

## BIO-DATA



1. **Name** DR. KRISHNAN SIVARAMAN
2. **Designation** Associate Dean-R&D and Industrial Liasoning,  
Associate Professor-Mechanical Engg  
Powai, Mumbai 400072
3. **Residential Address** Email: Krishnan.sivaraman@fcrit.ac.in  
Ph; 9920735865
4. **Date of birth** 11<sup>th</sup> April
5. **Total Experience** 22 yrs (Industrial, L&T Heavy Engineering)  
**Teaching** 2 yrs
6. **Qualifications**

| <b>Exam Passed</b> | <b>Year</b> | <b>Institution/ University</b>         | <b>Branch/Specialization</b>   |
|--------------------|-------------|--|--------------------------------|
| PhD                | 2016        | Indian Institute of Technology, Bombay | Welding/ Mechanical            |
| IWE                | 2008        | International Institute of Welding     | International Welding Engineer |
| ME                 | 2001        | PSG College of Technology, Coimbatore  | Industrial Metallurgy          |
| B.Tech             | 1999        | Calicut University, Kerala             | Mechanical Engineering         |

## 7. Employment Record

| Institution                                  | Year<br>(From To)      | Designation   |
|--|------------------------|---|
| Larsen & Toubro, Heavy Engineering IC, Powai | March 2001 to Dec 2022 | Sr. DGM – Manufacturing Technology, Digital and SCM |

- Well-qualified and technically proficient Engineer having more than 21 years of Industrial experience
- Experience in handling fabrication of high-pressure heat exchangers and pressure vessels for Refinery, Petro chemical, Fertilizer and Power plants to various codes/ standards and specifications of various Process Licensors
- Substantial experience in handling various materials, welding metallurgy, sophisticated welding techniques and technologies: welding processes, welding power sources, welding automation, Internal bore welding, orbital welding, weld overlay, PWHT, material testing, mechanical testing, welder training & qualification, failure analysis, weld repair, weld distortion, etc.
- Expertize in trouble shooting and technically guiding the QC and welding team for repair welding at various customer sites (Fertilizer, Petrochemical & Refineries) during plant shut down
- Experience in handling welding documentation and execution for EPC projects

## 8.0 Undergraduate / Postgraduate Teaching Experience and Subjects Taught

### Subjects Taught at UG level

| Sr.No. | Name of Subject                     | Semester |
|--------|-------------------------------------|----------|
| 1.     | Operations Planning and Control     | VIII     |
| 2.     | Logistics & Supply chain Management | VII      |

### Subjects Taught at PG level

| Sr.No. | Name of Subject | Semester |
|--------|-----------------|----------|
| 1.     |                 |          |

## 9. Research and Development Experience

- Developed welding procedures for various grades of Stainless Steel, Duplex & Super Duplex SS for single & double layer weld overlay using ESW (Electro Slag Strip Cladding) process
- Developed Internal Bore welding (IBW) technology for the welding of 2.25 Cr-1Mo and 9 Cr-1Mo steel for critical process plant and Nuclear application
- Established welding procedures for welding of high thickness Cr-Mo steels including Cr-Mo-V, Stainless Steels etc.

- Development, qualification and execution of automatic Tube to Tube sheet welding under Saipem/Toyo/ UreaCasale/ Stami Carbon for various Urea applications. This Includes the welding of 5 &17 mm projection bimetallic tubes by automatic orbital welding
- Development and implementation of automatic crevice free tube to tube sheet welding for Waste heat boiler application for the first time in India
- Developed and established large scale automation of tube to tube sheet welding for heat exchanger application involving CS, LAS, SS, Duplex, Super duplex, Inconel, Titanium, Zirconium metallurgy etc.
- Development of welding Technology for welding highly critical materials like 5Cr-0.5 Mo and Mod 9 Cr-1Mo (P91)
- Development of Robotic Stellite 1 + Stellite 6 weld overlay in elbow ID for refinery application using PAW
- Development of welding procedures for modified 9Cr-1Mo material by pulsed GMAW using solid and metal cored wire (PhD project)

