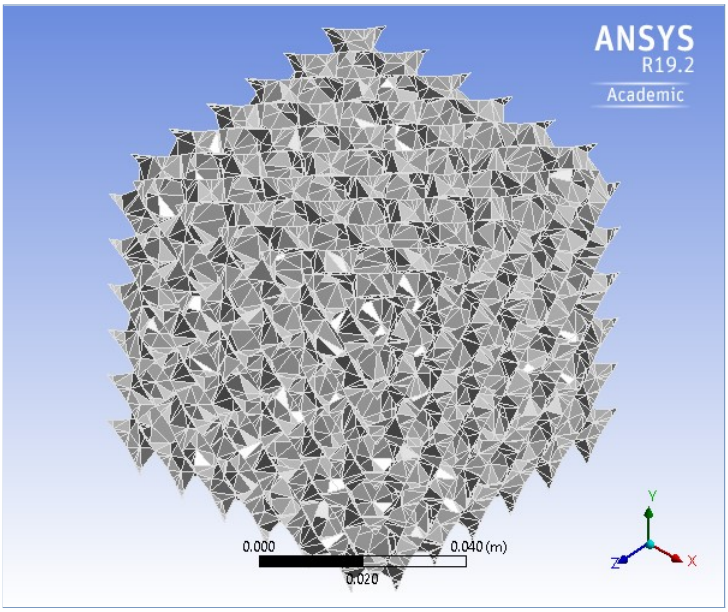
Project

First Saved	Saturday, February 9, 2019
Last Saved	Saturday, February 9, 2019
Product Version	19.2 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

- **Units**
- **Model (A4)**
  - Geometry
    - Part 1
  - Materials
    - Zeolite 4A
  - Coordinate Systems
  - Mesh
  - **Steady-State Thermal (A5)**
    - Initial Temperature
    - Analysis Settings
    - Loads
    - Solution (A6)
      - Solution Information
      - Results
- **Material Data**
  - Zeolite 4A

Units

TABLE 1

Unit System	Metric (m, kg, N, s, V, A) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (A4)

Geometry

TABLE 2
Model (A4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	H:\Google Drive\College Stuff\Studies\Thesis (Project)\Models\Schwarz D\Schwarz D V2.sat
Type	ACIS
Length Unit	Millimeters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	7.e-002 m
Length Y	7.e-002 m
Length Z	7.e-002 m
Properties	
Volume	5.3049e-005 m³
Mass	0. kg
Surface Area(approx.)	6.6311e-002 m²
Scale Factor Value	1.
Statistics	
Bodies	1
Active Bodies	1
Nodes	25118
Elements	30994
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	No
Parameters	Independent
Parameter Key	ANS;DS
Attributes	No
Named Selections	No
Material Properties	No
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	No
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Analysis Type	3-D
Mixed Import Resolution	None
Clean Bodies On Import	No
Stitch Surfaces On Import	No
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3

Model (A4) > Geometry > Parts

Object Name	*Part 1*
State	Meshed
Graphics Properties	
Visible	Yes
Transparency	1
Definition	
Suppressed	No
Stiffness Behavior	Flexible
Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Thickness	8.e-004 m
Thickness Mode	Manual
Offset Type	Middle
Behavior	None
Material	
Assignment	Zeolite 4A
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Length X	7.e-002 m
Length Y	7.e-002 m
Length Z	7.e-002 m
Properties	
Volume	5.3049e-005 m³
Mass	0. kg
Centroid X	-0.23537 m
Centroid Y	0.13163 m
Centroid Z	0.28835 m
Moment of Inertia Ip1	0. kg·m²
Moment of Inertia Ip2	0. kg·m²
Moment of Inertia Ip3	0. kg·m²
Surface Area(approx.)	6.6311e-002 m²
Statistics	
Nodes	25118
Elements	30994
Mesh Metric	None

Coordinate Systems

TABLE 4
Model (A4) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
Coordinate System ID	0.
Origin	
Origin X	0. m
Origin Y	0. m
Origin Z	0. m
Directional Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]

