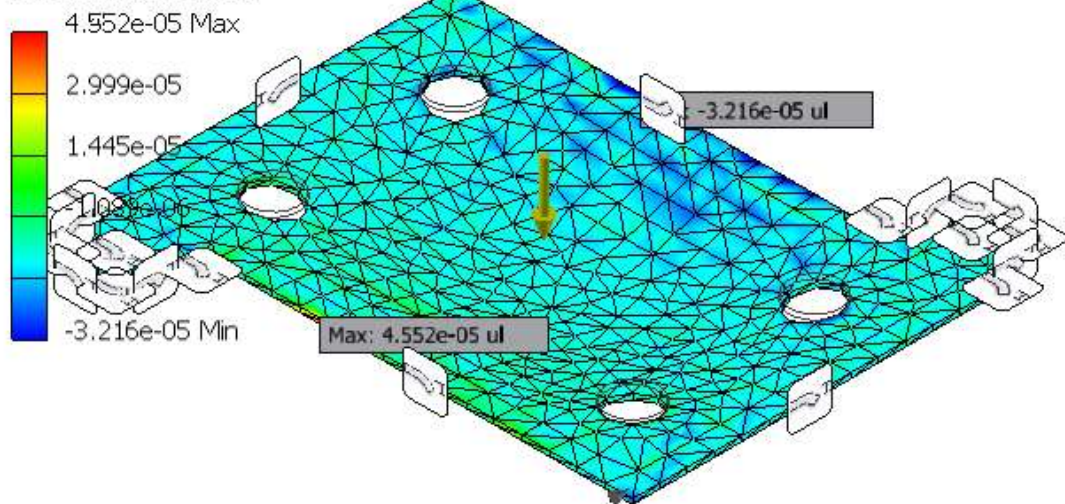
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Elements:3675

Type: Strain YZ

Unit: ul

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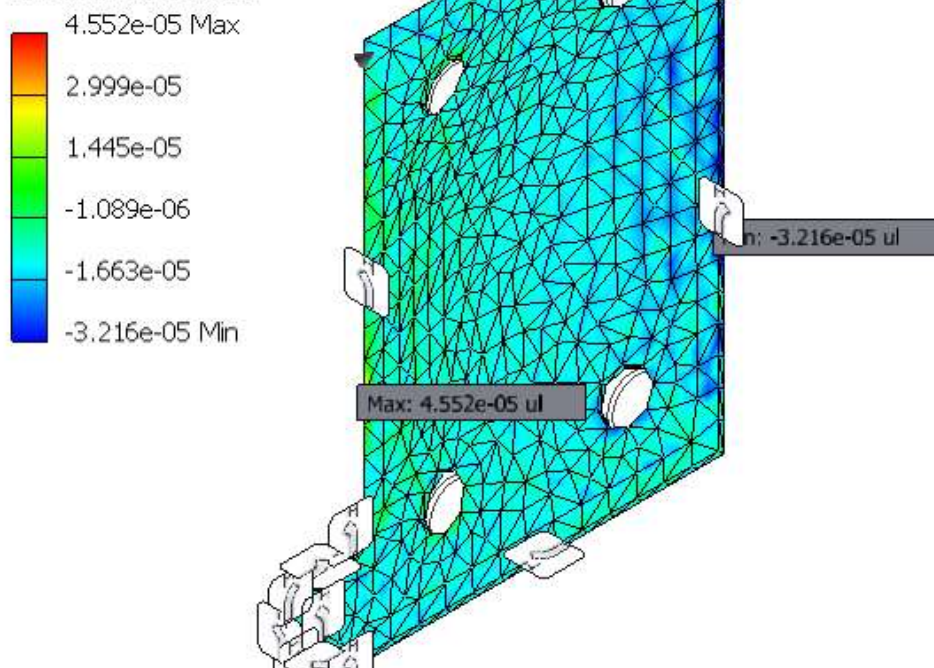
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Elements:3675