#### 10 Research Funding / Consultancy Services:

| Sr.No. | Name of the Company | Address     | Product           | Consulting Service   | Consulting Fees | Period |
|--------|---------------------|-------------|-------------------|--|-----------------|--------|
| 1      | KSFL                | Shajahanpur | Waste Heat Boiler | Investigation of leakage in Waste Heat Boiler              | --              | 2007   |
| 2      | GSFC                | Vadodara    | Hot header        | Emergency Repair of hot header                             | --              | 2007   |
| 3      | Ramuniya,           | Malaysia    | Heavy lift Crane  | Investigation of Crack in crane                            | --              | 2007   |
| 4      | GNFC                | Bharuch     | Waste Heat Boiler | Repair of Waste Heat Boiler                                | --              | 2008   |
| 5      | CFCL                | Kota        | Urea Reactor      | Investigation of Cracks in Titanium liner for Urea Reactor | --              | 2009   |
| 6      | CFCL                | Kota        | CO2 Absorber      | Investigation of shell rupture in CO2 Absorber             | --              | 2010   |

|    |      |          |                   |  |    |      |
|----|------|----------|-------------------|--|----|------|
| 7  | CPCL | Chennai  | Airfin Cooler     | Investigation of leakage in Airfin Cooler      | -- | 2014 |
| 8  | RIL  | Jamnagar | Coke Drum         | Emergency Repair of Coke Drum                  | -- | 2018 |
| 9  | SRF  | Dahej    | Reactor           | Material selection for HF service              | -- | 2018 |
| 10 | RCF  | Thal     | Urea Reactor      | Investigation of Shell rupture in Urea Reactor | -- | 2018 |
| 11 | CFCL | Kota     | Urea Reactor      | Investigation of Shell rupture in Urea Reactor | -- | 2019 |
| 12 | NFL  | Vijaipur | Urea Reactor      | Investigation of leakage in Urea Reactor       | -- | 2019 |
| 13 | SRF  | Dahej    | Tubular Reactor   | Repair methodology for Tubular Reactor         | -- | 2019 |
| 14 | IOCL | Panipat  | Coke Drum         | Bulge Repair of Coke Drum                      | -- | 2019 |
| 15 | HMEL | Bhatinda | Bath tub          | Repair of Bath tub in FCCU plant               | -- | 2019 |
| 16 | RIL  | Hazira   | Dissolver Reactor | Repair in Dissolver Reactor                    | -- | 2020 |

#### Research Grants:

| Sr.No. | Name of Funding Organization | Type of Grant     | Amount (Rs.) | Year | Name of Research Project                            |
|--------|------------------------------|-------------------|--------------|------|---|
| 1      | DST                          | Industry Academia | 20,00,00     | 2011 | Weld Quality Monitoring by Acoustic Emission Method |

#### Technical Collaboration / Consultancy with Industries

| Sr.No. | Name of the Funding Organization    | Type of Support     | Amount (Rs.) | Year               |
|--------|-------------------------------------|---------------------|--------------|--------------------|
| 1      | Exacta Fluid Engineering, Ahmedabad | Welding consultancy | --           | 2023-24<br>2024-25 |
| 2      | Nilkamal Limited, Sinnar            | Welding consultancy | --           | 2023-24            |
| 3      | Lubrizol, Mumbai                    | Welding consultancy | --           | 2023-24<br>2024-25 |
| 4      | Crystal Industrial, Mumbai          | Welding consultancy | --           | 2023-24<br>2024-25 |
| 5      | Kadant, Chennai                     | Welding consultancy | --           | 2023-24            |

- 11 Professional Societies Fellowship / Membership :** Indian Institute of Welding  
· (Life member), Indian welding society (Life member), Indian Institute of Metals (Life member) and Fellow Institution of Engineers

