



# SHADAN COLLEGE OF ENGINEERING & TECHNOLOGY

Established by SHADAN EDUCATIONAL SOCIETY.  
Approved by A.I.C.T.E and Affiliated to JNTUH, Hyderabad.  
Website: www.scet.in E-Mail: scet\_shadan@yahoo.co.uk

Date: \_\_\_\_\_

## DEPARTMENT OF MECHANICAL ENGINEERING

3.3.3 Number of books and chapters in edited volumes/books published and papers published in national/international conference proceedings per teacher during last five years.

HEI Input:

2019-20	2018-19	2017-18	2016-17	2015-16
28	26	24	9	5

HOD/ME

Head

Dept. of Mechanical Engineering  
Shadan College of Engg. & Tech.  
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Peerancheru, Hyderabad-86, T.S.  
College Code: 08

S.No.	Title of paper	Name of the author's	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to website of the Journal	Link to article/paper/abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	MEASUREMENT OF BRAND AWARENESS AND BRAND PERCEPTION OF AUTOMOBILE COMPANY	Dr. M. Raghu Sathyan	MECHANICAL	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)	2019-2020	ISSN: 2454-1443	<a href="http://jrmmae.in/volume4issue45.html">http://jrmmae.in/volume4issue45.html</a>	<a href="http://jrmmae.in/volume4issue45/paper5.pdf">http://jrmmae.in/volume4issue45/paper5.pdf</a>	UGC
2	DESIGN AND ANALYSIS OF TRAPEZOIDAL SHAPED CANTILEVER BEAM ALONG WITH AEROPHIL BLUNT BODY FOR VIBRO WIND	Dr. M. Raghu Sathyan	MECHANICAL	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMMAE)	2019-2020	ISSN: 2454-1443	<a href="http://jrmmae.in/volume4issue45.html">http://jrmmae.in/volume4issue45.html</a>	<a href="http://jrmmae.in/volume4issue45/paper3.pdf">http://jrmmae.in/volume4issue45/paper3.pdf</a>	UGC
3	INVESTIGATIONS ON THE EFFECTS OF NANOFIUID IN ELECTROCHEMICAL MACHINING OF INCONEL ALLOY 718 USING GREY TAGUCHI APPROACH	Dr. M. Marudhara Rao	MECHANICAL	International Research Journal in Global Engineering and Sciences (IJGES)	2019-2020	ISSN: 2456-172X	<a href="http://ijges.com/volume4issue41.html">http://ijges.com/volume4issue41.html</a>	<a href="http://ijges.com/volume4issue41/paper15.pdf">http://ijges.com/volume4issue41/paper15.pdf</a>	UGC
4	ANALYSIS OF VEHICLE SUSPENSION SYSTEM SUBJECTED TO FORCED VIBRATION USING MATLAB SIMULINK	Dr. S. Prabhakar	MECHANICAL	International Research Journal in Global Engineering and Sciences (IJGES)	2019-2020	ISSN: 2456-172X	<a href="http://ijges.com/volume4issue42.html">http://ijges.com/volume4issue42.html</a>	<a href="http://ijges.com/volume4issue42/paper16.pdf">http://ijges.com/volume4issue42/paper16.pdf</a>	UGC
5	CHARACTERIZATION AND MECHANICAL BEHAVIOR OF COMPOSITE MATERIAL USING FEA	Dr. M. Raghu Sathyan	MECHANICAL	International Journal on Recent Researches In Sciences, Engineering & Technology (IJRSSET)	2019-2020	ISSN: 2449-3165	<a href="http://ijrsset.com/volume7issue9.html">http://ijrsset.com/volume7issue9.html</a>	<a href="http://ijrsset.com/2019/September/issue5.pdf">http://ijrsset.com/2019/September/issue5.pdf</a>	UGC
6	DEVELOPING PART PROGRAMMING AND DESIGNING AND ANALYSIS OF COMPLEX DISC BRAKE ROTOR USING (UNIGRAPHICS)	Dr. M. Marudhara Rao	MECHANICAL	International Journal on Recent Researches In Sciences, Engineering & Technology (IJRSSET)	2019-2020	ISSN: 2449-3165	<a href="http://ijrsset.com/volume7issue11.html">http://ijrsset.com/volume7issue11.html</a>	<a href="http://ijrsset.com/2019/November/issue5.pdf">http://ijrsset.com/2019/November/issue5.pdf</a>	UGC
7	EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRICAL DISCHARGE MACHINING	Dr. S. Prabhakar	MECHANICAL	International Journal on Recent Researches In Sciences, Engineering & Technology (IJRSSET)	2019-2020	ISSN: 2449-3165	<a href="http://ijrsset.com/volume7issue11.html">http://ijrsset.com/volume7issue11.html</a>	<a href="http://ijrsset.com/2019/November/issue5.pdf">http://ijrsset.com/2019/November/issue5.pdf</a>	UGC
8	CHARACTERIZATION AND MECHANICAL BEHAVIOR OF COMPOSITE MATERIAL USING FEA	Zeyadib Azami	MECHANICAL	International Journal on Recent Researches In Sciences, Engineering & Technology (IJRSSET)	2019-2020	ISSN: 2449-3165	<a href="http://ijrsset.com/volume7issue9.html">http://ijrsset.com/volume7issue9.html</a>	<a href="http://ijrsset.com/2019/September/issue5.pdf">http://ijrsset.com/2019/September/issue5.pdf</a>	UGC



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9	CHARACTERIZATION AND MECHANICAL BEHAVIOR OF COMPOSITE MATERIAL USING FEA	Mr. Muzaffer	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/September/paper1.pdf	UOC
10	EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRICAL DISCHARGE MACHINING	Mr. Mohd Mubashir	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
11	CHARACTERIZATION AND MECHANICAL BEHAVIOR OF COMPOSITE MATERIAL USING FEA	Mr. N. Raja Sathish	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/September/paper1.pdf	UOC
12	DEVELOPING PART PROGRAMMING AND DESIGNING AND ANALYSIS OF COMPLEX DISC BRAKE ROTOR USING (UNIGRAPHICS )	Dr. A. Thilakan	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
13	DEVELOPING PART PROGRAMMING AND DESIGNING AND ANALYSIS OF COMPLEX DISC BRAKE ROTOR USING (UNIGRAPHICS )	Dr. Sathish	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
14	EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRICAL DISCHARGE MACHINING	Mr. Ganga Varadach	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
15	DEVELOPING PART PROGRAMMING AND DESIGNING AND ANALYSIS OF COMPLEX DISC BRAKE ROTOR USING (UNIGRAPHICS )	Dr. Harish Khan	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/December/paper1.pdf	UOC
16	EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRICAL DISCHARGE MACHINING	Mr. Ravi Prakash	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
17	EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRICAL DISCHARGE MACHINING	Mr. D. Dinash Yadav	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/November/papers.pdf	UOC
18	DEVELOPING PART PROGRAMMING AND DESIGNING AND ANALYSIS OF COMPLEX DISC BRAKE ROTOR USING (UNIGRAPHICS )	Dr. Afroz Mubay	MECHANICAL	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2019-2020	ISSN: 2348-3105	http://jrrst.com/Volumes/Issue%2011.html	http://jrrst.com/2019/December/paper1.pdf	UOC



