Solar Thermal Power Research at Istanbul Technical University

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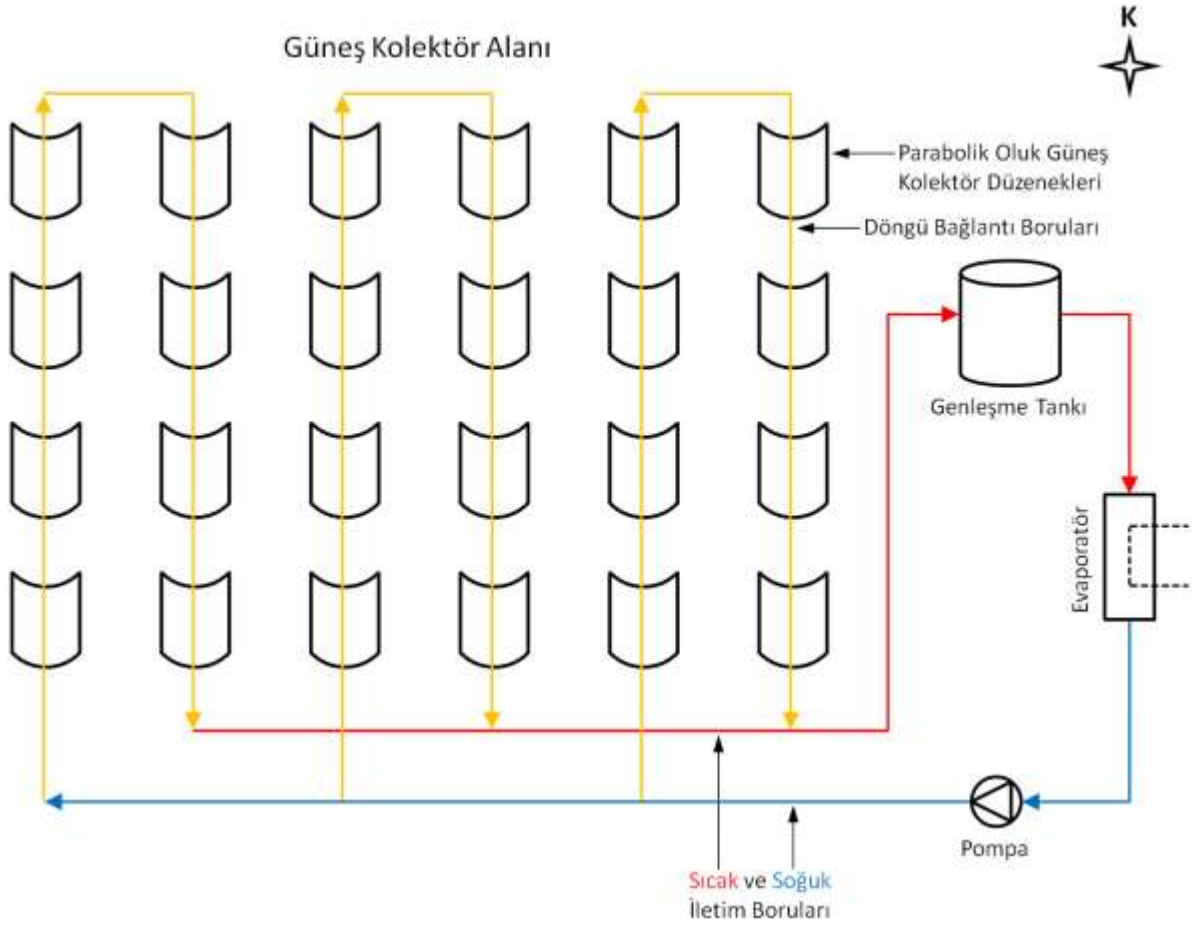
Istanbul Technical University

