Curriculum Vitae

Personal Details

Name Dr. Vivek Shamjibhai Ayar
Date of Birth 08 July 1993
Cell +91 8866771282
E mail vivekahir17@yahoo.com
Sex Male
Nationality Indian
Address 1, Sohampark Society; Nr Atul Vidhya Jyot; Vallabh Vidhyanagar; Anand. Gujarat– 388120

Career Objective

To become a successful professional in the field of **Engineering** and work as an asset for the growth of the organization through constant improvement in knowledge and innovations.

Educational Qualification

Degree	Institute/University	Year & month of Passing	Performance	
			CGPA (out of 10)	Percentage (%)
Ph.D.	Charotar University of Science and Technology (CHARUSAT)	September 2020	Not Applicable (NA)	
M. Tech. (Advanced Manufacturing Technology)	Charotar University of Science and Technology (CHARUSAT)	May 2016	9.26	89.08
B. E. (Mechanical)	DJMIT, Mogar, Gujarat Technological University (GTU)	May 2014	8.40	79.00
H.S.C.	R.P.T.P. Higher Secondary Education complex, GHSEB	March 2010	NA	70.00
S.S.C.	M.U.Patel High School, GSHEB	March 2008	NA	78.31

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Scopus Author ID 57205283356: https://www.scopus.com/authid/detail.uri?authorId=57205283356

ResearcherID (Publons-WoS) AAP-3432-2020: https://www.webofscience.com/wos/author/record/AAP-3432-2020

Google Scholar Profile: https://scholar.google.co.in/citations?user=3ZpfIm4AAAAJ&hl=en

Professional Experience

Assistant Professor
Department of Foundry and Forge Technology
National Institute of Advanced Manufacturing Technology (NIAMT) (Formerly NIFFT), (A Centrally Funded Technical Institute under MoE, Govt. Of India), Ranchi, Jharkhand
Period: October 2023 to till the date

Assistant Professor- Adhoc
Mechanical Engineering Department
Birla Vishvakarma Mahavidyalaya (BVM) Engineering College, Anand
Period: January 2022 to September 2023

Senior Research Fellow (SRF)
Department of Science and Technology (DST), New Delhi, sponsored
SMART Foundry 2020 Project
Period: November 2018 to June 2021

Junior Research Fellow (JRF)
Department of Science and Technology (DST), New Delhi, sponsored
SMART Foundry 2020 Project
Period: November 2016 to November 2018.

Achievements

- **Developed IoT enabled Modular melting, pouring and stirring system for the casting of nonferrous metals and Metal Matrix Composites (MMCs) (This system is about to be commercialized)**
- Received fellowship from Department of Science and Technology (DST), New Delhi, under SMART Foundry 2020 Project
- Awarded for Excellence in Academics at DJMIT (2010-2014)

Reviewer

- Advances in Manufacturing (Web of Science)
- International Journal of Metalcasting (Web of Science)
- International Journal of Automotive and Mechanical Engineering (Web of Science)
- Archives of Foundry Engineering (Web of Science)
- Jordan Journal of Mechanical and Industrial Engineering (Web of Science)
- International Journal on Interactive Design and Manufacturing (Web of Science)
- Journal of the Institution of Engineers (India): Series D (Scopus)
- Canadian Metallurgical Quarterly (Web of Science)
- Australian Journal of Multi-Disciplinary Engineering

Other Activities

- Member of Central Instrument Facility Management Committee at NIAMT (09/07/2024 onwards).
- Prepared a Qualification Pack and Model Curriculum of “Sand Moulder” for Indian Iron & Steel Sector Skill Council (IISSSC).
- Prepared a Consultancy Proposal on Non-Ferrous Casting for Jamshedpur auto cluster units to upgrade the skills of the existing manpower.

Invited Talks

"Basics of High Pressure Die Casting (HPDC)" for L&T Technology services ltd. Vadodara on 05/02/2024

"High Pressure Die Casting (HPDC) Design considerations" for L&T Technology services ltd. Vadodara on 06/02/2024.

"Concept of cavity fill and metal feed in High Pressure Die Casting (HPDC)" for L&T Technology services ltd. Vadodara on 08/02/2024.