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S.No.	Title of paper	Name of the author's	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to website of the Journal	Link to article/paper/abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	An Experimental Investigation of Magnetically Impinged Arc But Welding of Pipe. A Review	Naseeb Khan and Abdul Kader Shah	Mechanical Engineering	International Journal of Current Researches in Science, Engineering and Technology	2018-2019	Vol.3, No.3, E-ISSN: 2277-4106, P-ISSN: 2347-5181	<a href="https://ejournal.com/In-experimental-investigation-of-magnetically-impinged-arc-but-welding-of-pipes-a-review/">https://ejournal.com/In-experimental-investigation-of-magnetically-impinged-arc-but-welding-of-pipes-a-review/</a>	<a href="http://ijcst.com/2018/volume6/issue10/paper5.pdf">http://ijcst.com/2018/volume6/issue10/paper5.pdf</a>	scopus
2	EXPERIMENTAL INVESTIGATIONS ON DIESEL ENGINE WITH BIO-DIESEL	Dr. M. Rajaram Nannayyan	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
3	EXPERIMENTAL INVESTIGATIONS ON DIESEL ENGINE WITH BIO-DIESEL	Mr. Sohail	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
4	EXPERIMENTAL INVESTIGATIONS ON DIESEL ENGINE WITH BIO-DIESEL	Mr. D. Dinsh Yadav	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
5	EXPERIMENTAL INVESTIGATIONS ON DIESEL ENGINE WITH BIO-DIESEL	Mr. Syed Salman	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
6	EXPERIMENTAL INVESTIGATIONS ON DIESEL ENGINE WITH BIO-DIESEL	Mr. A. Raja Srinanth	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
7	DESIGN & ANALYSIS OF COMPOSITE DRIVE SHAFT FOR AUTOMOBILE APPLICATIONS	Dr. S. Prabhakar	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
8	DESIGN & ANALYSIS OF COMPOSITE DRIVE SHAFT FOR AUTOMOBILE APPLICATIONS	Mr. Gopi Venkiah	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
9	DESIGN & ANALYSIS OF COMPOSITE DRIVE SHAFT FOR AUTOMOBILE APPLICATIONS	Mr. Mudhoor	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC
10	DESIGN & ANALYSIS OF COMPOSITE DRIVE SHAFT FOR AUTOMOBILE APPLICATIONS	Mr. Mirza Shoeb Ahmed	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology (IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volumes6_Issu_e10.html">http://ijrrset.com/Volumes6_Issu_e10.html</a>	<a href="http://ijrrset.com/2018/volume6/issue10/paper5.pdf">http://ijrrset.com/2018/volume6/issue10/paper5.pdf</a>	UGC



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11	DESIGN & ANALYSIS OF COMPOSITE DRIVE SHAFT FOR AUTOMOBILE APPLICATIONS	Mr. Saad Salman	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/volume5_issue10.html">http://ijrrset.com/volume5_issue10.html</a>	<a href="http://ijrrset.com/2019/volume5/paper5.pdf">http://ijrrset.com/2019/volume5/paper5.pdf</a>	UGC
12	SUSTAINABILITY ANALYSIS ON METAL FLAMMENT IN FUSION DEPOSIT METHOD (FDM) METHOD	Dr. M. Rajesh Narayanan	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/volume5issue8.html">http://ijrrset.com/volume5issue8.html</a>	<a href="http://www.ijrrset.com/2019/volume5issue8/paper4.pdf">http://www.ijrrset.com/2019/volume5issue8/paper4.pdf</a>	UGC
13	A REVIEW ON SPRING-BACK IN SHEET METAL V BENDING	Dr. S. Subhakar	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRRSET)	2018-2019	ISSN: 2348-3105	<a href="http://ijrrset.com/Volume5/issue3.html">http://ijrrset.com/Volume5/issue3.html</a>	<a href="http://ijrrset.com/2019/March/paper5.pdf">http://ijrrset.com/2019/March/paper5.pdf</a>	UGC
14	INTELLIGENT BATTERY MANAGEMENT SYSTEM FOR FUEL VEHICLES	Dr. M. Rajesh Narayanan	Mechanical Engineering	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering(IJRMMAE)	2018-2019	ISSN: 2454-1443	<a href="http://ijrmmae.in/volume5-Issue4/1001">http://ijrmmae.in/volume5-Issue4/1001</a>	<a href="http://ijrmmae.in/volume5-Issue4/paper5.pdf">http://ijrmmae.in/volume5-Issue4/paper5.pdf</a>	UGC



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S.No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number	Link to Care list/Scopus/Web of Science/other, mention
1	Design analysis and experimental evaluation of sandwich composites subjected to fatigue	Nuseeb Khan, Syed sirwan mohammed quadir, Mirza sheeb ahmed baki,	Mechanical Engineering	Indian J.Sci Res	2017-2018	Volume 17 Issue 2, 2017, pp 217-240	<a href="http://www.ijr.in/issue2/2017/217-240.pdf">http://www.ijr.in/issue2/2017/217-240.pdf</a>	scopus
2	Performance and emission characteristics of a diesel engine with varying injection pressure and fuelled with hydrogen and cottonseed oil methyl ester blends	Nuseeb Khan, B. Beha Nsik, Syed Yusufuddin	Mechanical Engineering	Elsevier journal	Mar-18	Volume 5, Issue 2, pp 31693-31697	<a href="https://www.sciencedirect.com/science/article/pii/S2352484718317228">https://www.sciencedirect.com/science/article/pii/S2352484718317228</a>	web of science
3	PERFORMANCE ANALYSIS OF SOLAR FLAT PLATE COLLECTOR	T nagrjuna	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRASET)	2017-2018	ISSN :2348-3105	<a href="http://www.ijraset.com/volume5_issue2/paper7.pdf">http://www.ijraset.com/volume5_issue2/paper7.pdf</a>	UGC
4	PERFORMANCE ANALYSIS OF SOLAR FLAT PLATE COLLECTOR	DR.R.CHANDRASHEKHAR AN.	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRASET)	2017-2018	ISSN :2348-3105	<a href="http://www.ijraset.com/volume5_issue2/paper7.pdf">http://www.ijraset.com/volume5_issue2/paper7.pdf</a>	UGC
5	PERFORMANCE ANALYSIS OF SOLAR FLAT PLATE COLLECTOR	Mrs.Kunja Arifa	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRASET)	2017-2018	ISSN :2348-3105	<a href="http://www.ijraset.com/volume5_issue2/paper7.pdf">http://www.ijraset.com/volume5_issue2/paper7.pdf</a>	UGC
6	PERFORMANCE ANALYSIS OF SOLAR FLAT PLATE COLLECTOR	aragilasa	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRASET)	2017-2018	ISSN :2348-3105	<a href="http://www.ijraset.com/volume5_issue2/paper7.pdf">http://www.ijraset.com/volume5_issue2/paper7.pdf</a>	UGC
7	PERFORMANCE ANALYSIS OF SOLAR FLAT PLATE COLLECTOR	Upendra Kumar	Mechanical Engineering	International Journal on Recent Researches in Science, Engineering & Technology(IJRASET)	2017-2018	ISSN :2348-3105	<a href="http://www.ijraset.com/volume5_issue2/paper7.pdf">http://www.ijraset.com/volume5_issue2/paper7.pdf</a>	UGC
8	SOME STUDIES ON FAILURES IN GAS TURBINE BLADES - A REVIEW	Dr.M.Muraleshwar Rao	Mechanical Engineering	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering(IJRMMAE)	2017-2018	ISSN: 2454-1443	<a href="http://ijrmmae.in/Vol-1-Issue-1.html">http://ijrmmae.in/Vol-1-Issue-1.html</a>	UGC