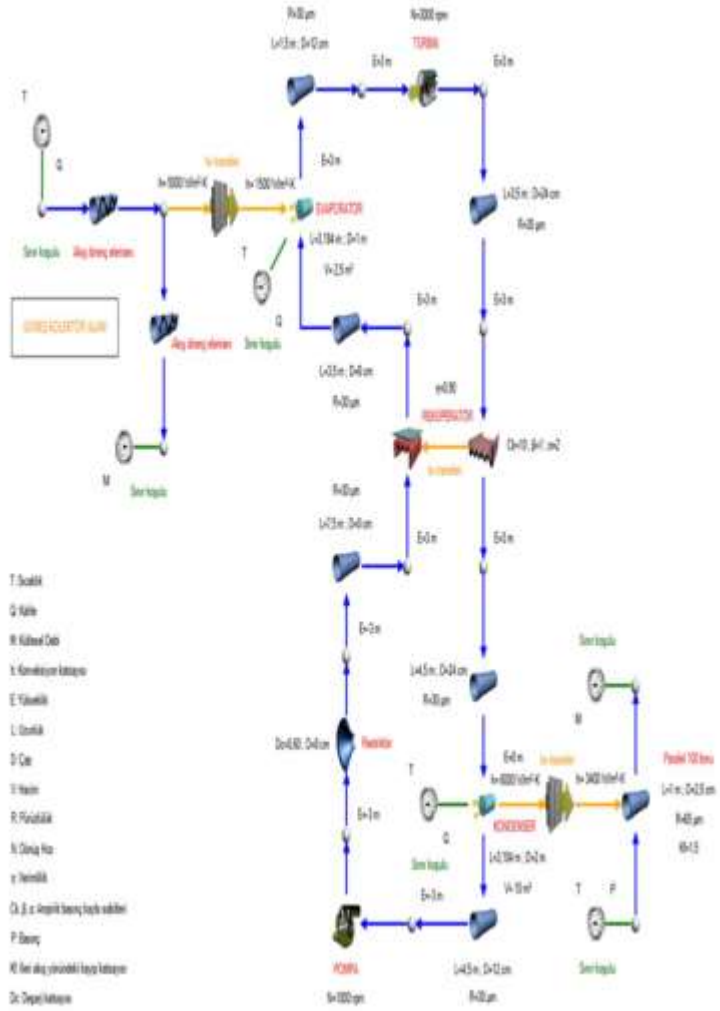
Energy Institute

Content

- Solar Thermal Power Research at ITU
- Future Perspectives for CSP Research

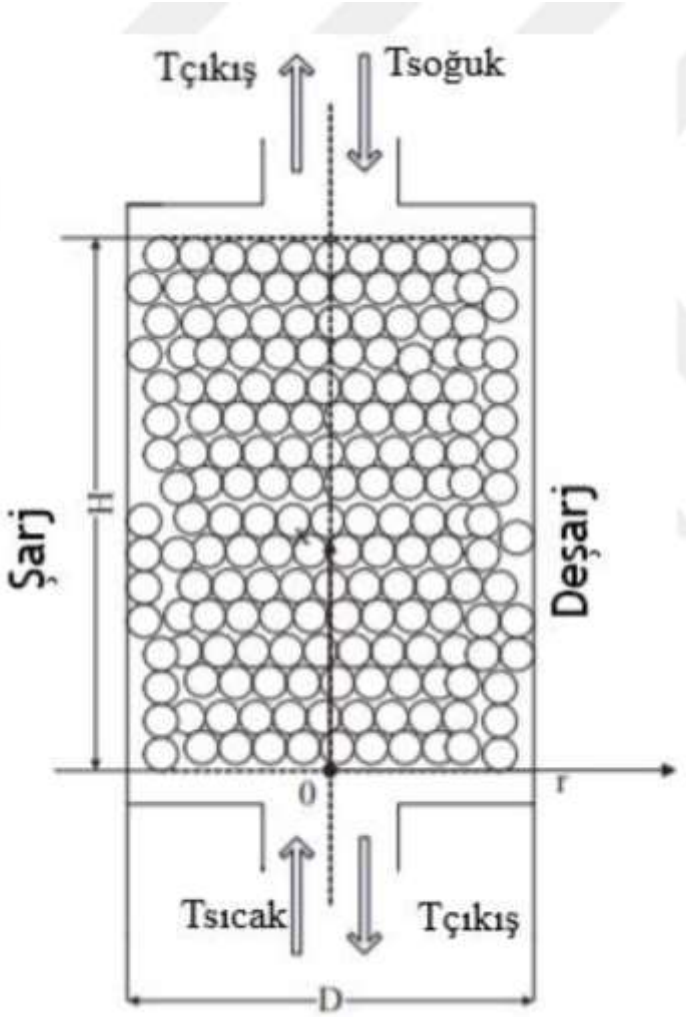
Design of Organic Rankine Cycle System for Solar Thermal Applications



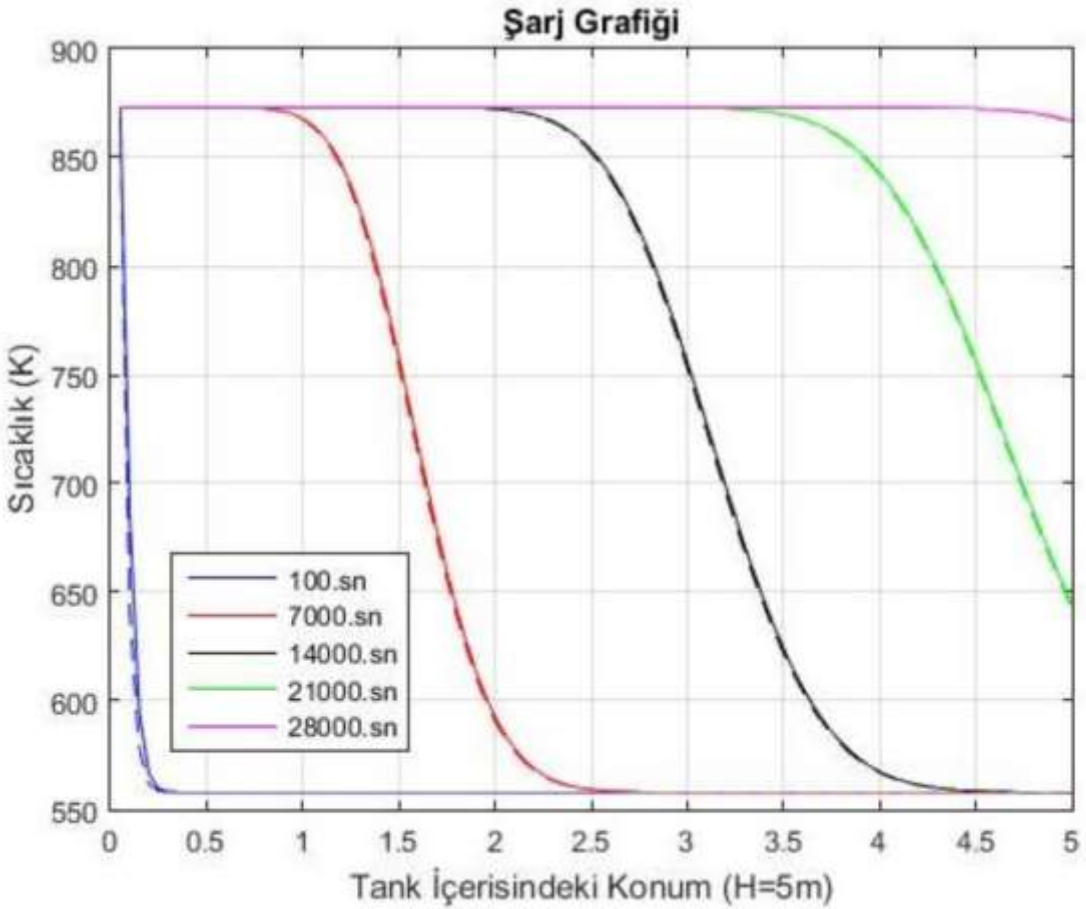


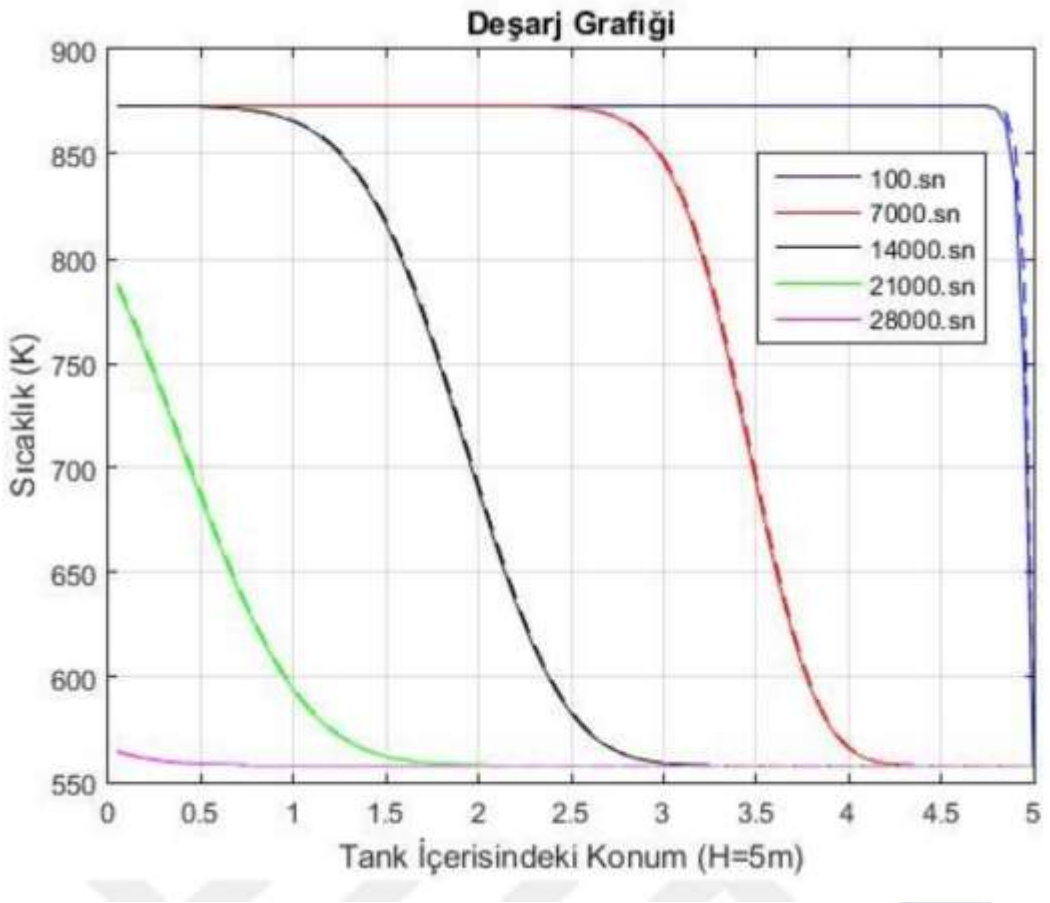
Thermocline thermal energy storage design