Type: Strain YZ

Unit: ul

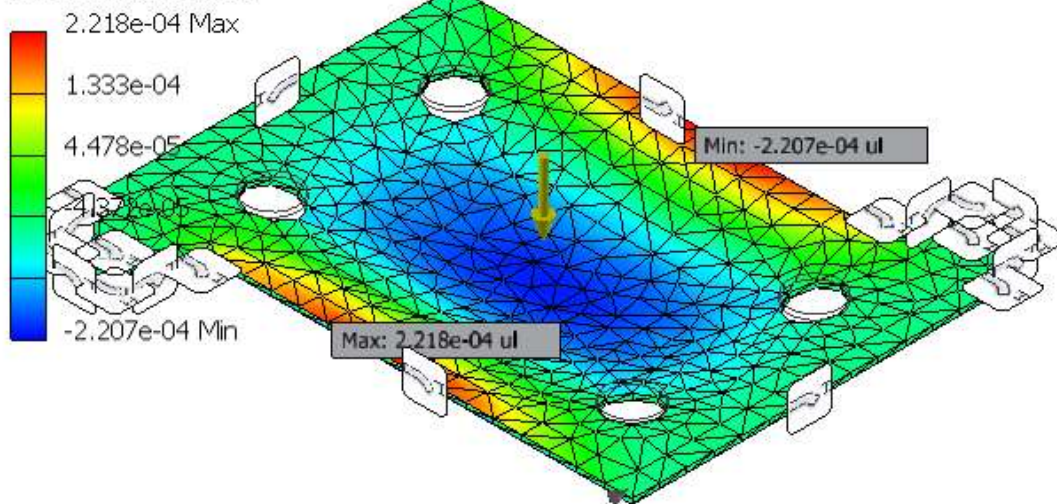
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▣ Strain ZZ

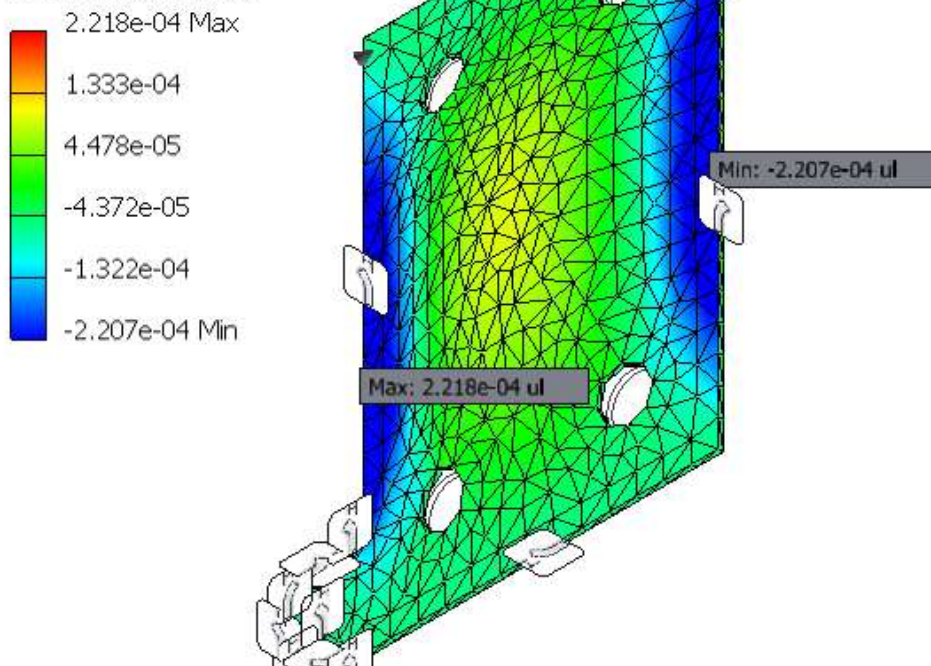
Nodes:7082
Elements:3675
Type: Strain ZZ
Unit: ul

11-07-2019, 16:12:53



Nodes:7082
Elements:3675
Type: Strain ZZ
Unit: ul

11-07-2019, 16:12:53



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