  
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S.No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition In UGC enlistment of the Journal /Digital Object Identifier (doi) number	Link to article/paper/abstract of the article	Link to website of the journal	is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	Optimal Design of helical Torsion Spring for Engine Valve Timing Mechanism	Dr. AFROZ MEHAR	Mechanical Engineering	International Journal of Engineering Research & Technology (IJERT)	2016-2017	2278-0167	<a href="https://www.ijert.org/doi/abs/10.17973/IJERTV7IS030034">https://www.ijert.org/doi/abs/10.17973/IJERTV7IS030034</a>	<a href="http://www.ijert.org/doi/abs/10.17973/IJERTV7IS030034">http://www.ijert.org/doi/abs/10.17973/IJERTV7IS030034</a>	scopus	
2	A Study on Fatigue Failure Analysis of An Automotive Heavy Vehicle Chassis for Stress and Durability Using Finite Element Analysis	Dr M.Sabbareddy	Mechanical Engineering	International Journal of Printing, Packaging & Allied Sciences	2016-2017	4357-58	<a href="https://www.researchgate.net/publication/320927536_A_Study_on_Fatigue_Failure_Analysis_of_Automotive_Heavy_Vehicle_Chassis_for_Stress_and_Durability_Using_Finite_Element_Analysis">https://www.researchgate.net/publication/320927536_A_Study_on_Fatigue_Failure_Analysis_of_Automotive_Heavy_Vehicle_Chassis_for_Stress_and_Durability_Using_Finite_Element_Analysis</a>	<a href="https://www.researchgate.net/publication/320927536_A_Study_on_Fatigue_Failure_Analysis_of_Automotive_Heavy_Vehicle_Chassis_for_Stress_and_Durability_Using_Finite_Element_Analysis">https://www.researchgate.net/publication/320927536_A_Study_on_Fatigue_Failure_Analysis_of_Automotive_Heavy_Vehicle_Chassis_for_Stress_and_Durability_Using_Finite_Element_Analysis</a>	scopus	
3	Optimization of A Single Cylinder, 4-Stroke Diesel Engine Performance Parameters Using Design/Construct/Analyze Method	Manish Khan, B. Balu Naik, Syed Younisulhadi	Mechanical Engineering	International Journal of Mechanical Engineering and Technology	2016-2017	Volume 8, Issue 1, PP. 62-69, ISSN 0974-3105	<a href="https://www.ijert.org/doi/abs/10.17973/IJERTV8IS010017">https://www.ijert.org/doi/abs/10.17973/IJERTV8IS010017</a>	<a href="https://www.ijert.org/doi/abs/10.17973/IJERTV8IS010017">https://www.ijert.org/doi/abs/10.17973/IJERTV8IS010017</a>	scopus	
4	The Study on Comparison of Aggressive Stress and Solitude Sensation between Binaural Cueing Protocol and Overlaid Protocol	D.R.P. MURUGESAN	Mechanical Engineering	International Journal on Recent Research in Science, Engineering & Technology (IJRRSET)	2016-2017	ISSN: 2249-3105	<a href="http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017">http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017</a>	<a href="http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017">http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017</a>	UGC	
5	Development of Anthropometric Robot Hand	DR. R.CHANDRAN ESKARAN	Mechanical Engineering	International Journal on Recent Research in Science, Engineering & Technology (IJRRSET)	2016-2017	ISSN: 2249-3105	<a href="http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017">http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017</a>	<a href="http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017">http://www.ijrrset.com/doi/abs/10.17973/IJRRSETV7IS010017</a>	UGC	
6	DESIGN OF CAN PERFORMANCE DETECTION SYSTEM BASED ON ARM EMBEDDED SYSTEM	Dr. K. Srinivasan	Mechanical Engineering	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMAE)	2016-2017	ISSN: 2454-1443	<a href="http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017">http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017</a>	<a href="http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017">http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017</a>	UGC	
7	Investigating perceived significance of Green manufacturing practices for spreading OSCM	DR. P. MURUGESAN	Mechanical Engineering	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering (IJRMAE)	2016-2017	ISSN: 2454-1443	<a href="http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017">http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017</a>	<a href="http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017">http://www.ijrmae.in/doi/abs/10.17973/IJRMAEV7IS020017</a>	UGC	

  
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S.No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number	Link to article/paper/abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	Strength Based Design of Compression Springs for Auto-Injector Syringes	Dr. AFROZ MEHAR	Mechanical Engineering	International Journal of Engineering Science and Computing	2015-2016	ISSN 2321-3367	<a href="https://www.researchgate.net">https://www.researchgate.net</a>	<a href="https://www.researchgate.net/publication/309330600">https://www.researchgate.net/publication/309330600</a> 9_Strength_Based_Design_of_Compression_Springs	scopus
2	A study on strengthening the operational efficiency of dairy supply chain	Dr.M.Subbairaj	Mechanical Engineering	Science Direct, Elsevier, Procedia- Social and Behavioral Sciences	2015-2016	285-291	<a href="https://www.sciencedirect.com/science/article/pii/S1877042815020120">https://www.sciencedirect.com/science/article/pii/S1877042815020120</a>	<a href="https://www.sciencedirect.com/science/article/pii/S1877042815020120">https://www.sciencedirect.com/science/article/pii/S1877042815020120</a>	web of science
3	"Experimental analysis of orthotropic cylindrical shell subjected to Internal Pressure	Dr. AFROZ MEHAR	Mechanical Engineering	International Journal on Mechanical Engineering and Robotics (IJMER)	2015-2016	2327-2747	<a href="https://www.researchgate.net">https://www.researchgate.net</a>	<a href="https://www.researchgate.net/publication/309340211">https://www.researchgate.net/publication/309340211</a> 7_Experimental_analysis_of_orthotropic_cylindrical	scopus
4	Performance Analysis of Solar Flat Plate Collector	Dr. AFROZ MEHAR	Mechanical Engineering	International Journal on Mechanical Engineering and Robotics (IJMER)	2015-2016	2120-2092	<a href="http://ijmer.in/journals">http://ijmer.in/journals</a>	<a href="http://ijmer.in/journals/Epaper_detail.php?paper_id=2019&amp;name=Performance_Analysis_of_Solar">http://ijmer.in/journals/Epaper_detail.php?paper_id=2019&amp;name=Performance_Analysis_of_Solar</a>	scopus
5	Application of queuing theory models for optimized service to air line	Naseeb Khan,Vaddi Venkata Srinivasan, Shaik Dawood, A.K. and Karthikeyan	Mechanical Engineering	International Journal of Current Research	2015-2016	Vol. 7, Issue 09, pp-20544-20547	<a href="https://www.researchgate.net/publication/31970899">https://www.researchgate.net/publication/31970899</a>	<a href="https://www.researchgate.net/publication/31970899">https://www.researchgate.net/publication/31970899</a> 8_Application_of_the_Queueing_Theory_in_Characterizing_and_Optimizing_the_Passenger_Flow_at_the_Airport_Security	scopus
6	Investigating perceived significance of Green manufacturing practices for spreading GSCM	Dr.M.Rajesh Sathyan	Mechanical Engineering	International Journal of Research in Mechanical, Mechatronics and Automobile Engineering(IJRMMAE)	2015-2016	ISSN: 2454-1443	<a href="http://ijrmmae.in/volume2-issue2.html">http://ijrmmae.in/volume2-issue2.html</a>	<a href="http://ijrmmae.in/volume2-issue2.html">http://ijrmmae.in/volume2-issue2.html</a>	UGC

  
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## CFD ANALYSIS OF SOLAR ABSORBER PLATE

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**Abstract:** Solar energy is becoming an alternative for the limited fossil fuel resources. One of the simplest and most direct applications of this energy is the conversion of solar radiation into heat, which can be used in water heating systems. A commonly used solar collector is the flat-plate. Solar flat plate collectors are used for domestic and industrial purposes and have the largest commercial application amongst the various solar collectors. This is mainly due to simple design as well as low maintenance cost. A lot of research has been conducted in order to analyze the absorber plate operation and improve its efficiency.