- Coupled thermal and flow analysis
- Finite difference implicit solution

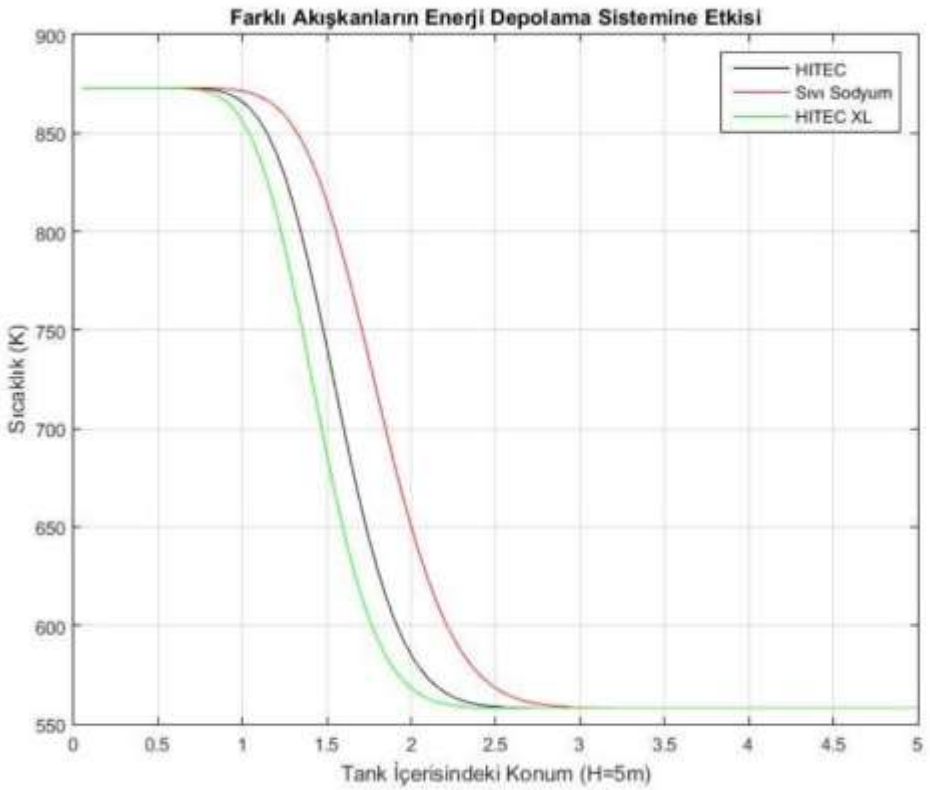


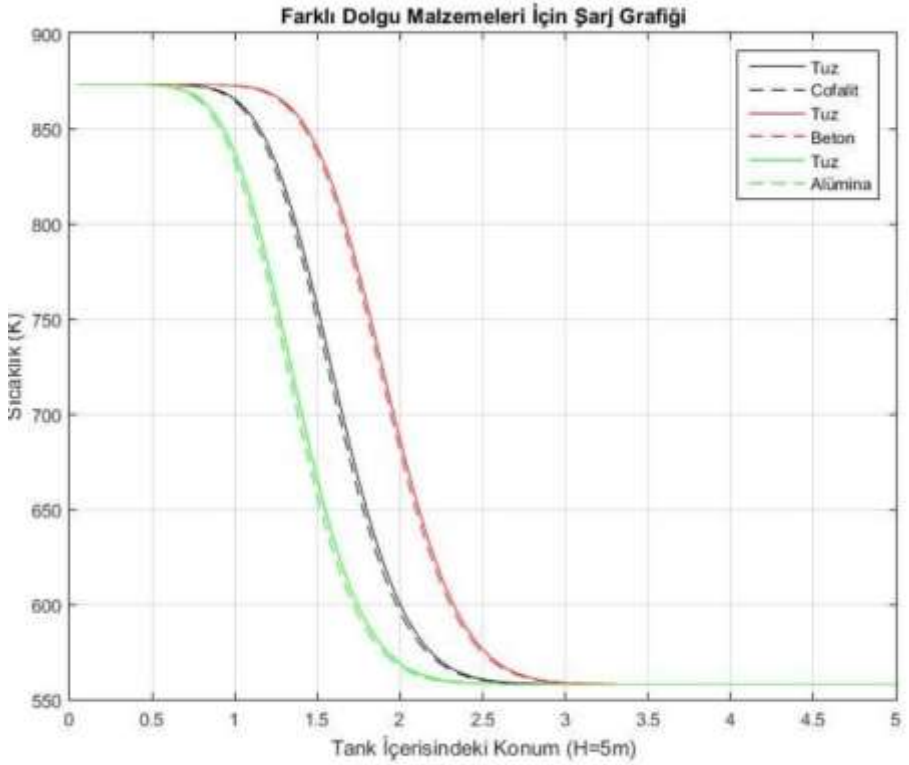
Charge and Discharge Characteristics



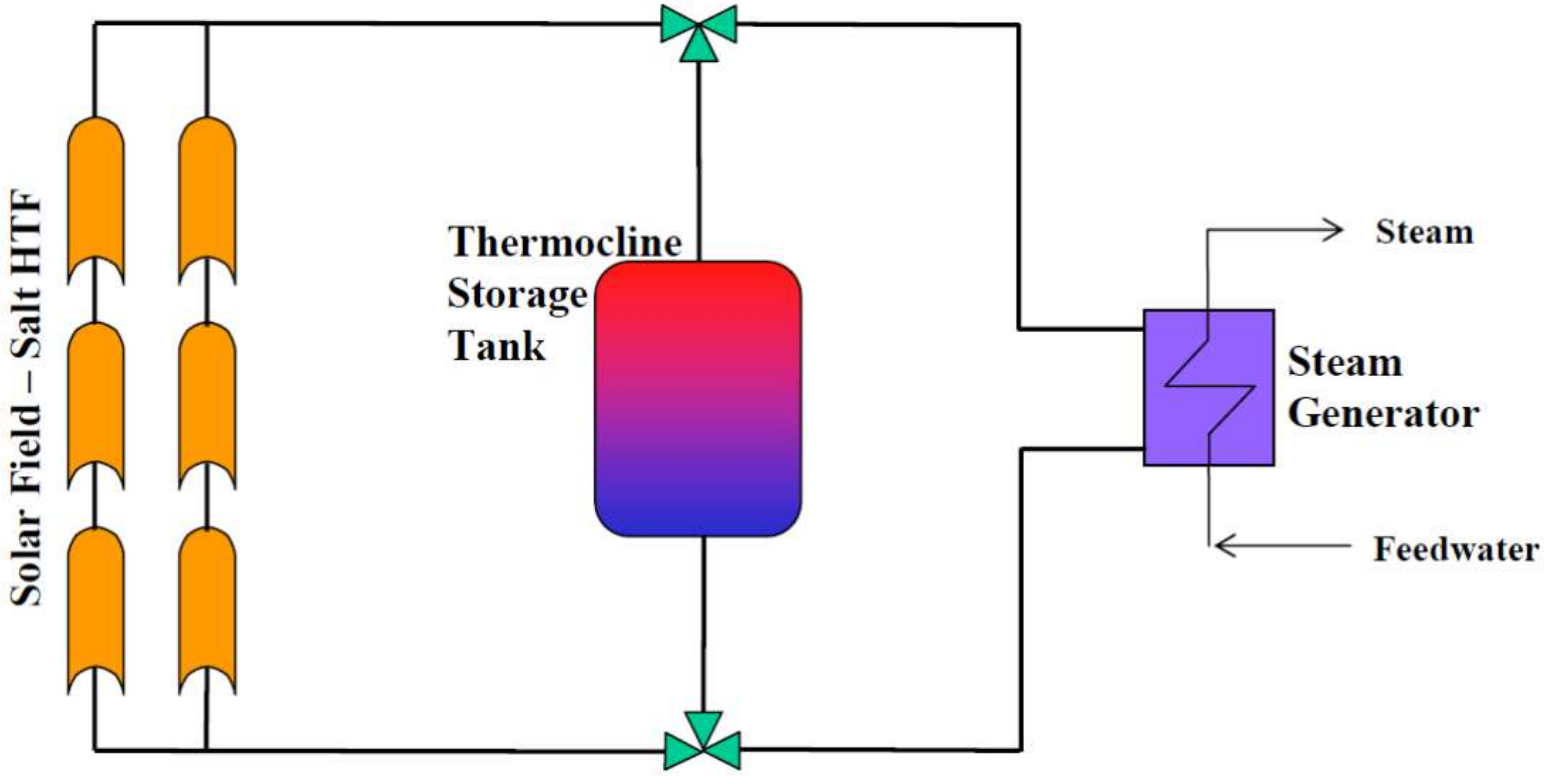