"Engineering Materials: Ex-situ and In-situ Metal Composites" at CHARUSAT University- Changa during October 2020.

"Metal Casting: Science Engineering and Technological Prospective" at SPCE-Bakrol during April 2020.

"Metal Casting: Science Engineering and Technological Prospective" at CHARUSAT University- Changa during May 2017.

Publications/Patents

Book/Book Chapter

- **Ayar V.S.,** Book Chapter on "Futuristic Trends in Decision Making Through Artificial Intelligence" in the book entitled "Decision Strategies and Artificial Intelligence Navigating the Business Landscape" with **ISBN No. 978-81-963849-1-3,** San International Scientific Publications, **https://doi.org/10.59646/edbookc16/009**

Patent Filed/Published/Accepted

- **Title: AI Based Cybersecurity Management for Industry 4.0.** Application No.202341065401A. Publication Date: 06/10/2023 in The Patent Office Journal No. 40/2023 Dated 06/10/2023 (Published)

- **Title: Pyrolysis-Based Plastic Waste to Energy Conversion System**. Application No. 202411032277A Publication Date: 10/05/2024 in The Patent Office Journal No. 19/2024 Dated 10/05/2024 (Published)

Copyright Applied/Registered

- **Title: Customized Controlling Panel Code.** ROC No: SW-16498/2023, ROC Date:07 Jun 2023, Diary No.:6576/2023-CO/SW (Registered)

- **Title: Weight Distribution App.** Diary No.:20600/2023-CO/SW (Applied)

International Journals:

1. **Ayar, V.S.,** Khandelwal, H., Parida, S.K., Shah, M.J., Vyas, A.V., Barot, R.P. and Sutaria, M.P., 2024. Design and development of IoT enabled modular melting, pouring, and, stirring system for casting of non-ferrous alloys and sustainable aluminum matrix composites (AMCs). International Journal on Interactive Design and Manufacturing (IJIDeM), pp.1-15. **(IF: 2.1 (TR)). https://doi.org/10.1007/s12008-024-02028-1**

2. Parida, S.K., Murmu, A.M., Hari, V., **Ayar, V.S.** and Das, R., 2024. 3D FE adhesion failure analyses of adhesive bonded single lap joint made with functionally modulus graded curved

adherends. International Journal on Interactive Design and Manufacturing (IJIDeM), pp.1-10. **(IF: 2.1 (TR)). https://doi.org/10.1007/s12008-024-01991-z**

3. **Ayar, V.S.,** Gajjar D.J, and Sutaria, M.P., 2023, Effect of Mechanical Vibration on Microstructure and Mechanical Properties of AlSi5Cu3 Alloy. International Journal of Metalcasting, Vol. 18, pp.2415-2429 **(IF: 2.6 (TR), CiteScore:3.8) https://doi.org/10.1007/s40962-023-01179-3**

4. **Ayar, V.S.** and Sutaria, M.P., 2021, Comparative Evaluation of Ex Situ and In Situ Method of Fabricating Aluminum/TiB_2 Composites. *International Journal of Metalcasting*, Vol. 15, pp.1047-1056 **(IF: 2.6 (TR), CiteScore:3.8) (SCI and SCOPUS indexed) https://doi.org/10.1007/s40962-020-00539-7**

5. Rangrej, S., Mehta, V., **Ayar, V.S.** and Sutaria, M.P., 2021, Effects of stir casting process parameters on dispersion of reinforcement particles during preparation of metal composites. *Materials Today: Proceedings*, *43*, pp.471-475. **(CiteScore:3.2) (Web of science and SCOPUS indexed) https://doi.org/10.1016/j.matpr.2020.11.1002**

6. **Ayar, V.S.** and Sutaria, M.P., 2020, Development and Characterization of In Situ AlSi5Cu3/TiB_2 Composites. *International Journal of Metalcasting*, Vol. 14, pp.59-68. **(IF: 2.6 (TR), CiteScore:3.8) (SCI and SCOPUS indexed) https://doi.org/10.1007/s40962-019-00328-x**