An attempt is being made to analyze the solar absorber plate using the Computational Fluid Dynamics (CFD) so as to simulate the solar absorber plate for better understanding of the heat transfer capabilities of the absorber. In the present work, Fluid flow and heat transfer in the absorber panel are studied by means of Computational Fluid Dynamics (CFD). The conjugate heat transfer phenomenon between absorber and water is modeled using solid works CFD software. The analysis was carried out to investigate the effect of material, mass flow rate, riser position and riser shape. The solar radiation heat transfer is not modeled. The geometric model and fluid domain for CFD analysis is generated using Solid works flow simulation software, Grid generation is accomplished by solid works Meshing Software. The numerical results obtained using the CFD software for copper and aluminum for same boundary conditions has to be analyzed for different design constructions.

**Keywords:** CFD Analysis, Solar absorber plate, Efficiency, Radiation, Solid Works

### 1. INTRODUCTION

Solar collectors are key components of active solar-heating systems. They gather the sun's energy, transform its radiation into heat and then transfer that heat to a fluid (usually water or air). The solar thermal energy can be used in solar water-heating systems, solar pool heaters, and solar space-heating systems. The sides and bottom of the collector are insulated to minimize the heat loss. Sunlight passes through the cover and strikes the absorber plate, which then heats up, converting solar energy into heat energy. The heat is transferred to the

water passing through the risers attached to the absorber plate. Absorber plates are most commonly painted with "selective coatings" which absorb and trap heat better than any other ordinary black paint. Absorber plates are usually made of metal—typically either copper or aluminum—because both of them are good heat conductors. Copper is the more expensive, but is better when it comes to resistance from corrosion. In locations with an average available solar energy, flat plate collectors are sized approximately at one-half to one-square foot per gallon of one-day's hot water use.

In order to increase the heat transfer rate of the system, we can make use of different types of augmentation methods. Augmentation methods include active and passive methods with the latter being the most widely used

### 2. COMPUTATIONAL FLUID DYNAMICS APPROACH

Computational fluid dynamics or CFD is the analysis of systems involving fluid flow, heat transfer and associated phenomena such as chemical reactions by means of computer-based simulation. The technique is very powerful and spans a wide range of industrial and non-industrial application areas. Dynamics of fluids are governed by coupled non-linear partial differential equations, which are derived from the basic physical laws of conservation of mass, momentum, and energy. Analytical solutions of such equations are possible only for very simple flow domains with certain assumptions made about the properties of the fluids involved. For conventional design of equipment, devices, and structures used for controlling fluid flow patterns, designers have to rely upon empirical formulae, rules of thumb, and experimentation. However, there are many inherent problems with these conventional design processes. Empirical formulae and rules of thumb are extremely specific to the problem at hand and are not globally usable because of the non-linearity of the governing equations. For example, a rule of thumb for designing an aircraft wing may not be applicable for designing a wing mounted on a racing car, as the upstream flow conditions are completely different for the two configurations.



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## EXPERIMENTAL INVESTIGATION OF PRESSURE DROP CHARACTERISTICS ACROSS RECTANGULAR CHANNEL USING DETACHED RIBS

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**Abstract:** In the present day it is very necessary to find heat transfer characteristics of heat exchanger, heat exchanger as an important appliances widely used in day to day life, like in industry, home appliances, gas turbine, transportation, power production, in aircraft etc, the improvement of heat transfer performance of heat exchanger can be done by using insertion of vortex generators across rectangular channel. The experimental study is conducted to examine the pressure drop characteristics across rectangular duct with different geometrical configuration of detached ribs, Detached Ribs as vortex generators are inserted  $90^\circ$  in a rectangular duct having different aspect ratio (AR) of 1.4, 1.8, 3, 3.6. The effect of width, pitch ratio (P/H) of inserting vortex generator, flow direction and aspect ratio of duct are examined for Reynolds numbers (Re) based on hydraulic diameter of rectangular duct  $D_h$ , and it is in the range of 8000 to 24000. The results shows if pitch to height increases friction factor ratio decreases by 28.98% , if Reynolds number increases , 8.34% time friction factor ratio increases , if aspect ratio increases friction factor ratio decrease by 80.03%. The experiment is repeated for different AR of vortex generators 1.4, 1.8, 3, 3.6. pitch ratio (P/h), width 16.07mm, 12.5mm, 7.5mm, 6.25mm, for different Re = 8000, 12000, 16000, 20000, 24000.

**Keywords:** Rectangular Duct, Detached Ribs, Pressure Drop, Vortex Generator, Aspect Ratio, Friction Factor Ratio

### I. INTRODUCTION

Heat exchangers are used in almost all the industrial plants, transfer of hot fluid to cold and vice versa , use of heat exchanger is there from olden days to till date and it will be continued, the principle is same from olden days to till today but there are changes in the use of techniques, and in future for better heat transfer

enhancement and to improve pressure drop vortex generators as an obstacle in heat exchanger will be used. Most industrial engineers and researchers focus on investigating the heat exchangers because of their wide use in industry, channel flow has got more importance in engineering industry because of their application, the channels may be rectangular, square, triangular, circular, non circular, trapezoid, and polygonal. In this paper, we are using rectangular channel to achieve effective cooling and more compactness, detached ribs are used as vortex generators, the experimental result for detached ribs for different configurations are shown, the influence of pitch to height ratio, aspect ratio of vortex generator for different Reynolds number and pressure are discussed.

K. Yongsiri, p. Eiamsa-ard, k. wongchare, S. eiamsa-ard (2013): In this paper researcher have taken the inclined detached-ribs with different angle of attacks( $\theta$ )  $0^\circ, 15^\circ, 30^\circ, 45^\circ, 60^\circ, 75^\circ, 105^\circ, 120^\circ, 135^\circ, 150^\circ, 165^\circ$  with different Reynolds range from 4000 to 24000 for heat transfer, pressure loss, thermal performance and compare with the attached ribs of  $\theta = 90^\circ$ . In CFD results at inclined ribs at  $\theta$

$= 60^\circ$  and  $120^\circ$  heat transfer, thermal performance factors are high than the other inclined ribs. In flow structure and

temperature field for Reynolds number 4000, inclined detached ribs of angles  $45^\circ, 60^\circ, 75^\circ, 90^\circ, 105^\circ, 120^\circ, 135^\circ, 150^\circ$  create more recirculation zone after the ribs and also at the angles  $0^\circ, 15^\circ, 30^\circ$  and  $165^\circ$  we can't find recirculation zone, result include that medium angle of attack give better mixing of fluid. Annart Boonloi (2014): Researcher use the  $30^\circ$  V-shaped baffles as the vortex generator placed on the double side of the thin with plate and without plate to perform heat transfer and thermal performance in a square duct, here  $30^\circ$  V-shaped vortex generator are inserted diagonal to the square for different



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## STUDY OF ERECTION SEQUENCE OPERATIONS OF A BOILER IN THERMAL POWER PLANT

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**Abstract:** This project is mainly about the study of operations that are held during the construction of a boiler. The series of activities that are carried out in a power plant are discussed in this project. By this project we can get an idea of how the current techniques and mechanical operations are used practically. The boiler is a steam generating equipment, the steam thus produced in the boiler was processed further to convert it into a electrical power. The steam processing requires water and coal as a main raw material. The water is circulated inside the tubes and the coal is used as a fuel for burning.

### I. INTRODUCTION

A boiler or steam generator is a device used to create steam by applying heat energy to water. Although the definitions are somewhat flexible, it can be said that older steam generators were commonly termed boilers and worked at low to medium pressure (7– 2,000 kPa or 1–290 psi) but, at pressures above this, it is more usual to speak of a steam generator.

A boiler or steam generator is used wherever a source of steam is required. The form and size depends on the application: mobile steam engines such as steam locomotives, portable engines and steam-powered road vehicles typically use a smaller boiler that forms an integral part of the vehicle; stationary steam engines, industrial installations and power stations will usually have a larger separate steam generating facility connected to the point-of-use by piping. A notable exception is the steam-powered fireless locomotive, where separately-generated steam is transferred to a receiver (tank) on the locomotive.

