Prof. Saliya Jayasekara

B.Sc. (Eng.), M.Sc. (Sweden), Ph.D. (Melbourne)

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Google Scholar:

https://scholar.google.com/citations?user=3w_QBY0AAAAJ&hl=en&citsig=AMD79op3BPA8ykRcC abv13qBWpGdUoVUCg

QUALIFICATIONS

Jan 2010 – March 2013	PhD Studies The University of Melbourne, Australia Thesis: "Thermodynamic Performance Enhancement and Optimization of Decentralized Power Systems for Bulk Energy Consumers"
Sep 2001 - May 2003	Master of Science – Heat and Power Royal Institute of Technology, Sweden
Aug 1996 - Oct 2000	Bachelor of Science - Mechanical Engineering University of Moratuwa, Sri Lanka

AWARDS AND SCHOLARSHIPS

- Research fellow, School of Engineering, Geelong Waurn Ponds Campus, Deakin University Australia
- Full scholarship for higher studies from Swedish International Development Cooperation Agency
- Australian Post Graduate Award (APA) for PhD studies
- Best paper award from International Symposium on Green Manufacturing Applications in Seoul, Korea

DEMONSTRATED SKILLS and ACHIEVEMENTS

Extensive experience in the design of power plants and thermal systems

In Overseas

 Lead design engineer for the detail design of 1.5 MW and 4 MW, 1200 kPa D type water tube steam boilers complying with AS1228, AS4343 and AS4041 from scratch to manufacture in China. The detail design entailed not only the thermo/fluid analysis but also pressure part design, hazard specification, wind and seismic loading design, nozzle external loading design (FEA), detail design of two condensate flash vessels to AS1210, feed pump sizing and the design aspect relating to site installation matching with existing equipment.

- Lead design engineer for the detail design of 3.5 MW, 1500 kPa reversed flame wet-back hot water heater with stainless steel fined tube condensing economiser at Hunt Boiler Victoria Australia. Preparation of pressure vessel design documents including all drawings for external verification and registration.
- Proposed technical feasibility and preliminary cost estimate including the design on aspects of waste heat recovery system associated with 200°C, 2.7 MW exhaust gas stream at GM Holden Ltd. Victoria Australia.
- Lead research engineer for the development of fully computerised thermal performance and flow characteristic laboratory at Hunt boilers Braeside, Australia. This enabled us to analyse the performance of heat exchanger materials used in different types of finned tube banks (tube banks with composite materials)
- Lead engineer for investigation and solution implementation using CFD modelling to enhance two under capacity boilers (2 X 3.5 MW) at Melbourne airport Australia. Chimney redesign and increased turbulence inside the fire tubes enhanced the operating capacity of the heaters from 3.1 MW to 3.55 MW. This saved the company reputation and thousands of dollars.
- Lead design engineer for the design and specification of all equipment in the waste heat recovery system for 4217 kWe solar turbine (Caterpillar) co-generation project in NSW Australia. Review and design of "O" type heat recovery steam generator (HRSG) including water wall furnace, mild steel finned tube convection coils and stainless steel economizer. Developed performance data for the HRSG, such as the duct burner gas consumption, as well as steam production rates for different scenarios (fired, unfired and 700 kW turbine output)
- Consultation on design and manufacture of de-aerator tank (4 m³) for the cogeneration plant that burns waste generated from VISY paper plant in Campbellfield, Victoria Australia. The contaminated condensate resulting from drum water (condensate in the process at 12 barg) that is used in attemperator was identified as a big threat to the back pressure turbine (operating at 64 barg).
- Successful sizing and design of 3 X 500 kW, 11 barg saturated steam boilers for the refurbishment of old steam ferry in Hobart Australia. The old abundant double acting two stage stem engine with no name plate data complicated the sizing process of boilers that were to be fixed in a narrow space under the boat deck.
- Evaluation of the safety valve pipe designs of 3 X 6 MW hot water heaters in northern water treatment plant where the consultants came up with miscalculations. The correct stress analysis avoided the installation of bellows that reduce the impact from silencers.
- Successful completion of design calculations and drafting (AS 1797/BS EN 12953/BS 2790) of shell boilers from 2000 pph to 24000 pph (from & at 100°C) at 150psi & 250 psi for MechMar Corporation Berhard Malaysia.

In Sri Lanka

- Member of the TEC (coal procurement) for 900MWe coal fired Lakvijaya Power Plant at Norochcholai Sri Lanka. Responsible for the verification and development of coal specification, penalty functions, tender documents, implementation of energy management program to reduce the plant heat rate, reporting to Secretary the ministry of Power and Energy.
- Member of the special investigation committee to review procurement of Coal of Lanka Coal Company (Pvt.) Ltd. During the period from 2009-2015 appointed by Committee on Public Enterprises (COPE) the Government of Sri Lanka.
- A member of the Committee appointed by the President of Sri Lanka on November 30th 2022 to look into the incidents of Liquefied Petroleum Gas (LPG) cylinder fires and explosions that occurred at domestic, commercial, and sales outlets in various parts of the country. A compressive report on the root cause of island wide gas explosions were handed over to the president.