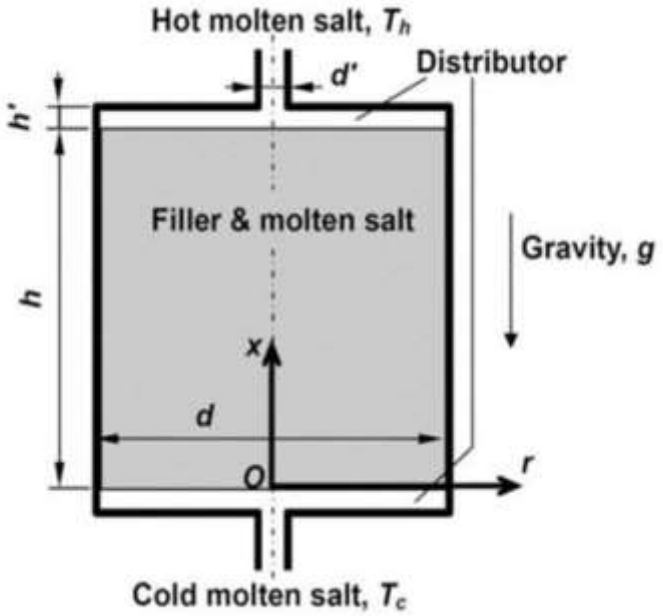
Influence of Fluid and Filler Materials



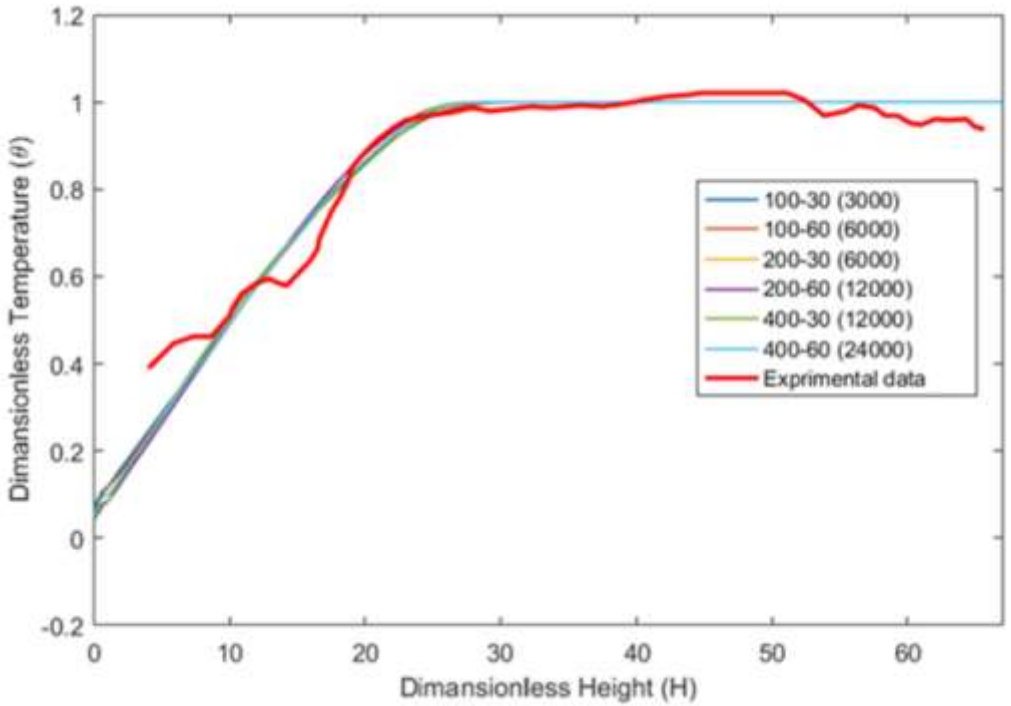


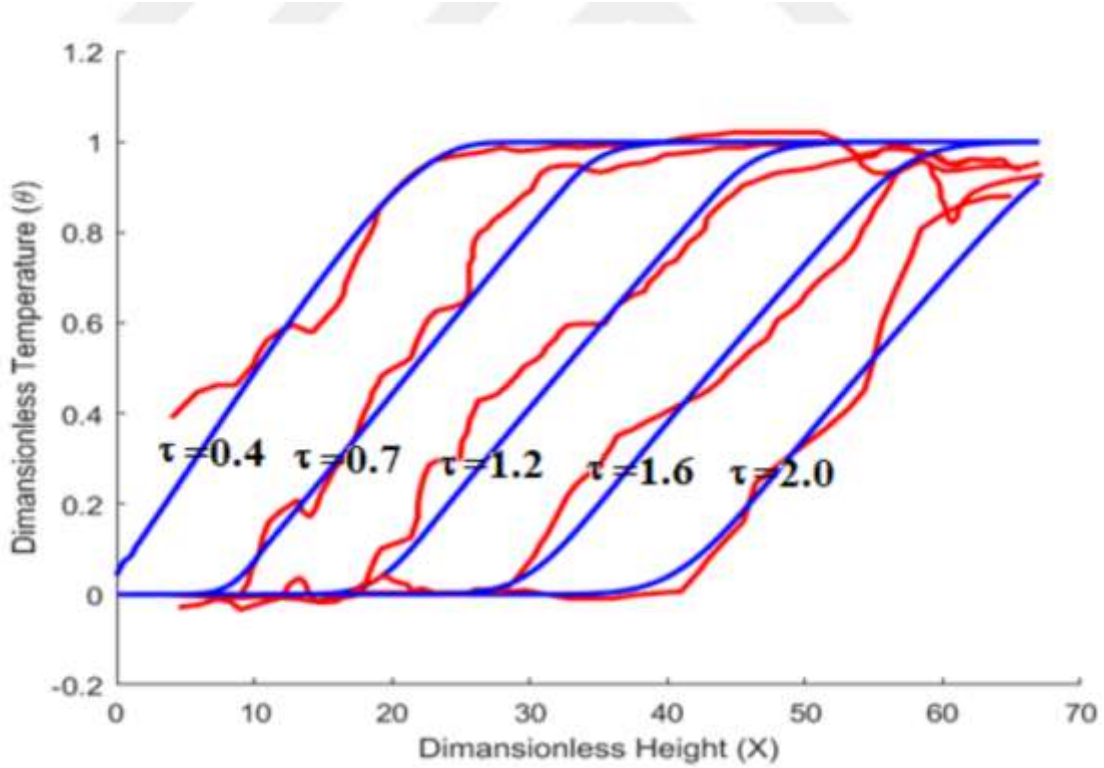
Thermocline Thermal Energy Storage Design