Types of generator unit used in coal fired power plants:

The steam generator or boiler is an integral component of a steam engine when considered as a prime mover. However it needs to be treated separately, as to some extent a variety of generator types can be combined with a variety of engine units. A boiler incorporates a firebox or furnace in order to burn the fuel and generate heat.

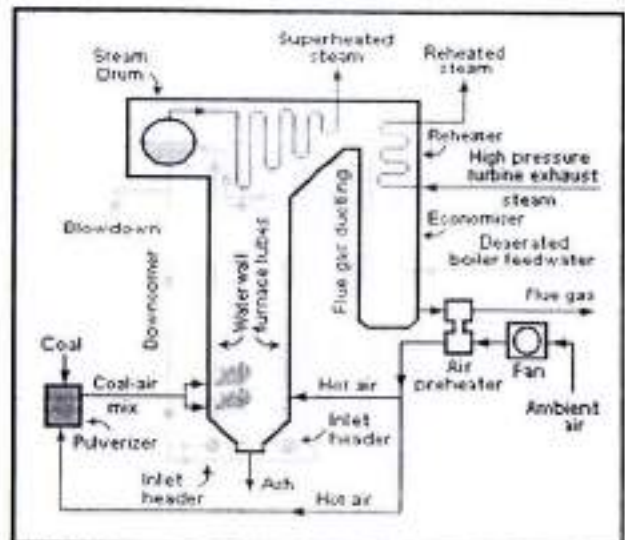


Fig 1.1 steam generator (components of prime mover)

The generated heat is transferred to water to make steam, the process of boiling. This produces saturated steam at a rate which can vary according to the pressure above the boiling water. The higher the furnace temperature, the faster the steam production. The saturated steam thus produced can then either be used immediately to produce power via a turbine and alternator, or else may be further superheated to a higher temperature; this notably reduces suspended water content making a given volume of steam produce more work and creates a greater temperature gradient, which helps reduce the potential to form condensation. Any remaining heat in the combustion gases can then either be evacuated or made to pass through an economiser, the role of which is to warm the feed water before it reaches the boiler.

### Types of boiler

#### Fire-tube boiler

For the first Newcomen engine of 1712, the boiler was little more large brewer's kettle installed beneath the power cylinder. Because the engine's power was derived from the vacuum produced by condensation of the steam, the requirement was for large volumes of steam at very low pressure hardly more than 1 psi (6.9



## REMOTE CONTROLLED MECHATRONICS SYSTEM

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**Abstract:** This paper presents controlling of mechatronics system using remote operated. This system has a special feature of smart video transfer and capture feature. The images are transferred to the monitor by the surveillance system. The system is always controlled by the remote operated by human. The remote controlled mechatronics system is aim to use in the situation like natural calamities, to inspect and navigate from remote location and collect the video without wires. It Just by throwing from window the ball can send the images inside the room and also can navigate the video ball from one room to another room to look for people. This is perfect for changeable lighting conditions. High-resolution security cameras have additional light sensors on their digital chips. This includes augment the effective image quality. These cameras are effectual only with high-resolution monitors. Small in size and Simpler to setup. The Wireless digital cameras give sharper effects. In video ball the encoders are given as an input and the decoders are the output. The program is given to the system it transmits by the transmitter and the monitor receive the images by receiver. The wireless video transmit the signal and at remote location the live video issued to inspect the areas where are accessible and non accessible.

**Keywords—** Remote controlled Mechatronics system, Video surveillance system, Video ball, Microcontroller, Encoder, Decoder.

### 1. INTRODUCTION

Observing or analyzing a particular site for safety and business purposes is known as video surveillance. Security and crime control concerns are the motivating factors for the deployment of video surveillance cameras. Video surveillance cameras are used in shopping centers, public places, banking institutions, companies and ATM machines. Nowadays, researches experience continuous growth in network surveillance. The reason being is the instability incidents that are happening all around the world. Therefore, there is a need of a smart surveillance system for intelligent monitoring that captures data in real time, transmits, processes and understands the information related to

those monitored. The video data can be used as a forensic tool for after-crime inspection. Hence, these systems ensure high level of security at public places which is usually an extremely complex challenge hence video surveillance systems have become more popular. Video surveillance systems have wide range of applications like traffic monitoring [1] and human activity understanding [2]. Presently, the surveillance systems used requires constant human vigilance. However, the humans have limited abilities to perform in real-time which reduce the actual usability of such surveillance systems [3-5]. Also such surveillance systems are not reliable for real time threat detection. From the perspective of forensic investigation, a large amount of video data obtained from surveillance video tapes need to be analyzed and this task is very tedious and

error prone for a human investigator [6-9]. To overcome this drawback, automatic video analysis system is developed that continuously monitors a given situation and reacts in real-time [10]. The proposed system has an ability to sense intrusion and respond to it in real time. The location recognition technology has been so far studied and developed mainly with single interesting object for tracking human and things, mobile asset management, security and etc. Such location recognition technology provides accuracy in interior space within two to three meters without obstacles, but with obstacles, larger range of error is appeared, thus research for recognition of more accurate interior location has conducted. Not only that, interest in location recognition of multiple objects in environment is increased, not in environment with single object location recognition. The requirement to get valid images is very important at the video security surveillance system. Thus, research in video surveillance systems are multidisciplinary field associated to image analyzing and processing, pattern recognition, signal processing, embedded computing, and communication. In this paper presents the working of remote controlled mechatronics system.

### 2. LITERATURE SURVEY

D. Koller, K. Daniilidis, H. H. Nagel is discussed in Model-based object tracking in monocular sequences of



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## “HYBRID POWER GENERATION USING SOLAR PANEL AND WIND MILL”

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**Abstract:** Now a day's electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy.

In this proposed system, we have designed a Advance Hybrid Inverter System. This System uses two Sources to charge battery.

We see many people using inverters these days which proves that its necessity has been increased in the current years. A Hybrid inverter is similar to a normal electric inverter but uses the energy from two different sources to charge battery such as Solar and Wind Energy.

An inverter helps in converting the direct current into alternate current with the help of solar power or Wind mill Power. Direct power is that power which runs in one direction inside the circuit and helps in supplying current when there is no electricity. Direct currents are used for small appliance like mobile e phones, MP3 players, iPod etc. where there is power stored in the form of battery. In case of alternative current it is the power that runs back and forth inside the circuit. The alternate power is generally used for house hold appliances. An inverter helps devices that run on DC power to run in AC power so that the user makes use of the AC power. If you are thinking why to use solar inverter instead of the normal electric one then it is because the solar one makes use of the solar energy which is available in abundant from the Sun and is clean and pollution free

### 1. INTRODUCTION

#### Hybrid Power Generation System using Wind and Solar Energy

Hybrid energy system is the combination of two energy sources for giving power to the load. In other word it can defined as "Energy system which is fabricated or designed to extract power by using two energy sources is called as the hybrid energy system." Hybrid energy system has good reliability, efficiency, less emission, and lower cost. In this proposed system solar and wind power is used for generating power. Solar and wind has good advantages than other than any other non-

conventional energy sources. Both the energy sources have greater availability in all areas. It needs lower cost. There is no need to find special location to install this system.

#### A. Solar Energy

Solar energy is that energy which is gets by the radiation of the sun. Solar energy is present on the earth continuously and in abundant manner. Solar energy is freely available. It doesn't produce any gases that mean it is pollution free. It is affordable in cost. It has low maintenance cost. Only problem with solar system it cannot produce energy in bad weather condition. But it has greater efficiency than other energy sources. It only needs initial investment. It has long life span and has lower emission.