- Lead engineer and chair of technical committee member for the design & build of roof mounted grid tied net- plus solar power systems for six international cricket stadiums in Sri Lanka totalling 3353kWp of installed capacity and 4744MWh/year of calculated annual energy yield.
- Key member of the team engaged in sizing and designing of 1MWe biomass fired power plant "Dendro" including steam turbine & condenser, boiler, cooling tower, feed water tank, steam and water circulation pipe network, de-aerator, ejectors (vacuum pump), DM plant, FD and ID fans in Sri Lanka. Lead mechanical engineer in designing and installation of counter flow air to air heat exchanger for firewood drying.
- Consultant for the design and specification of all mechanical equipment in the proposed 3 MWe biomass thermal power plant in Dehiattakandiya, Sri Lanka under the proponent of IFC and implemented by Vidullanka. Estimated total cost of the project is well over 4 million USD.
- Project manager for sizing, installation, and commissioning of 2 x 500kWe generator set run on producer gas at Thirappane Sri Lanka. 1500MWt producer gas generator (Gasifire) turns locally sourced biomass of approximately 2 inches into producer gas for the converted comings Diesel engine to Otto engine.
- Successful renovation of 500 kWe condensing power plant fired by saw dust and barks at Ikatan Chun Lee sawmill Malaysia. System design and thermo/fluid assessment of two wood weathering chambers including a flue gas condensing air to air heat exchanger that was developed from scratch.
- National consultant for the project "Promoting Sustainable Biomass Energy Production and Modern Bio-Energy Technologies" jointly implemented by United Nations Development Program and Sri Lanka Sustainable Energy Authority. Conducted than 20 feasibility studies at different institutes including Lion Brewery Ceylon (Pvt.) Ltd., Camso Loadstar (Pvt.) LTd. and South Asia Textile Industries Lanka (Pvt.) Ltd for switching from fossil fuel to biomass.
- Consultant team leader for the feasibility study completed for the implementation of tri-generation power system (CCHP) at Biyagam export processing zone conducted by Sri Lanka Sustainable Energy Authority.
- The leader of the team appointed by the University of Moratuwa to conduct the root cause analysis of roller press failure at Siam City Cement, Galle, Sri Lanka. The full insured sum of was 700,000USD. A comprehensive failure analysis report was submitted to Sedgwick Singapore Pte.. Ltd., Singapore.
- The leader of the team appointed by the University of Moratuwa to the root cause analysis of condenser failure of three 360 TR water cooled chillers at Araliya Beach Resort and Spa Unawatuna, Sri Lanka. The full insured sum of was 200,000USD and A comprehensive failure analysis report was submitted to Ceylinco Insurance PLC Sri Lanka.
- Conducted feasibility analysis followed by designed and installation of waste heat recovery system and steam supply pipelines from 24 MWe Wartsila Vasa 12V32 engines at Lakdanavi power plant to Trelleborg Lanka. The length of the steam supply and condensate return was 1.2 km of 15000 kg/h capacity at 10 barg pressure.

EMPLOYMENT HISTORY

February 2022 – Up to Date

Professor in Mechanical Engineering at the Department of Mechanical Engineering

January 2016 – February 2022 Senior Lecturer University of Moratuwa | <u>www.mrt.ac.lk</u> Katubadda

Key Responsibilities

- Leading and supervision of research students
- Teaching undergraduate and post graduate students in thermodynamics and energy related subjects

• Administration and coordination of undergraduate and post graduate course subjects

April 2018 – March 2019 Research fellow School of Engineering Geelong Waurn Ponds Campus Deakin University Australia

Key responsibilities

- Numerical modelling and heat transfer simulations in micro channel heat exchanger
- Curriculum development at Project-Oriented Design-Based Learning (PODBL) units
- Teaching undergraduate engineering students

March 2013 – December 2015 Research and Design engineer Hunt Boilers | www.forbesaust.com.au 11 Helen Kob Dr, Braeside VIC 3195

Key responsibilities

- Evaluation of the performance (based on BS 845) of the existing fined tube economizers, condensing economizers, boilers, hot water heaters and HRSGs for possible improvements. Coordinate the site performance tests accordance with the BS 845.
- Carry out detailed design calculations and evaluations of all designs in the company complying with pressure vessel design codes AS 1228, AS1210, AS 4041 AS4343 and development of computer software for AS 1228 and AS1210.
- Improve the effectiveness of all fined tube condensing economisers used in hot water heaters and boilers. Carry out heat exchanger design using TEMA standards and STX (computer software) for the design of heat exchangers to TEMA requirements.
- Design and development of the test rig to determine heat transfer properties of plain and wavy fined tubes, segmented fined tubes, boiler tubes and plates including the fluid dynamic characteristics when used in a tube bank.
- Overall technical design to client's specification and optimisation of final design for estimating and proposal bids.
- Carry out all aspects of the design as required and to supervise the drafting of equipment from sketches to manufacturing drawings for client approval and shop fabrication purposes.
- Compile and formulate boiler drawings and pressure vessel design specification for the boiler design technology transfer to newly built Hunt manufacturing facility in China under a licensing agreement on boiler design technology. This involved the compilation of both in-house engineering design standards and boiler design computer programmes.