CFD Modelling
Porous medium approach
Performance comparison with alternative fluids
Effects of porosity and sphericity
Benchmark with experimental data


Dimansionless Temperature (θ)
Dimansionless Height (H)
100-30 (3000)
100-60 (6000)
200-30 (6000)
200-60 (12000)
400-30 (12000)
400-60 (24000)
Exprimental data


Dimansionless Temperature (θ)
Dimansionless Height (X)
τ=0.4
τ=0.7
τ=1.2
τ=1.6
τ=2.0

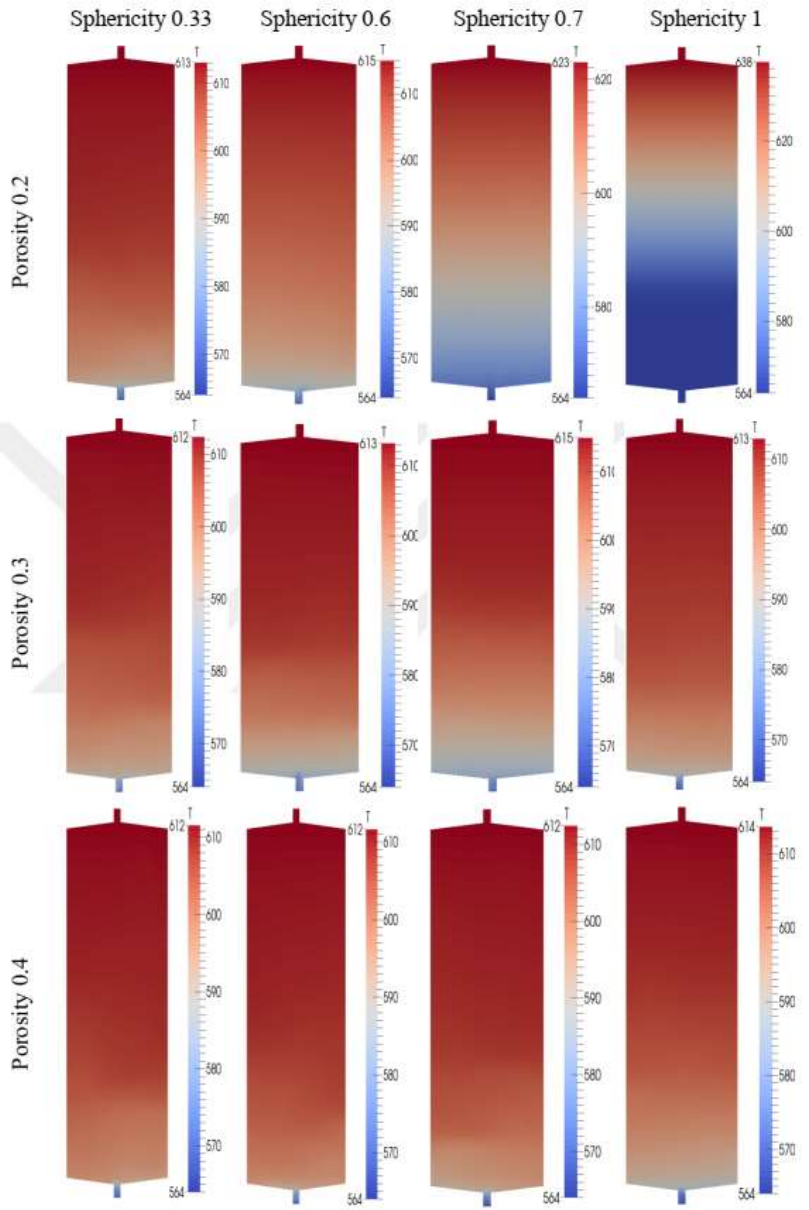
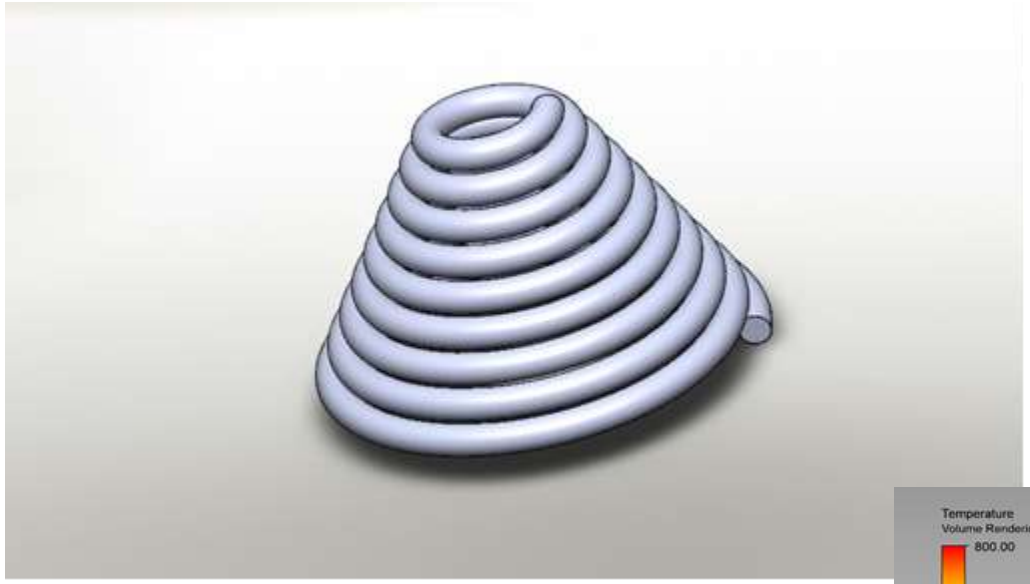
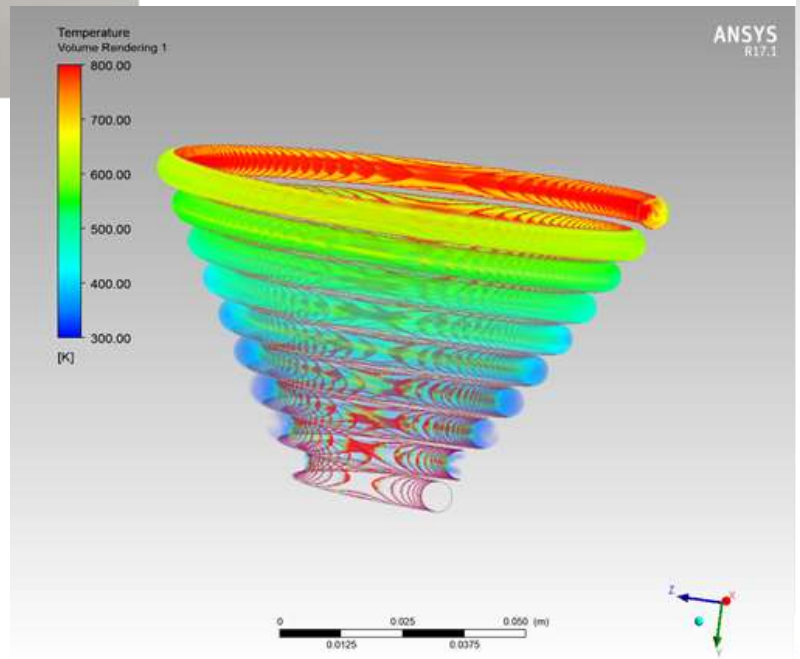
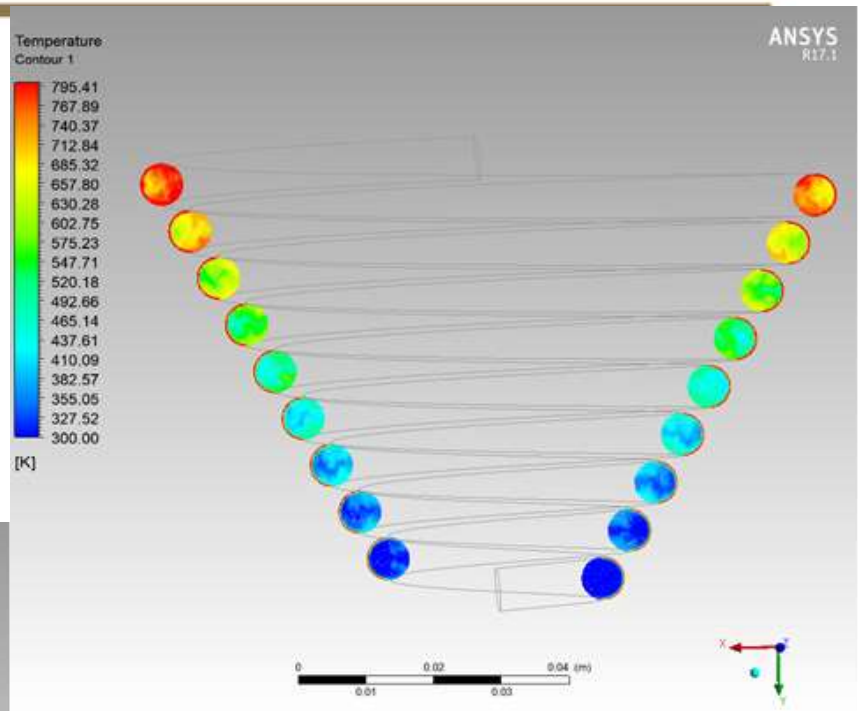