#### B. Wind Energy

Wind energy is the energy which is extracted from wind. For extraction we use wind mill. It is renewable energy sources. The wind energy needs less cost for generation of electricity. Maintenance cost is also less for wind energy system. Wind energy is present almost 24 hours of the day. It has less emission.

Initial cost is also less of the system. Generation of electricity from wind is depend upon the speed of wind flowing

A Hybrid energy system, or hybrid power, usually consists of two or more renewable energy sources used together to provide increased system efficiency as well as greater balance in energy supply.

The key to cost reductions of this order is, of course, the right sort of support for innovation and development - something that has been lacking for the past and, arguably, is still only patchy at present. Research and development efforts in solar, wind, and other renewable energy technologies are required to continue for:

- improving their performance,
- establishing techniques for accurately predicting their output
- reliably integrating them with other conventional generating sources

#### Advantages of Hybrid System

According to many renewable energy experts, a small "hybrid" electric system that combines home wind



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## DESIGN AND FINITE ELEMENT ANALYSIS OF MISSILE CANISTER

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**Abstract:** Cylindrical pressure vessels are widely used for commercial, under water vehicles and in aerospace applications. At present the outer shells of the pressure vessels are made up of conventional metals like steels and aluminium alloys. The payload performance/ speed/ operating range depends upon the weight. The lower the weight the better the performance, one way of reducing the weight is by reducing the weight of the shell structure. The use of composite materials improves the performance of the vessel and offers a significant amount of material savings. Moreover, the stacking sequence is very crucial to the strength of the composite material. This Paper involves various objective functions such as orientation, composition and buckling load. Canister is a cylindrical pressure vessel used to store and launch a missile. The matrix and fibre reinforcement used are Epoxy resin and glass fibre cloth. The design considerations are 30 bar (internal pressure) and 5 bar (external pressure). External pressure causes buckling and buckling analysis is also performed. Theoretical calculations are done to find out the inclination of piles, fiber fraction for maximum strength. The Comparisons are made for two different approaches i.e. the finite element model and the theoretical model. A 3-D finite element analysis is built using ANSYS-Workbench software into consideration, for static and buckling analysis on the pressure vessel. Safe design is known by comparing the factor of safety of theoretical and analysis.

**Key Words:** Composite material, Shells, Fiber orientation, composition, Critical Pressure, Buckling

### 1. INTRODUCTION

Missile is an object capable of being projected, usually with the intent of striking some distant object. All the more especially, a missile is generally a weapon that is self-propelled in the wake of leaving the starting gadget. As it were, missile is a rocket propelled weapon intended to convey an unstable warhead with awesome exactness at fast. Missiles are tough, very much developed machines. Be that as it may, in light of their size, weight, and mass, they are not that simple to deal with nor are

missiles indestructible. Most missile harm is, sadly, an aftereffect of imprudence and poor dealing with rehearses. To decrease the likelihood of harm, missiles are shipped, stored and handled with unique equipment's. Affirmed containers, canisters, and dealing with gear's furnish most extreme missile security with least taking care of by work force. The missile compartment utilized beforehand was of top kind (bag) containers. This kind of compartment has extensive contact territory at the end locale. So it is imperative that the producer needs to take outrageous care in delivering this compartment with no warpage at the end district. Else there will be a leakage of gas from the hole created due to warpage. In this manner the assembling turns out to be more unpredictable and more costly. Missile is a question equipped for being anticipated, as a rule with the purpose of striking some far off protest. All the more especially, a missile is typically a weapon that is self-propelled in the wake of leaving the starting gadget. As such, missile is a rocket-propelled weapon intended to convey a hazardous warhead with extraordinary exactness at rapid. Missiles are durable, all around developed machines. In any case, due to their size, weight, and mass, they are not that simple to deal with nor are missiles indestructible. Most missile harm is, shockingly, a consequence of lack of regard and poor taking care of practices. To lessen the likelihood of harm, missiles are shipped, stowed and handled with unique equipment's. Affirmed containers, canisters, and dealing with hardware's furnish most extreme missile wellbeing with least taking care of by work force.

### 2. LITERATURE REVIEW

A missile is damaged shockingly because of carelessness and poor dealing with practices. A published paper, "Design and Analysis of a Storage Container used in Missile" by Prudvi Raju, Devarapalli, Venkata Ramesh Mamilla, designed a container which is used for transportation and storage of missile. To decrease the possibility of damage, missiles are shipped, stored and handled with affirmed missile containers. Endorsed containers, furnish greatest missile safety with least taking care of by personnel. This makes the design and



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## EXPERIMENTAL INVESTIGATION OF AIR FLOW CHARACTERISTICS IN RECTANGULAR CHANNEL USING PEDESTALS AS VORTEX GENERATOR

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**Abstract-** This experimental study is to investigate the effect or influence of pedestal vortex generator on one wall of rectangular duct on the flow performance. The effects of geometrical parameters of pedestal vortex generator and aspect ratio of duct on friction factor ratio have resulted in Reynolds number which is based on hydraulic diameter of the rectangular channel in the range 8000 to 24000. The factors which are varied for vortex generator were pitch to height ratio of vortex generator ( $P/h$ ) and aspect ratios of vortex generators ( $\Delta$ ). Vortex generator numbers were also varied on wall at axial locations. Experimental results reported for aspect ratio 2.8, 5.5, 7.3 and 1.6 of pedestal vortex generator and pitch to height ratio ( $P/h$ ) 4, 8, 12, 16. And 8000 to 24000 is the range of Reynolds number. Experimentally investigated that the friction factor ratio increases with increase in Reynolds number and friction factor ratio increases with decrease in pitch to height ratio. For pedestal vortex generator with aspect ratio 2.8 and height 8mm the results were, For pitch to height ratio ( $P/h$ )=16 friction factor ratio for 8000 Reynolds number is 27.12% less than the friction factor ratio for the Reynolds number 24000. So it is clear that friction factor ratio increases with increase in Reynolds number. And for Reynolds number 20000, pitch to height ratio ( $P/h$ )=4 friction factor ratio is 21.14% greater than pitch to height ratio ( $P/h$ )=16 so we can say that friction factor ratio increases with decrease in pitch to height ratio.

**Keywords:** Pitch to height ratio, Aspect ratio, Pressure drop, Hydraulic diameter, Pedestals

### I. INTRODUCTION

There are many uses in engineering processes in which we come across addition or removal of heat for this to happen we use heat exchange equipment's in wide applications of engineering. Flow in channels gains more attention because of their uses in heat exchangers. In

channels we use vortex generators which obstruct the flow and produce vortices due to these vortices heat transfer rate is enhanced. There are many types of vortex generators which are used in channel flow and the most often used are ribs, wings and winglet pairs. And for these vortex generators there are many number of methods to raise the coefficient of heat transfer. Commonly used methods are active, passive and compound methods. But here we are using passive method in which no external power is used but we make use of geometry of surface which is main factor in passive method, where as in active method we use external power like mechanical equipment's, surface vibration, electric or acoustic fields. The method which makes use of both active and passive method is named as compound method. In passive method the main factors which raises the heat transfer rate mainly depends on two important things one is disturbing thermal layer and mixing of bulk fluid. This disturbance in the presence of roughness elements will raise the heat transfer rate by producing a boundary layer which is thinner than undisturbed thermal boundary layer. Mixing of bulk fluid increases the heat transfer rate and because of vortices produced due to disturbance reduces thermal gradient in the center and it mainly on side wall region of the channel. This can be achieved by using vortex generators.

The method which uses vortex generators to raise the heat transfer rate is named as induced vortex enhancement technique. The vortex generators are mainly divided into four forms on the basis of their geometry. Ribs, winglet pairs, delta wings and delta winglet pairs.