Mesh

TABLE 5
Model (A4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	Mechanical
Element Order	Program Controlled
Element Size	2.3e-003 m
Sizing	
Use Adaptive Sizing	No
Growth Rate	Default (1.2)
Mesh Defeaturing	Yes
Defeature Size	Default (1.15e-005 m)
Capture Curvature	Yes
Curvature Min Size	Default (2.3e-005 m)
Curvature Normal Angle	Default (30.0°)
Capture Proximity	No
Bounding Box Diagonal	0.12124 m
Average Surface Area	5.657e-006 m²
Minimum Edge Length	5.8577e-005 m
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Standard Mechanical
Target Quality	Default (0.050000)
Smoothing	Medium
Mesh Metric	None
Inflation	
Use Automatic Inflation	None

Inflation Option	Smooth Transition
Transition Ratio	0.272
Maximum Layers	2
Growth Rate	1.2
Inflation Algorithm	Pre
View Advanced Options	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Straight Sided Elements	No
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Use Sheet Thickness for Pinch	No
Pinch Tolerance	Default (2.07e-005 m)
Generate Pinch on Refresh	No
Sheet Loop Removal	No
Statistics	
Nodes	25118
Elements	30994

Steady-State Thermal (A5)

TABLE 6
Model (A4) > Analysis

Object Name	*Steady-State Thermal (A5)*
State	Solved
Definition	
Physics Type	Thermal
Analysis Type	Steady-State
Solver Target	Mechanical APDL
Options	
Generate Input Only	No

TABLE 7
Model (A4) > Steady-State Thermal (A5) > Initial Condition

Object Name	*Initial Temperature*
State	Fully Defined
Definition	
Initial Temperature	Uniform Temperature
Initial Temperature Value	22. °C

TABLE 8
Model (A4) > Steady-State Thermal (A5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
Solver Controls	
Solver Type	Program Controlled
Solver Pivot Checking	Program Controlled
Radiosity Controls	
Radiosity Solver	Program Controlled
Flux Convergence	1.e-004
Maximum Iteration	1000.
Solver Tolerance	0.1 W/m²
Over Relaxation	0.1
Hemicube Resolution	10.
Nonlinear Controls	
Heat Convergence	Program Controlled
Temperature Convergence	Program Controlled
Line Search	Program Controlled
Output Controls	
Calculate Thermal Flux	Yes
Nodal Forces	No
Contact Miscellaneous	No
General Miscellaneous	No
Store Results At	All Time Points
Analysis Data Management	
Solver Files Directory	H:\Google Drive\College Stuff\Studies\Thesis (Project)\Models\Ansys\Thermal Analysis\Schwarz D\Zeolite\70degC_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Contact Summary	Program Controlled
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System
Solver Unit System	mks

TABLE 9
Model (A4) > Steady-State Thermal (A5) > Loads

Object Name	*Hot Side*	*Cold Side*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	1180 Faces	1173 Faces

Definition		
Type	Temperature	
Magnitude	70. °C (ramped)	10. °C (ramped)
Suppressed	No	

FIGURE 1
Model (A4) > Steady-State Thermal (A5) > Hot Side

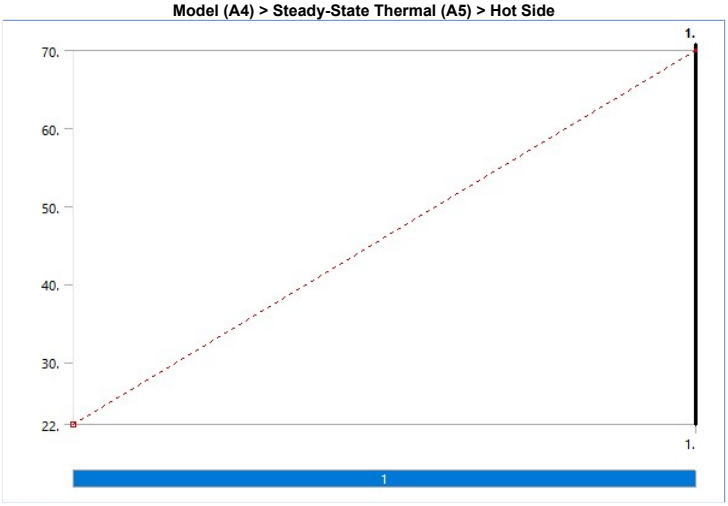
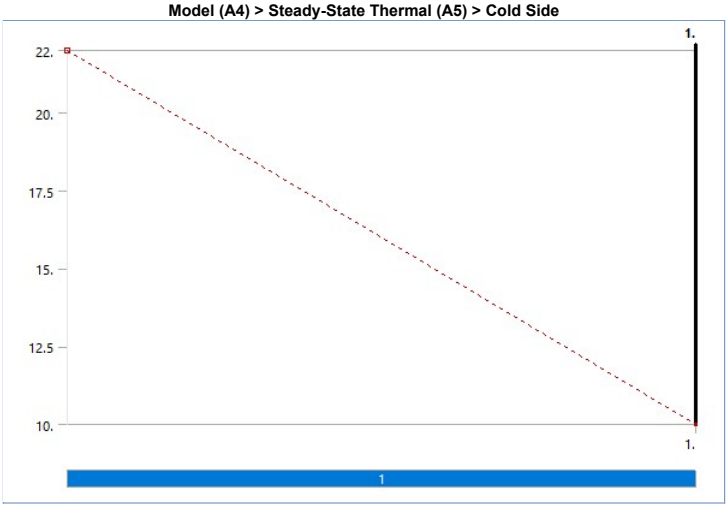