7. Vyas, A.V., **Ayar, V.S.,** and Sutaria, M.P., 2020, Investigation on Reactive Wetting during Investment Casting of Magnesium Alloy AZ91. *Materials Today: Proceedings*, Vol. 26, pp.2452-2457. **(CiteScore:3.2) (Web of science and SCOPUS indexed) (As a Corresponding Author) https://doi.org/10.1016/j.matpr.2020.02.521**

8. Barot, R.P., and **Ayar, V.S.,** 2020, Casting Simulation and Defect Identification of Geometry Varied Plates with Experimental Validation. *Materials Today: Proceedings*, Vol. 26, pp.2754-2762. **(CiteScore:3.2) (Web of science and SCOPUS indexed) (As a Corresponding Author) https://doi.org/10.1016/j.matpr.2020.02.575**

9. Ayar, M.S., **Ayar, V.S.,** and George, P.M., 2020, Simulation and Experimental Validation for Defect Reduction in Geometry Varied Aluminium Plates Casted Using Sand Casting. Materials Today: Proceedings, Vol. 27, pp.1422-1430. **(CiteScore:3.2) (Web of science and SCOPUS indexed)https://doi.org/10.1016/j.matpr.2020.02.788**

10. **Ayar, V.S.,** Mehta, T.R. and Sutaria, M.P., 2018, Enhancement of Mechanical properties of AlSi5Cu3 Aluminum alloy using TiB2 reinforcements. IOP Conference Series: Materials Science and Engineering, Vol. 455, pp. 012127. (CiteScore:1.1) (Web of science and SCOPUS indexed) **https://doi.org/10.1088/1757-899X/455/1/012127**

International/National Conference (Presented/Published):

11. **Ayar, V.S.,** Mehta, T.R. and Sutaria, M.P., 2018 Enhancement of Mechanical properties of AlSi5Cu3 aluminum alloy using TiB_2 reinforcements. 2nd International Conference in Aeromechanical Materials for Manufacturing (ICAAMM 2018) held on 13th and 14th July 2018 at MLR Institute of Technology, Hyderabad.

12. **Ayar, V.S.,** Parmar, H.K and Sutaria, M.P., 2017, Computational Analysis of Ultrasonic Treatment of Melt for Effective Dispersion of Reinforcement Particles. International Conference on Research and Innovations in Science, Engineering &Technology. (Selected papers) (ICRISET-2017), Kalpa Volume 1, Pages 287–293. BVM Engineering College, Gujarat. (**Received Best paper award (3rd prize)**

13. **Ayar, V.S.,** Parmar, H.K, and Sutaria, M.P., 2017, Experimental Evolution of Contact Angle and Surface Roughness During Investment Casting of Mg Alloy. International Conference on Emerging Trends in Mechanical Engineering (ICETME-2017) held on 24th and 25th February 2017 at GCET Engineering College, Anand, Gujarat.

14. **Ayar, V.S.,** Chaudhari, T.K., and Vasava, P.K., 2015, Application of Fuzzy Logic to Develop a Model for Cable Reeling Drum Parameters" National Conference on Recent Research in Engineering and Technology (NCRRET 2015) held on 26th and 27th February 2015 at DJMIT, Anand, Gujarat.

15. **Ayar, V.S.,** Jani, S.S., and Joshi, S.H., 2014 Develop a Model for Cable Reeling Drum with Fuzzy tool in MATLAB" in International Journal of Engineering Development and Research (IJEDR) Volume 3, issue 1, ISSN: 2321-9939.

Ph.D. Title and Abstract

Investigation on AlSi5Cu3/TiB_2 Composites: Process Parameters and Heat Treatment under the supervision of **Dr. Mayurkumar P. Sutaria** (Professor, CHARUSAT University)

In the modern technological world, the development of new materials to fulfil human needs is very important. The effective use of engineering materials is needed to enhance the efficiencies of various mobile and static structural applications. Advances in science, engineering, and technology have led to the development of composite materials having the desired combination of properties like toughness, strength, stiffness, weight, etc., which is not possible to get in conventional materials. Thus, composites are gaining a lot of attention in the field of automobiles, aerospace, electronics, etc. Aluminum Matrix Composites (AMCs) have emerged as strong contenders among others. Aluminum alloy (AlSi5Cu3) is one of the most commonly used material in automobile components and other engineering applications like gearbox, crankcase, tool handles, etc. due to good castability, mechanical properties, machinability, and chemical reaction resistance. Thus, AlSi5Cu3 was used as a matrix material to further extend the applications by modifying the chemistry and structure, leading to the enhancement of mechanical properties. Due to the unique combination of properties like low density, high Young's modulus, high hardness, and high wear resistance, high-temperature stability, TiB_2 is used as a reinforcement material for modifying AlSi5Cu3 and for the preparation of its composites.