**12 Achievements / Awards / Position**

- - **Vice chairman** of the **Indian Institute of Welding**, Mumbai branch
  - Group member of the **consultative committee of young scientists** formed by the Department of Science and Technology (2018-21) – GOI initiative
  - Acted as a member of the **Project Review and Monitoring Committee (PRMC)** for establishment of CoE Welding at PSG Tech, Coimbatore - DHI Initiative.
  - Received the prestigious **Dynaimc Welding Engineer Award-2022** at National level from WeldFabtech towards significant contribution for Nation building
  - Received the prestigious **Dynaimc Welding Engineer Award-2019** at National level from WeldFabtech towards significant contribution for Nation building
  - Received the prestigious **Placid Rodriguez memorial lecture award -2015** at National level from IIW as **young scientist** in the field of welding
  - Received **Weldman Award for the paper** presented in the National Welding Seminar 2014 held at Jamshedpur
  - Received **Young Technologist Award – 2012 at National level from Indian Welding** society
  - Received **Best National Welding Engineer award** from Indian Institute of Welding- 2008
  - Received **KCP award for the paper** titled "Improvements in Tube to Tube Sheet Welding for Waste Heat Boiler Applications" presented in the IIW IC 2008 held at Chennai in Jan 2008.
  - Received **Best paper award** for the paper titled "Automation of Tube to Tube sheet welding using GMAW process for RG/ CG Boilers" presented in the IIW Annual welding seminar held at Mumbai in Jan 2003
  - Acted as **Technical committee chairman** in many Seminars/ conferences organized by IIW
  - Faculty for the **International Welding Engineer** certification program conducted by the International Institute of Welding
  - Acted as Examiner for MS (Welding) program at MS University Baroda
  - Expert member of Thesis Advisory Committee (TAC) for PhD in NMIMS
  - Examiner for M.Tech (Thesis) at IIT Bombay Mechanical Engineering
  - Member of Board of studies – Department of Metallurgy, PSG College of Technology, Coimbatore

**13 Projects guided in UG/PG level: 10 ME Projects** from the L&T and MS University

- Baroda led ME Welding Program
  - BE (4 Nos)
  - PhD – 2 Nos (Undergoing)

**- Short Term Training Programmes attended/ Conducted:**

| Sl No | Courses/Workshops/Seminars   | Role   | Year |
|-------|--|--|------|
| 1     | Annual welding seminar – Indian Institute of welding, Mumbai         | Organizing committee member and Technical committee chairman | 2013 |
| 2     | Work shop – Welding Technology - Indian Institute of welding, Mumbai | Organizing committee member and Speaker                      | 2014 |
| 3     | Annual welding seminar – Indian Institute of welding, Mumbai         | Organizing committee member and Technical committee chairman | 2015 |
| 4     | National welding Seminar - IIW                                       | Technical committee member                                   | 2015 |
| 5     | Annual welding seminar – Indian Institute of welding, Mumbai         | Organizing committee member and Technical committee chairman | 2017 |
| 6     | Workshop- SS welding made easy                                       | Organizing committee member and speaker                      | 2018 |
| 7     | Work shop – Low alloy steel welding made easy                        | Organizing committee member and speaker                      | 2018 |
| 8     | Annual welding seminar – Indian Institute of welding, Mumbai         | Organizing committee member and Technical committee chairman | 2019 |
| 9     | International welding congress 2020-IIW                              | Organizing & technical committee member                      | 2020 |

**15. List of Journal Papers Published**

- i. Krishnan, S., Kulkarni, D.V., De, A., 2015. Probing pulsed current gas metal arc welding for modified 9Cr-1Mo Steel. J. Mater. Eng. Perform. 24, 1462-1470. (ISSN: 1059-9495)
- ii. Krishnan, S., Kulkarni, D.V., De, A., 2015. Pulsed current gas metal arc welding of P91 steels using metal cored wires. J. Mater. Process Tech. 229, 826-833. (ISSN: 0924-0136)
- iii. Krishnan, S., Kulkarni, D.V., De, A., 2016. Multipass pulsed current gas metal arc welding of P91 steel. Sci. Technol. Weld. Joining. 21, 171-177. (ISSN: 1362-1718)
- iv. Sivaraman, K., Kulkarni, D., 2013. Welding of Stainless Steel - A Heavy Engineering Perspective, Advanced Materials Research, Vol. 794, pp. 380-390, 2013 (ISSN: 1662-8985)
- v. Dr. Krishnan Sivaraman, Abhishek Singh, 2021. Influence on Weldability of P91 Steel with change in composition of Shielding Gas in GMAW Process. International Journal of Mechanical Engineering. Special issue, Volume 6, pp 1201-1207 (ISSN: 0974-5823)
- vi. Dr. Krishnan Sivaraman, Abhishek Singh., 2022. Welding automation for materials used in high corrosive service. Industrial Engineering Journal, Indian Institution of Industrial Engineering VOLUME XV & ISSUE NO.05, pp 29-33 (ISSN: 0970-2555) [UGC CARE LIST]
- vii. Dr. Krishnan Sivaraman, Manish Bhamare, 2022. Stainless steel pipe to pipe weld automation using activated GTAW process. Stochastic Modelling and Applications. Vol. 26 No. 3 (January - June, Special Issue 2022 Part - 9), pp 71-77 (ISSN: 0972-3641) [UGC CARE LIST]