Vortex generators which disturb the flow and produce vortices which further increase the heat transfer rate and these shapes of vortex generators are either be cut or punched. And these vortex generators are attached to the surface of the channel which is to be roughened. These



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## INVESTIGATION ON PERFORMANCE OF BURNISHING PROCESS ON DIFFERENT MATERIALS

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### Abstract

The main aim of this paper is to analyze the impact of roller burnishing operations on the work material, which is a cold-working, non-metal removal and plastic deformation process. Surface finish has a positive and prolonged effect on the functioning of the machined parts. In this work roller burnishing is used to get a high-quality surface finish on different materials like aluminium, copper and brass.

A test rig was set up on a center lathe to conduct experiments. The surface finish of the roller burnished cylindrical surfaces was examined for the soft materials like aluminium, Copper and also for hard materials like Brass. The optimum values of feed, speed, and depth of penetration were suggested by conducting a number of experiments varying one-factor-at-a-time holding the other parameters constant. Number of passes of the tool was also the factors under study for the optimization.

Since all the factors are independent, varying one-factor-at-a-time and keeping the rest constant method of experimental optimization technique will not give accurate results either for the main effects or any interactions present. At same time it is not possible to vary more than one factor at a time experimentally.

### 1. INTRODUCTION

#### Surface Roughness:

The surfaces of engineering components will provide link between manufacturing and their function in use. Provision and long-term keeping of specified characteristics of machine parts greatly depends on their surface quality. The main cause of machine failures (80%) are wear of contact surfaces in mating parts. Wear resistance of rubbing parts can be improved by reducing the initial wear of components. In this line, it is better practice to make the sliding Surfaces with a roughness equal to that of worn-in parts.

In today's production of machines and instrument components, finishing processes are becoming more and more important. Increasing attention is being paid to the quality of the surface finish obtained. Surface finish is

important not only as an appearance it also has a positive prolonged effect on the functioning of machine parts. Surface finish is a characteristic of any machined surface. It is sometimes called as surface texture or roughness. The advantages of good surface finish are:

- Good surface finishes increase the wear resistance of the two work pieces in an assembly.
- Good surface finishes have cosmetic affect and make the parts look good.
- Good surface finish permits the proper function of static and dynamic O-ring in hydraulic and Pneumatic equipment
- Good surface finishes increase the load carrying capacity, tool life.
- Good surface finishes increase the corrosion and fatigue life of the components

Surface roughness is generally defined as the irregularities, which are inherent in the production process left by the manufacturing tool.

Some factors are

- The marks left by the tool
- The finer structure due to the tearing of material during machining.
- The debris of built-up edge.
- Small irregularities in the shape of the tool tip.

Poor surface finish may neutralize the effect of tolerances and require more power to operate the machines. Hence surface finish has vital role in machining process. The components manufactured without good surface finish may result in numerous problems. Increased wear on moving stressed parts, Excessive stress concentration etc. Thus, with a view to eliminate the above problems, a good surface finishing process is required.

### 2. LITERATURE

#### Burnishing

Burnishing is also called as chip less finishing process. It cold works the metal surfaces by applying the forces that exceed the yield strength of the material through



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## DESIGN & DEVELOPMENT OF FRP SANDWICH CRASH BUMPER FOR ENHANCED SAFETY

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**ABSTRACT:** A bumper is a shield made of steel, aluminum, rubber, or plastic that is mounted on the front and rear of a passenger car. When a low speed collision occurs, the bumper system absorbs the shock to prevent or reduce damage to the car. The crash bumper is a component associated with the safety of passenger and automotive engine and related components.

Better and Improved design is a continuous process to create better components with improved performance than the existing ones. A new or better component is one which is more economical in all respects such as cost, performance, and aesthetics and so on.

In the present work the PVC made automotive bumper is studied thoroughly and the section properties are evaluated. Various fiber reinforced plastic designs considered for the analysis on the basis of providing better flexural rigidity at very moderate change in the weight of bumper were proposed. The cross sectional area and mechanical properties are calculated along with the flexural rigidity of designs. Finite element analysis is carried out on these designs to select a better and commercially feasible design. The proposed design model has been fabricated and tested.

### 1. INTRODUCTION

The bumper is one of the most important parts of a car, which can be found at the rear-most and front-most parts. The car bumper is designed to prevent or reduce physical damage to the front and rear ends of passenger motor vehicles in low-speed collisions. Automobile bumpers are not typically designed to be structural components that would significantly contribute to vehicle crash worthiness or occupant protection during front or rear collisions. It is not a safety feature intended to prevent or mitigate injury severity to occupants in the passenger cars. Bumpers are designed to protect the hood, trunk, grille, fuel, exhaust and cooling system as well as safety related equipment such as parking lights, headlamps and taillights and rest of the vehicle in low

speed collisions. When bumpers are poorly designed, these car body parts sustain most of the damage in parking-lot collisions and other low-speed impacts.

#### Basic function of bumper :

The function of the bumper is to absorb crash energy without significant damage to the bumper itself and no damage to the vehicle's front or rear end. The bumper of vehicle is a first element, which perceives the front impact in the most common cases of automobile accidents. Generally today's bumpers are made with a reinforcement bar of steel, aluminum, or plastic with a plastic cover. The system includes crash absorbing mechanisms that compress on impact, such as polypropylene foam or plastic honeycomb. The most effective bumpers are positioned with distance between the reinforcement bar and the vehicle's sheet metal. It helps the vehicle sustain tremendous impact while preventing the safety systems from being damaged. However, it can reduce the injury of passengers especially during high speed impacts. Car bumpers can be damaged in accidents. For low speed collisions of 16km/h or lower bumpers are intended to protect body parts such as, hoods trunk lids, and lamps from losing their functions. Bumpers are designed to plastically deform at the time of collision under the speeds. So as to absorb the crash energy and protect automotive body and the rest of the vehicle.

### 2. LITERATURE REVIEW

Stephen H. Hamid Razi and M. Dudley 1999. [1]. Have carried out study of composite material. In a composite material under tension or compression loading, a damage zone (DZ) is developed in front of a notch prior to failure. Recent research indicates that the DZ manifests itself in the form of strain-softening material behavior. This describes a generalized analysis method based on a bilinear strain-softening material law combined with a damage zone model (DZM) to predict residual strength of thin-skin honeycomb sandwich structures with damage such as holes and slots. This method was



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## CALCULATION OF SPECIFIC ENERGY IN BARE AND TBC COATED SUPER ALLOYS

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**ABSTRACT** Aerospace engines and land based Gas turbines operates at very high temperatures which are made with materials which can withstand high temperatures such as Ni- based or Co-based superalloys. To increase the efficiency of engine by increasing working temperature, however superalloys are used for engine components needs to protect from high temperatures. The thermal barrier coatings (TBCs) gives good protection to high temperatures and also it is easy to apply on blades and engine components. A TBCs of 150  $\mu$ m thick on a gas turbine blade will lead to an increase of 150 – 200o C in the operating temperature of the gas turbine. However, further cooling is necessary to protect the TBC and underlying superalloys from high temperatures air film cooling is one of the best way cool the turbine blades easily. For this purpose, fine holes drilling on the surface of turbine blades is required. Laser drilling of these TBC/superalloys multi layer system is best method than other existing techniques.

Conventional drilling methods are not possible or difficult to use for drilling of very small and fine holes. Laser drilling does not involve tool wear and it is easy to drill the bare and ceramics coated superalloys. Plasma sprayed thermal barrier coatings (TBCs) consist of partially stabilized zirconia as a top coat and NiCrAlY as bond coat, deposited on a nickel based superalloy (Inconel/IN718) substrate used for laser drilling experiments. Different thickness of TBCs, (600 & 1600  $\mu$ m) on 2mm thick IN718 superalloy and 4mm thick IN718 superalloy used for this study. A pulsed Nd: YAG Laser ( $\lambda = 1.06 \mu$ m) with a focal length of 120mm and using different pulse widths and pulse energy were used for drilling.