Figure A.7 : Temperature profile of Solar :Salt after 3 hours of discharge.

Spiral Air Cavity Receiver Thermal Design

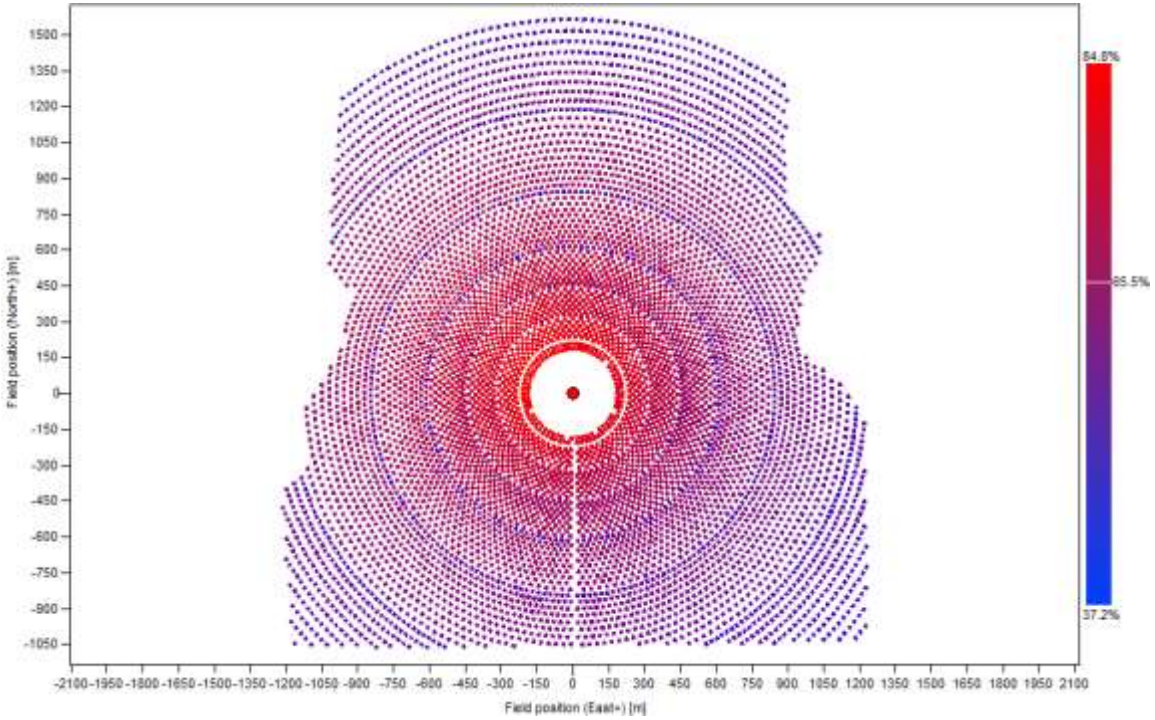




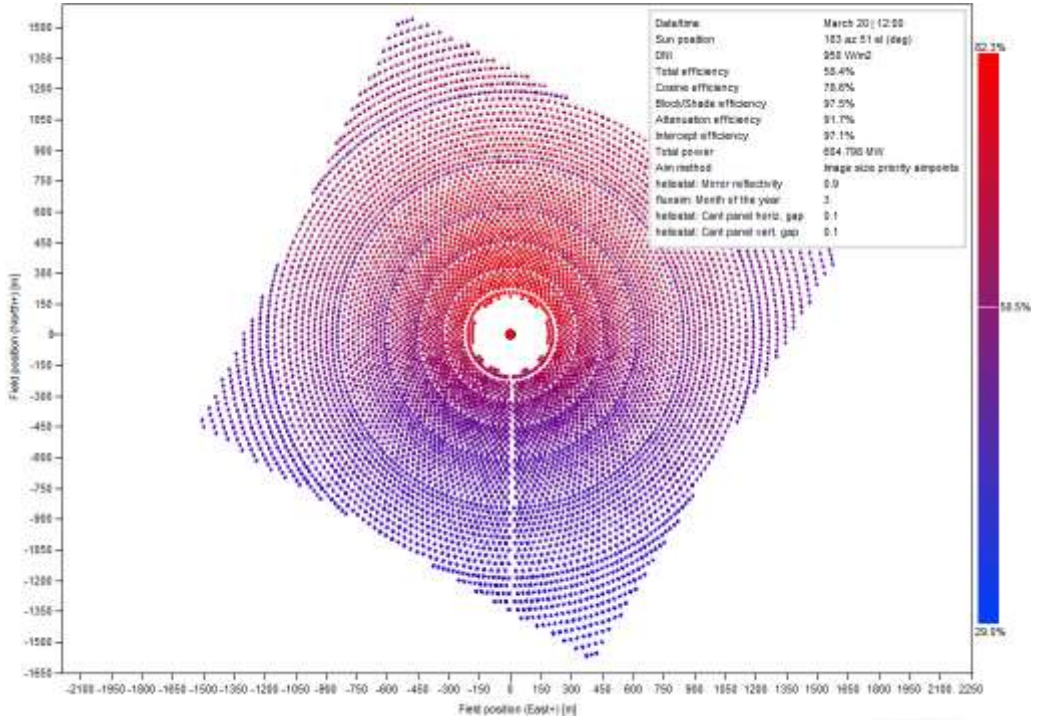


Heliostat Field Design for Solar Tower Plant

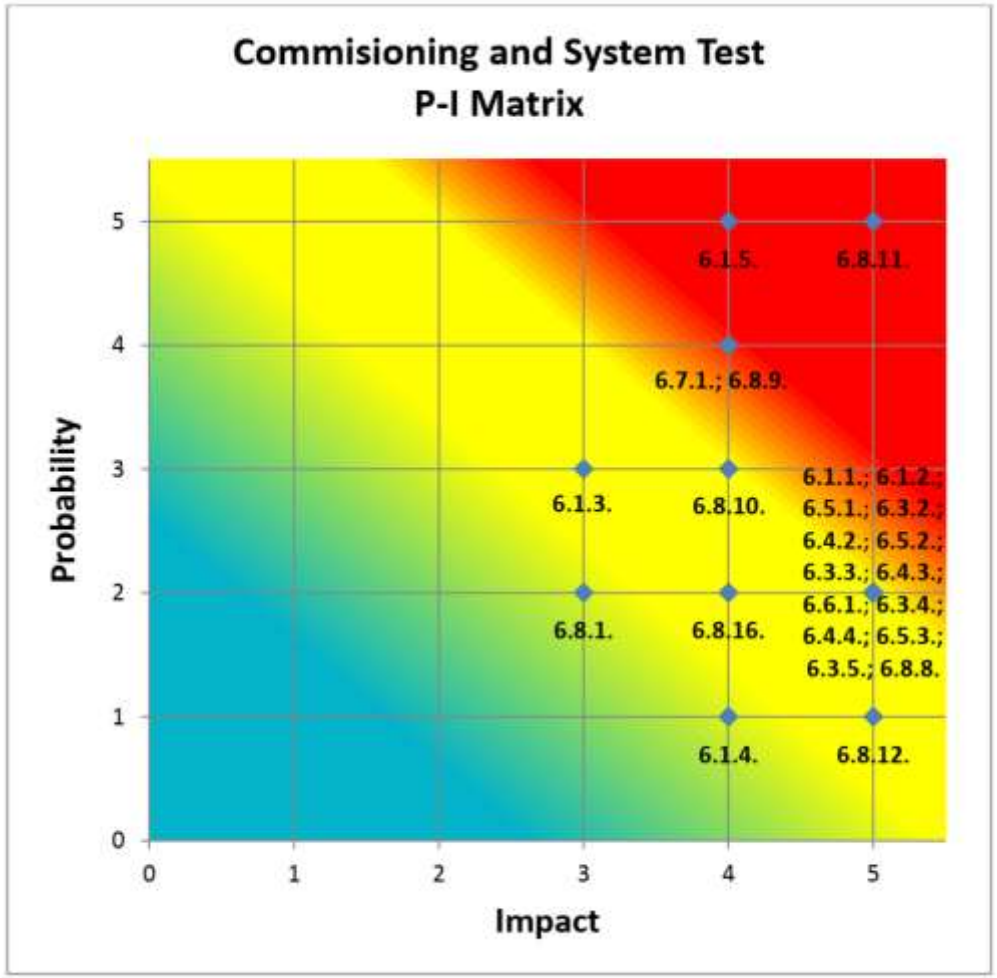
NOOR CSP PLANT

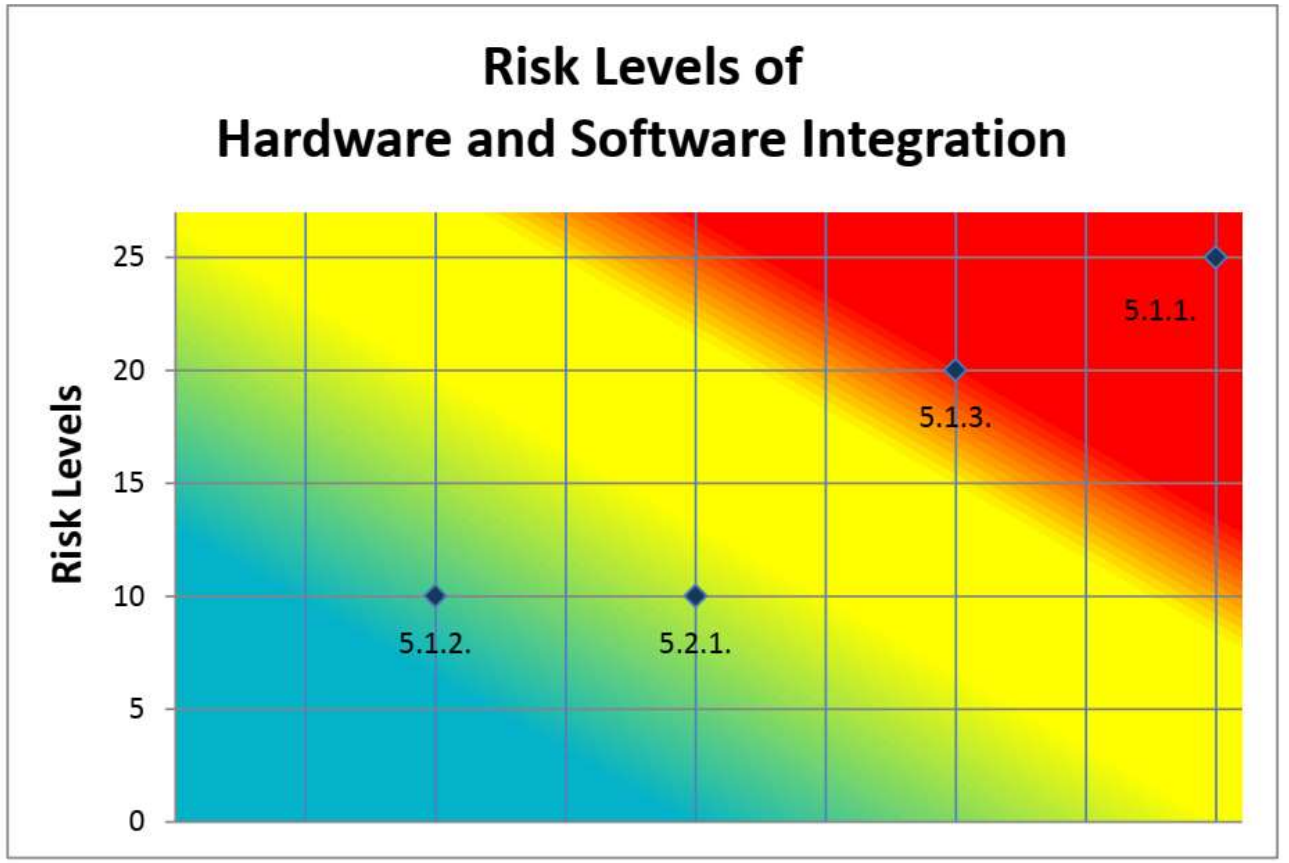