- viii. Dr. Krishnan Sivaraman, Abhishek Singh, 2022. Failure Analysis – An Overview with Case Study. SAMRIDDHI: A Journal of Physical Sciences, Engineering and Technology (ISSN: 2229-7111) [UGC CARE LIST]
- ix. Dr. Krishnan Sivaraman, Karthik Iyer, Abhishek Singh, 2022. Robotic welding applications in pressure vessel manufacturing. Industrial Engineering Journal, Indian Institution of Industrial Engineering (ISSN - 0970-2555) [UGC CARE LIST]
- x. Dr. Krishnan Sivaraman, Ravinder Singh, Abhishek Singh, 2022. Failure Analysis and Field Repair of Urea Reactor, SAMRIDDHI: A Journal of Physical Sciences, Engineering and Technology (ISSN: 2229-7111) [UGC CARE LIST]
- xi. Dr. Krishnan Sivaraman and Abhishek Singh, 2023. A Case study on Lamellar Tearing, VOLUME XVI & ISSUE NO.01. Industrial Engineering Journal, Indian Institution of Industrial Engineering (ISSN - 0970-2555) [UGC CARE LIST]

## 16. List of Papers Published in National and International Conferences

- i. Automation in tube to tube sheet welding for Boiler & Heat Exchanger in severe service conditions: Krishnan Sivaraman, M.K.Mukherjee, & V Chinnasamy, Larsen & Toubro, India. Annual Welding assembly, Commission XI of the International Institute of Welding , Chennai, 2011.
- ii. An Investigation on Effect of Process Parameters on Weld Bead Profile of Modified 9Cr-1Mo Steel by Pulsed GMAW: Krishnan Sivaraman, Dileep Kulkarni & A.De, 67th Annual Welding Assembly Seoul, South Korea, 2014.
- iii. Failure Analysis and Field Repair of Urea Reactor Shell Rupture by Ravinder Singh, Dr. Krishnan Sivaraman and Tushar Bhagwat in the 2021 AIChE Safety in Ammonia Plants Symposium, August 29 – September 2 2021 in San Diego, California
- iv. Finite element modeling to determine stresses in Quenched and Tempered steel: V. Balusamy, S.Jayakant, S.Krishnan, S S Ramakrishnan. IIM Annual seminar, Bhilai, 2001.
- v. Automation of Tube to Tube sheet welding using GMAW process for RG/ CG Boilers: Krishnan Sivaraman & Kishor Khochare, Larsen & Toubro, India. IIW Annual welding seminar, Mumbai, 2003.
- vi. Automation of crevice free Tube to Tube sheet welds on thin wall tube sheets using GTAW process for waste heat Boilers: Krishnan Sivaraman &Kishor Khochare, Larsen & Toubro, India. international welding seminar, Hyderabad, 2005.
- vii. Effect of sulphur in weldability of autogeneous weld joints: Krishnan Sivaraman & M.K.Mukherjee, Larsen & Toubro, India. Design Symposium, Mumbai, 2007.
- viii. Improvements in Tube to Tube Sheet Welding for Waste Heat Boiler Applications: Krishnan Sivaraman, M.K. Mukherjee & R. Ramanujan, Larsen & Toubro, India. IIW IC, Chennai, 2008.
- ix. Lamellar Tearing – Causes & Prevention: Krishnan Sivaraman, Rahul Kulkarni& Jayadeep Joshi, Larsen & Toubro, India. Design Symposium, Mumbai, 2008.

