Mohamad Samhori

Senior Thermodynamics, Refrigeration & Control Systems Engineer- Air conditioning, Heat pumps and dehumidification

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Professional Profile

Senior Thermodynamics, Refrigeration and Control Systems Engineer with 25+ years of experience in vapor-compression systems, inverter heat pumps, air conditioning and dehumidification products. Proven track record in owning thermodynamic performance while also designing advanced control logic and algorithms to achieve optimal efficiency, stability and reliability. Expert in refrigeration cycle optimisation, fin-and-tube heat exchanger design, psychrometric analysis, laboratory validation. Strong ability to bridge modelling, real-world testing and control implementation for high pressure ratio environments, delivering high COP and robust operation.

Core Expertise

- Vapor-compression refrigeration cycles (Variable speed, Enhanced vapor injection, R290, R32, low-GWP blends such as R454C and R455A)
- Psychometrics: latent/sensible loads, moisture removal
- Detailed fin-and-tube heat exchanger modelling: geometry (rows, fin pitch, horizontal & vertical tube spacing), air- and refrigerant-side pressure drop, heat transfer coefficient on the air side and refrigerant side, optimization using EES and CoilDesigner
- Sub-cooling circuit design to improve EER, and flash-gas bypass to improve the efficiency
- Distributor, capillary and refrigerant piping design to ensure uniform two-phase distribution and avoid maldistribution in heat exchangers
- Enhanced Vapor Injection (EVI) / economized cycles for high-lift and high-ambient efficiency improvement
- Liquid injection strategies to control discharge temperature and enable safe operation at high pressure ratios
- High-ambient system design and optimisation
- Simulation & modelling: EES, VapCyc, CoilDesigner, MATLAB
- Control logic & algorithms: compressor speed, EEV, fan control, defrost, protections, oil management
- System architecture & communication: CANbus, Modbus, multi-controller systems
- State-machine based control design (I-Logix / StateFlow)

- Laboratory validation, climate chamber & psychrometric testing, data correlation
- Technical documentation: specifications, design notes, test reports, certification support
- Cross-functional leadership: mechanical, electronics, software and test teams

Professional Experience

Bosch – Senior Refrigeration, Thermodynamics & Controls Engineer (Oct 2024 – Present)

- Own and optimise heat-pump refrigeration circuits and control strategies for performance, efficiency and reliability.
- Adapt low GWP refrigerants such as natural refrigerants (R290) as we as blends (R454C/R455A)
- Develop detailed thermodynamic and cycle models using EES and VapCyc,
- Model and optimise fin-and-tube heat exchangers using EES and CoilDesigner: number of rows, fin pitch, tube spacing, circuiting, air-side and refrigerant-side pressure drops, and UA matching to system targets.
- Design sub-cooling circuits and subcoolers to improve capacity and overall cooling efficiency.
- Design distributors, capillaries and refrigerant pipe routing to ensure uniform two-phase distribution and avoid maldistribution.
- Develop and assess Enhanced Vapor Injection (EVI) / economizer (and flash tank) concepts to improve COP and capacity under high lift.
- Define liquid injection control strategies to limit compressor discharge temperature and enable stable operation at high pressure ratios (UAE conditions).
- Specify and evaluate compressors, heat exchangers, distributors, EEVs, four-way valves and fans.
- Design and support implementation of control algorithms aligned with thermodynamic performance targets.
- Analyse and mitigate two-phase flow maldistribution, noise and instability through design and controls.
- Define test plans, execute development tests and correlate simulation results with laboratory data.
- Produce technical specifications, design notes and performance documentation for product readiness and certification.
- Drive optimisation of existing product platforms focusing on COP, robustness and manufacturability.

Bosch–Electra Joint Venture – System, Thermodynamics & Control Logic Engineer (Nov 2013 – Sep 2024)

- Technical owner of Air-to-Water inverter heat pumps and air conditioners, covering both thermodynamics and controls.
- Performed vapor-compression cycle analysis using EES and VapCyc to guide system architecture decisions.
- Conducted fin-and-tube heat exchanger simulations using CoilDesigner.

- Researched and introduced low-GWP refrigerants (R32, R454C, R455A).
- Led control algorithm team designing state-machine based logic for compressors, EEVs, fans and system protections.
- Defined system architecture and communication protocols (CANbus, Modbus).
- Executed climate chamber and psychrometric testing to validate performance and control stability.
- Interfaced with customers and cross-functional teams on performance, features and trade-offs.

Airwell China – Control Algorithm & Thermal Systems Engineer (Jan 2006 – Oct 2013)

- Designed control strategies and thermal concepts for Air-to-Water heat pumps, VRF, split and multi-split systems.
- Developed advanced EEV, compressor and fan control algorithms to maximise efficiency and stability.
- Defined controller I/O, sensors, system architecture and inter-controller communication.
- Conducted extensive psychrometric laboratory testing and performance data analysis.
- Supported mechanical and hardware teams with thermodynamic insights and optimisation feedback.
- Developed diagnostics, fault handling and user interfaces to improve reliability and serviceability.

Electra Consumer Products – Control Algorithm Engineer (Dec 2000 – Dec 2005)

- Developed control logic for fixed-speed and inverter air-conditioning systems.
- Performed table testing and psychrometric lab testing to validate thermal performance and algorithms.

Degem Systems – Mechanical Engineer (Jun 1998 – Nov 2000)

- Designed training systems for air-conditioning and refrigeration including miniature DX systems.
- Integrated thermodynamics, heat transfer and troubleshooting simulations into training software.

Education

B.Sc. in Mechanical Engineering – Specialisation in Thermodynamics, Heat Transfer, and Mass Transfer
Tel-Aviv University, Israel

Simulation, Programming & Tools

- EES (Engineering Equation Solver) – cycle and system modelling
- CoilDesigner – fin-and-tube heat exchanger simulation
- VapCyc – vapor-compression cycle analysis
- MATLAB, StateFlow, basic Simulink
- I-Logix state machines for control design

- MS Excel, Word, PowerPoint, Visio

Languages

- Arabic – Native
- Hebrew – Fluent
- English – Very good (technical & professional)
- Chinese (Mandarin) – Working proficiency