Researchers have explored various techniques to develop composites but repeatability, poor wettability between reinforcement (particles) and matrix material, homogeneous distribution of the particles, etc. are major challenges. Melting and pouring data such as melting time, pouring time, pouring temperature, etc., need to be logged systematically. These data provide critical insight to address quality related issues at the post-processing stage and to get consistent properties and quality every time. To address these issues, in the present investigation, a compact, easy to use, and IoT enabled melting and the pouring system was developed to synthesize in situ and ex situ composites.

Processing temperature plays an important role, governing the size and shape of the in situ formed TiB_2 particles. In order to study the effect of processing temperature on the formation of TiB_2 particles, synthesis of composites was carried out at 750˚C, 800˚C, and 850˚C. Composites processed at 750˚C and 850˚C show the presence of irregular needle type unstable $TiAl_3$ intermetallic. Composites processed at 800˚C show the absence of $TiAl_3$ and the presence of polygonal shaped TiB_2 particles (having three to six sides) and most of the particles are hexagonal in shape. The average size of TiB_2 particles is 42 microns.

Comparative evaluation of ex situ AlSi5Cu3/3%TiB_2 composites with in situ AlSi5Cu3/3%TiB_2 composites was carried out. The microstructure of in situ composites shows a homogeneous distribution of TiB_2 particles without agglomeration as compared to ex situ composites. SEM micrographs of in situ composites also show distinct and reaction free boundaries between reinforcement and matrix material while in the ex situ composites, the boundaries are not distinct and reaction free. Thus, further investigation to evaluate the effect of the mold material, percentage of TiB_2, and heat treatment was carried out using in situ composites.

In both sand and metal molds, the grain size number (G) of composites was observed to be higher than pure AlSi5Cu3. As the percentage of TiB_2 increases, increment in the number of grains was observed. In order to study the effect of heat treatment on mechanical properties of pure AlSi5Cu3 and its composites, T6 heat treatment was performed. After heat treatment, the average Ultimate Tensile Strength (UTS) of pure AlSi5Cu3 casted in the sand mold and metal mold increased by 11 % and 20 %, respectively. After heat treatment, the average hardness of pure AlSi5Cu3 casted in the sand mold and metal mold increased by 22 % and 08 %, respectively. In sand and metal molds, UTS of heat treated composites increased by 27 % and 65 %, respectively, as compared to pure AlSi5Cu3 in as-cast condition.

Workshop/Seminar/Courses organized/attended

Name	Date/Duration
Characterization Techniques for Materials	23/02/2016 to 24/02/2016
NPTEL Course on Fundamentals of Acoustics	January- April 2017
NPTEL Course on Principles of Vibration Control	February- March 2017
Finite Element Analysis	25/03/2017 to 31/03/2017
Metal Casting: Science Engineering and Technological Prospective (Organised)	01/05/2017 to 06/05/2017
Acoustic and Industrial Noise Control	15/05/2017 to 19/05/2017
CEP Workshop on SMART Foundry	31/08/2018 to 02/09/2018
NPTEL Course on Academic Writing	July- October 2019
Honing Research Publication Skills	21/08/2019 to 23/08/2019
Aluminum-Silicon Cast Alloys: Processing and Characterization	09/10/2019
Advanced Materials (Fabrication, Characterization and Applications)	20/07/2020 to 25/07/2020
Advanced Composite Materials	23/07/2020 to 29/07/2020
SMART Manufacturing- Opportunities and Challenges	17/08/2020 to 22/08/2020
Recent Developments of Nano-Composites and Smart Materials in The Aerospace Industry	07/09/2020 to 19/09/2020
Post Covid Challenges in Teaching Learning	14/09/2020 to 19/09/2020
Comprehending quality aspects in NAAC accreditation process organized	03/05/2022 to 07/05/2022
Refresher course on Nanoscience and Nanotechnology	13/06/2022 to 24/06/2022
Advanced Pedagogy	06/02/2023 to 17/02/2023
NEP 2020 Orientation and Sensitization Programme	18/12/2023 to 30/12/2023.
Advanced Pedagogy	15/01/2024 to 26/01/2024.
Industrial Instrumentation	19/02/2024 to 23/02/2024