KARAPINAR CSP PLANT

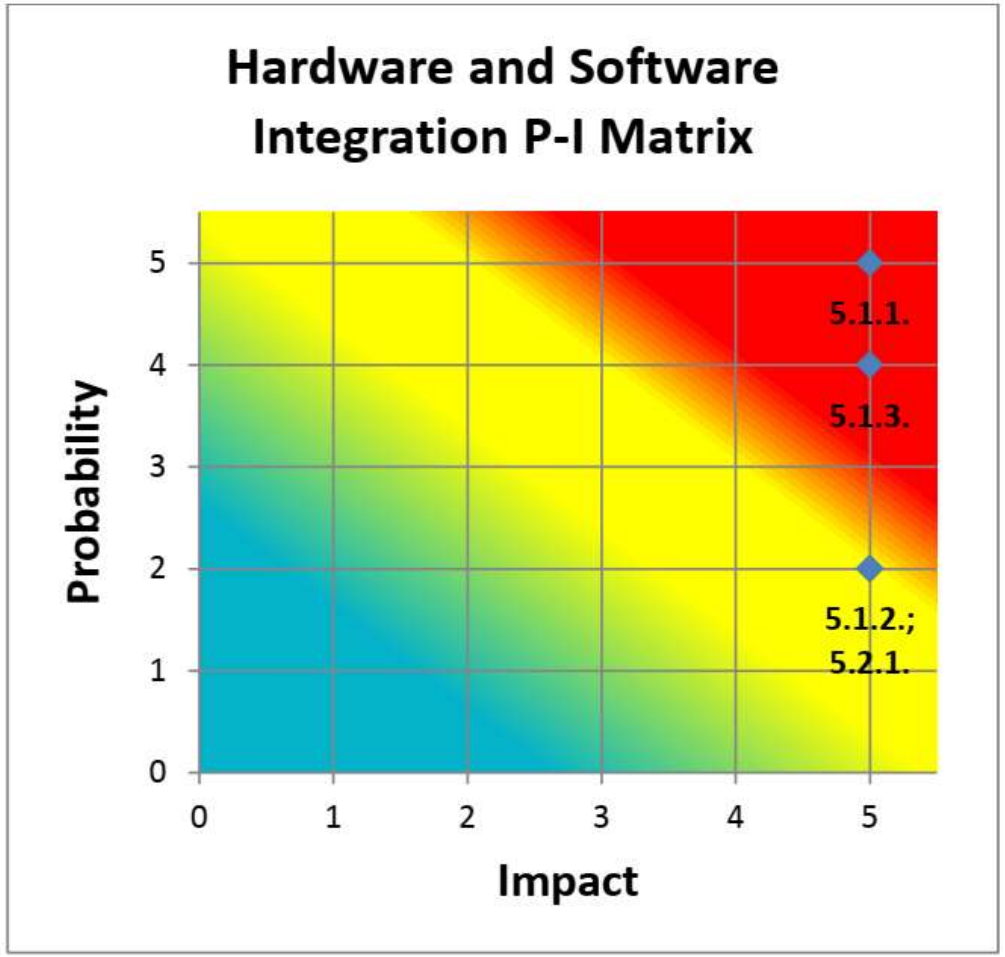


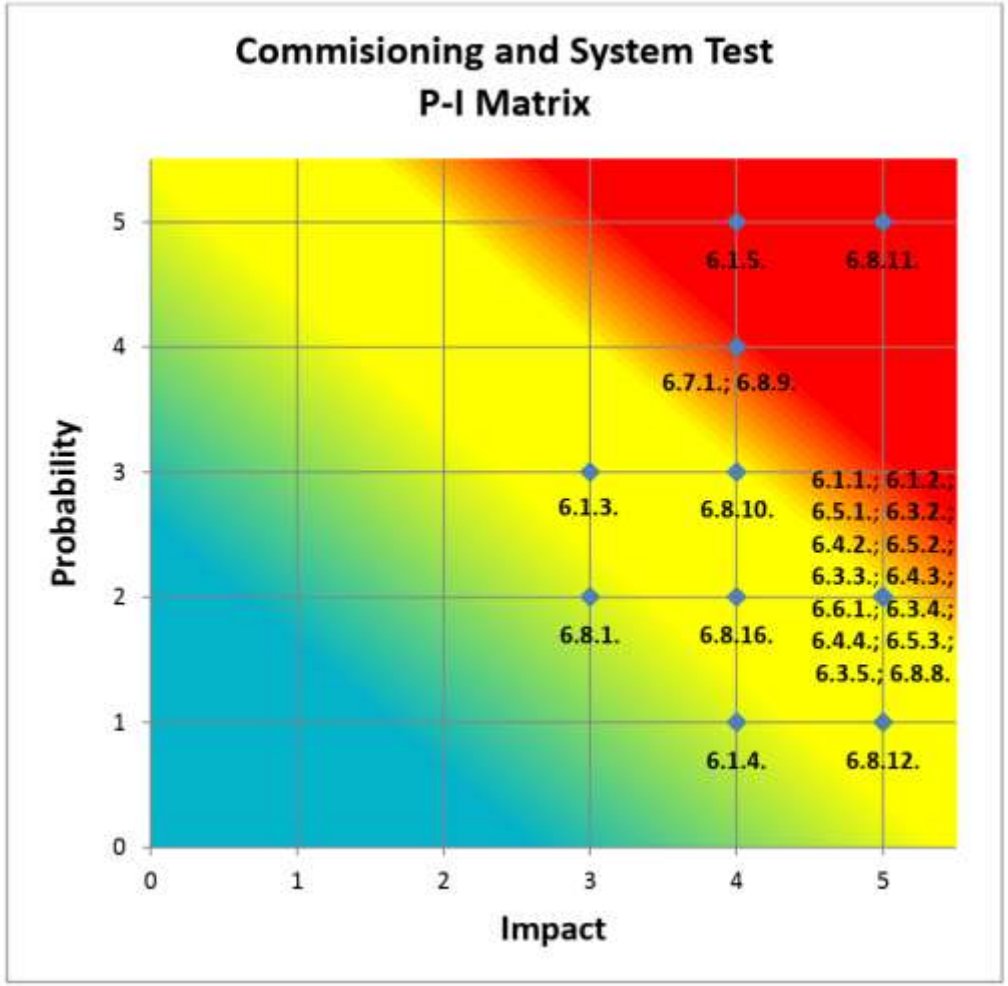
CSP Project Risk Analysis





CSP Project Risk Analysis





CSP Project Risk Analysis

5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5
Probability	**1**	**2**	**3**	**4**	**5**
Risk Levels	**Impact**				

Figure 4.40 : Risk level priority.

Future Perspectives and Priorities

- Demo plant
- System integration
- Cost reduction
- Lightweight heliostat development
- Thermal storage integration
- Hybrid plant design
- High temperature cycles / CSP plants
- Ceramic/composite materials
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