FIGURE 2
Model (A4) > Steady-State Thermal (A5) > Cold Side



Solution (A6)

TABLE 10
Model (A4) > Steady-State Thermal (A5) > Solution

Object Name	*Solution (A6)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	7. s
MAPDL Memory Used	313. MB
MAPDL Result File Size	15.813 MB
Post Processing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 11
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Update Interval	2.5 s
Display Points	All
FE Connection Visibility	
Activate Visibility	Yes
Display	All FE Connectors
Draw Connections Attached To	All Nodes

Line Color	Connection Type
Visible on Results	No
Line Thickness	Single
Display Type	Lines

TABLE 12
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Results

Object Name	*Temperature*	*Total Heat Flux*
State	Solved	
Scope		
Scoping Method	Geometry Selection	
Geometry	All Bodies	
Position		Top/Bottom
Definition		
Type	Temperature	Total Heat Flux
By	Time	
Display Time	Last	
Calculate Time History	Yes	
Identifier		
Suppressed	No	
Results		
Minimum	9.9983 °C	0. W/m²
Maximum	70.013 °C	440.04 W/m²
Average	40.134 °C	98.634 W/m²
Minimum Occurs On	Part 1	
Maximum Occurs On	Part 1	
Information		
Time	1. s	
Load Step	1	
Substep	1	
Iteration Number	1	
Integration Point Results		
Display Option		Averaged
Average Across Bodies		No

FIGURE 3
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Temperature

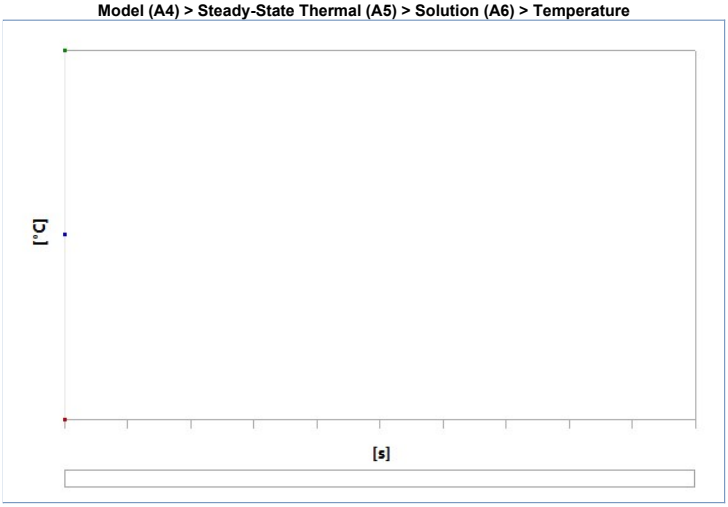


TABLE 13
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Temperature

Time [s]	Minimum [°C]	Maximum [°C]	Average [°C]
1.	9.9983	70.013	40.134

FIGURE 4
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Temperature > Temperature