Major Projects

Period of Project	Project Title	Name of the Organization	Aim of the project
1 Year	Investigation on Reactive Wetting Kinetics During Casting of Mg Alloys	CHARUSAT University	Measure the wettability of Mg alloy on to the investment casting mould and study the reaction.
1 Year	Modelling and Development of Cable Reeling Drum (CRD)	ELECON Engineering Co. Ltd.	Optimization of input and output parameters of Cable Reeling Drum (CRD)

References

Dr. S. Savithri

Chief Scientist (Rtd)
Council of Scientific and Industrial Research (CSIR)
National Institute for Interdisciplinary Science & Technology (NIIST)
Trivandrum-695 019
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Dr. Nagahanumaiah

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Bengaluru- 560022
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Dr. Mayurkumar P. Sutaria

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Chandubhai S Patel Institute of technology
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CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

CHARUSAT

Formed under Gujarat State Act No. : 8 of 2009

Accredited Grade A by NAAC

Ref. No. : CHARUSAT/ADM/2021/09/1151
Date: September 06, 2021

Details in support of claim of "Particulars of experience in Product Development/ Technology Innovation / Applied Technology / Translational Research etc."

(TO WHOMSOEVER IT MAY CONCERN)

Name of the candidate			**Dr. VIVEK SHAMJIBHAI AYAR**	
Particulars of innovation / development			Please select the category	
Title			Category	Tick appropriate box
1	**IoT enabled Modular Melting, Pouring and Stirring System for the casting of Nonferrous metals and Metal Matrix Composites (MMCs).**		Product Development	✓
			Technology Innovation	
			Applied Technology	✓
			Translation Research	
			Others	
2	Name of the Organization where the above innovation / development carried out		**Department of Mechanical Engineering, Chandubhai S. Patel Institute of Technology, Charotar University of Science and Technology (CHARUSAT), Changa, Gujarat**	
3	Period / Duration of development / Innovation		**November 2016 to June 2021**	
4	Funding Agency and Grant No. (if any)		**Department of Science and Technology (DST), New Delhi, sponsored SMART Foundry Project (DST/TSG/AMT/2015/332 dated 17/08/2016).**	
5	Title of M.Tech Project Work		**Investigation on Reactive Wetting Kinetics During Casting of Mg Alloys.**	
6	Title of PhD Thesis		**Investigation on AlSi5Cu3/TiB_2 Composites: Process Parameters and Heat Treatment.**	
7	Relevant SCI Publications Details		**https://doi.org/10.1007/s40962-019-00328-x https://doi.org/10.1007/s40962-020-00539-7**	
8	Status of innovation / development (please tick the appropriate stage)		Concept design	✓
			Proto type / Process Development	✓
			Demonstration	✓
			IPR filed (Patent / Copy Right / Design Registration etc. if any) with details:	
9	Please furnish the details of Technology Transferred (if any):			
10	Please furnish the abstract of innovation / development as mentioned at Sl. No. 1 above in the following manner (extra sheet may be attached if required):			
	i)	Key specialization of the Product / Technology developed:	**Development of an ultra-compact SMART Foundry, for sensor-driven automatic and economic production of small intricate metal parts with high quality.**	
	ii)	Advantages (up to 10 points):	**1. Compact, easy to use and IoT enabled Modular system. 2. Continuous monitoring and logging of data. 3. Minimum wastages of resources for trial production.**	
	iii)	Potential applications:	**In the field of Metal Foundries.**	

Signature of the candidate Vivek Ayar

Signature with seal of the Head of the Institution / Organization / Head of the Dept. where the above innovation development has been carried out

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