- x. Development of welding procedures for 5Cr ½ Mo materials for High pressure Exchangers: Krishnan Sivaraman, M.K. Mukherjee & Prashant Chubachi, Larsen & Toubro, India. National Welding Seminar, Mumbai, 2009.
- xi. Automation of Crevice free tube to tube sheet joints for Waste Heat boiler applications: Krishnan Sivaraman, M.K. Mukherjee, R. Ramanujan & Pravin Koli. National Welding Seminar, Kolkata, 2010.
- xii. Development of Narrow groove Tandem SAW for Multi-Wall vessels: Krishnan Sivaraman, M.K. Mukherjee, Biswajit Paul, R Ramanujan & Amit Mokashi, Larsen & Toubro, India. National welding Seminar, Visakhapattanam, 2010.
- xiii. Application of high productivity welding processes in pressure vessel manufacturing: Krishnan Sivaraman, Larsen & Toubro, India. International Conference on Challenges in Quality Fabrication of Pressure Vessels & Piping, Indian Welding Society, Delhi, 2011.
- xiv. Development of welding automation for liner welds in Urea Equipments: Krishnan Sivaraman, M.K.Mukherjee, Biswajit Paul, Kaustubh Gune & Amit Mokashi Larsen & Toubro, India. National welding Seminar, Bhilai, 2011.
- xv. Latest trends in Welding and NDT of Boilers & Pressure Vessels: Krishnan Sivaraman, Larsen & Toubro, India. Boiler Awareness programme, Indian Boiler Regulation, Mumbai, 2011.
- xvi. Application of High Productive GTAW in Pressure Vessel Fabrication: Krishnan Sivaraman, M.K.Mukherjee, V.Guruprasad & KarthikIyer, Larsen & Toubro, India. IIW Welding seminar, 2012
- xvii. Failure Analysis & Investigation Methods – An Overview: Surendra Patle, R. Rajkumar & Krishnan Sivaraman, Larsen & Toubro, India. International Welding Symposium (IWS-12K), Mumbai, 2012.
- xviii. Lamellar Tearing – A Case Study: Krishnan Sivaraman & Surendra Patle, Larsen & Toubro, India. Technology Conclave, Mumbai, 2013.
- xix. A Study on Influence of Shielding Gas Composition on Weldability of P91 Steel by GMAW Process: S. Krishnan, B. Gondalia, D.V. Kulkarni (Larsen & Toubro, India) and A. De (IIT-Mumbai). National Welding Seminar, Bangalore, 2013.
- xx. Metal Dusting – Case Study: Surendra Patle, R. Rajkumar & Krishnan Sivaraman Larsen & Toubro, India. OPE Symposium (IWS-12K), Chennai, 2013.
- xxi. Application of semiautomatic welding process for attachment welds: Amit Kadam, Karthik Iyer & Krishnan Sivaraman, L&T. IWS 2K14 symposium, Mumbai, 2014.
- xxii. Failure analysis of Waste Heat Boiler during service: Surendra Patle, Krishnan Sivaraman and R. Rajkumar. NMD ATM, Pune, 2014.
- xxiii. Automation of stainless-steel pipe to pipe welds using activated GTAW process: Manish Bhamare, Krishnan Sivaraman, Deepak Poojary and Deepak Gupta, L&T. National Welding Seminar, Jamshedpur, 2015.
- xxiv. Welding Techniques for boilers and recent trends: Krishnan Sivaraman, Larsen & Toubro, India. Boiler Awareness programme, Indian Boiler Regulation, Sholapur, 2015.



- xxv. Use of Temper Bead Gas Metal Arc Welding (GMAW) for In-situ Repair of Coke Drums by Krishnan Sivaraman in the National welding meet 2020 held at Jamshedpur October 2020
- xxvi. Fabrication of Stainless-Steel Equipment for Cryogenic Application – Recommended Welding Practices at National Welding Seminar 2023 held at Bangalore
- xxvii. Dissimilar Tube-to-Tube Sheet Welding Challenges - A Case Study at AMPP conference, March 2023 held at Denver, United states

**17. Books/Reports/General articles etc.**

Practical aspects of Industrial Welding Processes, Taylor and Francis Books India Pvt Ltd (Book under editing)

**18. Invited Lectures in FDP/ STTP**

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**19. International Conference Technical Program Committee Member / Reviewer :**

International welding congress 2020 conducted by Indian Institute of welding – Technical committee member