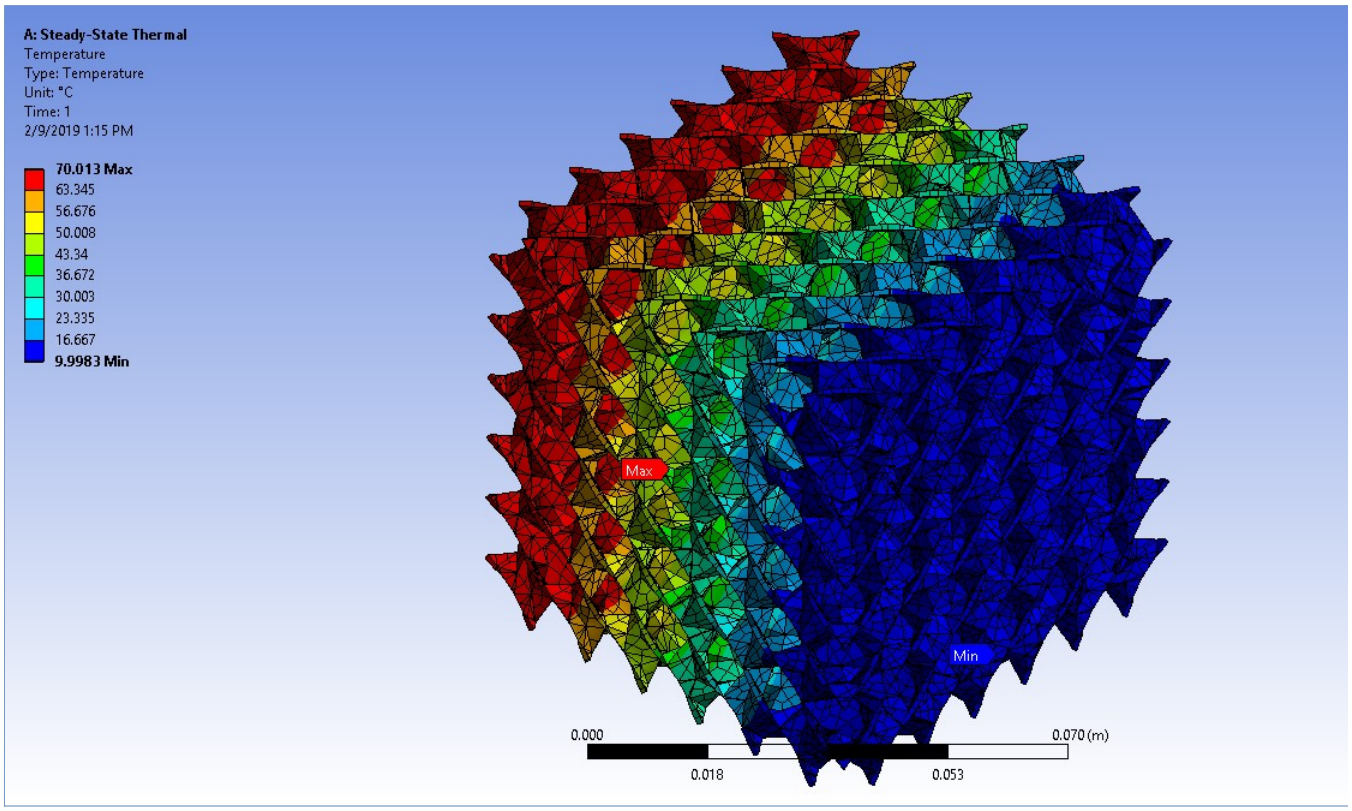


FIGURE 5
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Total Heat Flux

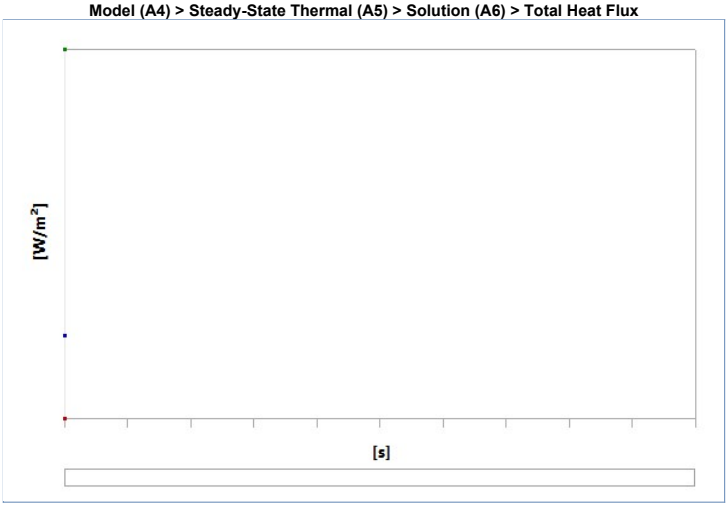
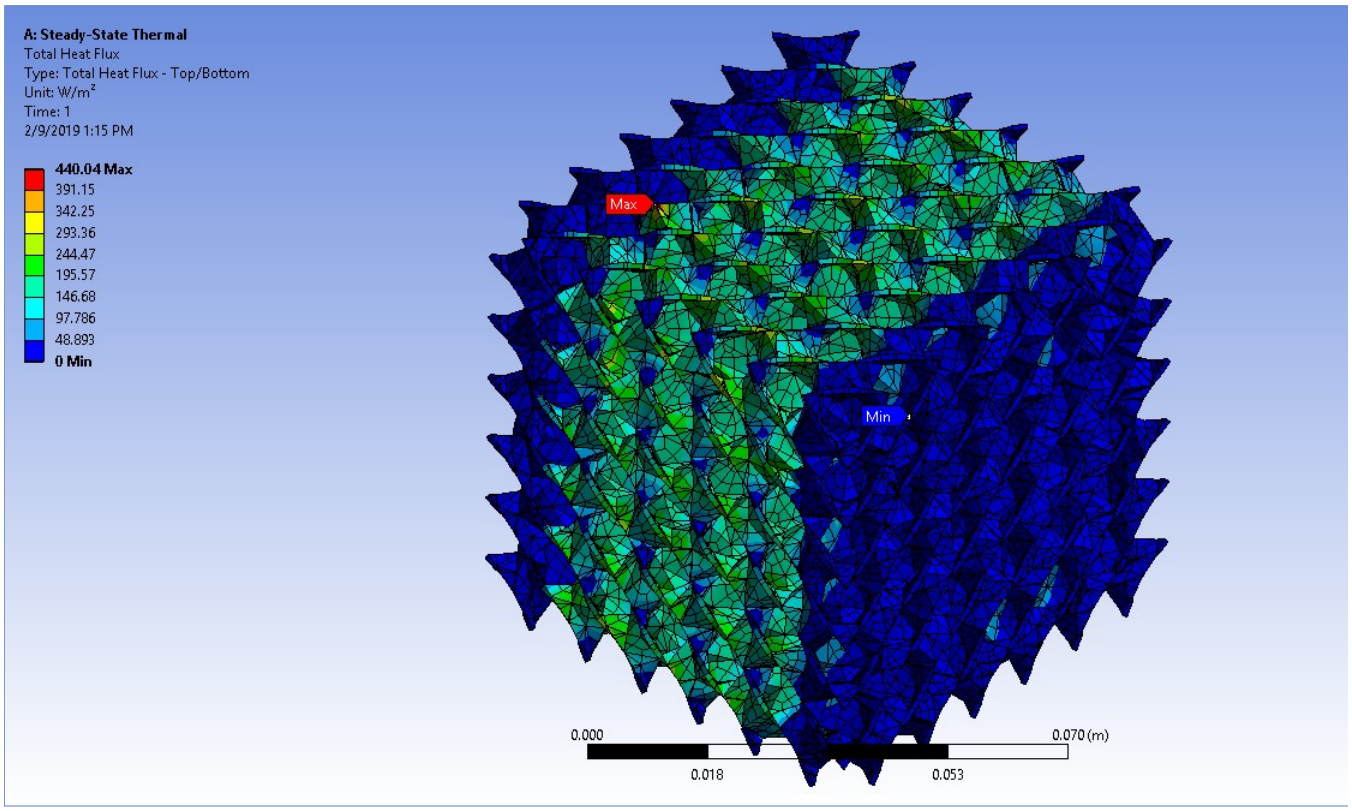


TABLE 14
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Total Heat Flux

Time [s]	Minimum [W/m²]	Maximum [W/m²]	Average [W/m²]
1.	0.	440.04	98.634

FIGURE 6
Model (A4) > Steady-State Thermal (A5) > Solution (A6) > Total Heat Flux > Heat Flux



Material Data

Zeolite 4A

TABLE 15
Zeolite 4A > Constants

Thermal Conductivity	0.17 W m^-1 C^-1

TABLE 16
Zeolite 4A > Color

Red	Green	Blue
130	177	176