June 2009 – April 2010 Industrial Technical Service Manager The SWITCH-Asia "Greening Sri Lanka Hotels" project | *www.chamber.lk* The Ceylon Chamber of Commerce, 3rd Floor IBM Building No. 48 Navam Mawatha, Colombo

Key responsibilities

- Promotion of the project among target groups, stakeholders and selected SMEs
- Baseline surveys and baseline setting of energy consumption
- Development of energy consumption/generation evaluation protocol for EME sector
- Development of energy information database for baseline setting
- Technical advisory services, support and training for hotels in energy management and implementation of sustainable energy utilization strategies.
- Set up of Resource Management Circles and monitoring the progress
- Organising recognition awards

Aug 2005 – June 2009 Senior Design Engineer MechMar Coporation Berbar

MechMar Coporation Berhard | www.mechmar.com.my Hicom-glenmarie Industrial Park, 40150 Shah Alam, Selangor, Malaysia

Key responsibilities

- Calculate and determine pressure part specifications of boilers (packaged/utility), drums, vessels, reactors, high-pressure steam distribution pipe networks in accordance with previous Australian AS 1797, British BS 2790, BS EN 12953 and ASME Section 1 standards.
- Sizing/design and installation of mini thermal power plants (run on palm oil residues and saw dust) on back pressure or condensing modes.
- Prepare all required documents to obtain necessary approvals from third party inspection bodies such as Malaysia DOSH (JKKKP) approvals for construction.
- Plan, schedule and supervise surveying activities related to piping, mechanical equipment and facilities measures for system installation

May 2003 – Jul 2005 Mechanical Engineer

Lanka Transformers Limited | www.lankatransformers.com 02, Park Street Colombo 07 Sri Lanka

Key responsibilities

- Manage, plan, control and coordinate construction activities which involved interpreting site contracts, identifying potential risks and mitigating risks via preventive measures, managing subcontractors, capacity planning and allocation, directing the execution of works in accordance with contracts, overseeing compliance with contract procedures and reviewing project plans.
- Collaborate and work closely with suppliers of different scopes in supplying boilers, turbines and other accessories to ensure the compatibility and integrity between components through their specification, performance and previous projects in similar capacity

PUBLICATIONS

Journal papers

- **S. Jayasekara**, J. Siriwardana, and S. Halgamuge, "Enhanced thermal performance of an absorption chiller fired by multiple dynamic heat sources," International Journal of Precision Engineering and Manufacturing 13 (2012), 1231-1238.
- **S. Jayasekara**, S. Halgamuge, "Mathematical modelling and experimental verification of an absorption chiller including three dimensional temperature and concentration distributions", Applied Energy, vol. 106, pp. 232–242, 2013.
- **S. Jayasekara**, S. Halgamuge, "Optimum Sizing and Tracking of Combined Cooling Heating and Power Plants (CCHP) for Bulk Energy Consumers", Applied Energy, vol. 118, pp. 124-134, 2014.
- **S. Jayasekara**, S. Halgamuge, "A combined effect absorption chiller for enhanced performance of combined cooling heating and power systems", Applied Energy, vol. 127, pp. 239-248, 2014.
- J. Siriwardana, **S. Jayasekara**, and S. Halgamuge, "Potential of air-side economizers for data centre cooling: A case study for key Australian cities," Applied Energy, vol. 104, pp. 207-219, 2013.

Conference papers

- **S. Jayasekara**, J. Siriwardana, and S. Halgamuge, "Modulating flow cascade heat recovery for improved CCHP performance with minimum exergy destruction," International Symposium on Green Manufacturing and Applications, Seoul, Korea, 2011, (**Winner of the best paper award**).
- **S. Jayasekara**, S. K. Halgamuge, "A review on optimization strategies of combined cooling heating and power generation", International Conference on Information and Automation for Sustainability, IEEE 6th ICIAfS in Beijing, China, September 2012.
- J. Siriwardana, **S. Jayasekara**, and S. Halgamuge, "Non-linear thermal aware optimization of data centre equipment upgrade," in Proc. 2010 Annual International Conference on Green Information Technology, 2010.

- K. Thurairaja, A. Wijewardane, **S. Jayasekara**, C. Ranasinghe, "Mathematical modelling of thermal efficiency and exergy analysis for Organic Rankine Cycle for electricity generation". IESL 112th Annual Sessions, 2018.
- K. Thurairaja, A. Wijewardane, C. Ranasinghe, **S. Jayasekara**, "Working fluid selection and mathematical modelling of Organic Rankine Cycle for Electricity Generation," 5th International Conference on Power and Energy Systems Engineering (CPESE2018), Nagoya University, Japan, 2018.
- Y. M. C. L. Yapa, S. Jayasekara "Design modelling and performance analysis of a recycling drum drier for a salt absorbent", 4th international conference on mechatronics and machine design (ICMMD 2020), Singapore

PROFESIONAL REGISTRATION

• Assessed as a professional engineer by the Engineers Australia (ref no. ASCO 2126-11)

REFEREES

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