During laser drilling, material removal in general occurs by vaporization and expulsion of molten material. The energy required to remove material via melt ejection or expulsion of molten material is about one twelfth for IN718 and one third for ZrO<sub>2</sub> of that required to vaporize the same volume. In this project we investigated the amount of specific energy required to remove the material from melt ejection and vaporization

mechanisms. And compared with theoretical values. In addition, all metallurgical characteristics of interest, viz. extent and nature of spatter, recast and heat-affected zone have been evaluated.

### 1. INTRODUCTION OF THE LASERS

The increasing demand for processing of advance materials like superalloys and other materials which are difficult-to-process by conventionally and the availability of high power lasers have stimulated interest in research and development related to laser manufacturing. The already existing laser-based operations such as laser cutting, laser welding, laser heat treatment and rapid prototyping have already found their way into actual manufacturing shop floors. In addition, the applications of lasers in surface alloying, cladding and glazing now offer the exciting possibility of producing new materials with novel properties. The increasing interest in the use of lasers for manufacturing can be attributed to the several unique advantages listed below, which are generically applicable to the entire range of materials processing applications. The materials that can be processed using laser ranges from metals and alloys to inorganic as well as organic non metals and composites. The prominent laser based materials processing applications are briefly discussed below.

1. Laser Cutting
2. Laser Drilling
3. Laser Welding
4. Laser Cladding
5. Laser Alloying
6. Rapid Prototyping
7. Laser Marking
8. Laser Hardening
9. Laser Glazing

### 2. LITERATURE REVIEW

Gas Turbine



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## DESIGN AND 3D PRINTING OF FOOT AND ANKLE- FOOT ORTHOSES

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**ABSTRACT-** Many people with disabilities require positioning of the feet and stability at the ankles, which is achieved through the use of an ankle-foot orthotics (AFO). Models currently in use are bulky, uncomfortable, and hard to put on, especially for pediatric patients. These patients visibly have trouble walking as their oversized shoes, necessary for the insertion of the AFO, get in the way. The goal of this research is to design a AFO to solve the current issues. The design is constructed with many considerations taken into account. Finally, structure is modeled in Creo (Pro-E) software and saved in IGES format. Then the model is imported in Ansys software for analyzing various stresses, at last manufacturing process takes place with the help of 3D printing.

### 1. INTRODUCTION

The Ankle-foot-orthotics (AFOs) is externally applied assistive devices that are prescribed to the patients with neuromuscular dysfunctions in order to improve abnormal lower limb motor functions. AFO's are mainly used to control the range of motion of the ankle joint, to compensate for the muscle weakness caused by different motor neuron diseases, to improve the gait functions during post-operative stages and to optimize the efficiency of walking.

Different types of AFO's are used to treat different dysfunctions. Each type of AFO's has its characteristic function. However, AFO's with same function can have different designs that differ in material, geometry, additional mechanism and components which affect the comfort, cost of AFO and oxygen consumption of patients. Additionally, recent advances in different technology areas, such as 3D manufacturing, three dimensional (3D) scanning and CAD-CAM (computer aided design-computer aided manufacturing) have led to new designs and manufacturing methods for AFO's. The

objective of this project is to provide a design, analyze, and manufacture of AFO's.

### 2. LITERATURE SURVEY

First of all, it would be beneficial to describe orthoses and prosthesis concepts that are mostly confused with each other. Briefly, orthoses are braces to support dysfunction of a body part, while prostheses are artificial parts to replace a missing body part. Prostheses are devices for external and internal use. External prostheses, such as prosthetic legs or prosthetic breast form used after mastectomy (Lake, Ahmad, & Dobrahsian, 2013), can be employed for cosmetic and also functional aims with the developments in prosthetic technology. On the other hand, internal prostheses, such as artificial knee joints (Guo, Hao, & Wan, 2016) and cataract lenses (Heys & Truscott, 2008) are devices which are surgically implanted within a body.

Orthoses are assistive devices that are used to align, protect and assist limbs or body parts besides supporting to treat deformities. Orthoses can be used for neurological conditions, injuries and congenital deformities. Orthoses are designed as standard or custom made forms from an individual mold in the shape of patient's foot. Orthoses can be divided into two classes, i.e. i) standard orthoses for general use and ii) custom made orthoses that are prescribed for more complex conditions. Orthoses are used for lower extremity (Moisan & Cantin, 2016), upper extremity (Belda-Lois et al., 2006), and spine (Hofmann et al., 2016). Lower extremity orthoses have a wide range of use that are designed for hip, knee and ankle joints' immobilizations. They reduce energy consumption and pain as assisting the gait and improving the posture. Development of lower extremity orthotic technologies and new materials lead to new designs and manufacturing methods, and also affect selection criteria of orthoses.



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## EXPERIMENTAL STUDY AND THE EFFECT OF ALKALI TREATMENT WITH TIME ON JUTE POLYESTER COMPOSITES

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**ABSTRACT**—The main aim of the work is the treatment that is to be given to enhance the surface properties of the fibers in view of obtaining better interfacial reaction between the matrix and the fiber of the composite, which in turn enhances the mechanical properties of the laminate on the whole. The work also focuses on the effect of alkaline solution treatment on the fibers. Numbers of laminates are prepared with different soaking time to be able to subject them to various test methods.

Key words: Alkali treatment, Natural fiber, laminate

### 1. INTRODUCTION

Currently, many research projects are devoted to the utilization of cellulose-based fibers as reinforcement for plastics. However, these fibers are mainly composed of cellulose, hemicellulose, and lignin. In order to expand the use of cellulose-based fibers for composites, it is useful to have the information on fiber characteristics and factors which affect performance of the fibers

P. J. Roe, M. P. Ansell in (1985),

[1] studied the behavior of the jute fiber. Raw jute fiber has been incorporated in a polyester resin matrix to form uni-axially reinforced composites containing up to 60 vol % fiber. The tensile strength and Young's modulus, work of fracture determined by Charpy impact and inter-laminar shear strength have been measured as a function of fiber volume fraction. Derived fiber strength and Young's modulus were calculated. Polyester resin forms an intimate bond with jute fibers up to a volume fraction of 0.6, above which the quantity of resin is insufficient to wet fibers completely. He compared properties of jute and glass fibers, and on a weight and cost basis jute fibers are seen in many respects to be superior to glass fibers as a composite reinforcement. Jute fiber forms an intimate bond with polyester resin, and can fully or partially replace glass fiber without entailing the introduction of new techniques of composite fabrication.

A.K. Mohanty, Mubarak A. Khan,

G. Hinrichsen in (1998), [2] investigated on surface modifications of two varieties of jute fabrics, i.e. hessian cloth (HC) and carpet backing cloth (CBC), involving de waxing, alkali treatment, cyanoethylation and grafting, were made with a view to their use as reinforcing agents in composites based on a biodegradable polymeric matrix. Dipa Ray, B.K. Sarkar, A.K. Rana and N.R. Bose in (2001), [3] investigated the effect of alkali treatment of 5% alkali (NaOH) solution for 0, 2, 4, 6 and 8 h at 30°C.

Joung-Man Park, Son Tran Quang, Byung-Sun Hwang, K. Lawrence De Vries in (2005), [4] investigated on interfacial evaluation of the untreated and treated Jute and Hemp fibers reinforced different matrix polypropylene-maleic anhydride polypropylene copolymer (PP-MAPP) composites by micromechanical technique combined with acoustic emission (AE) and dynamic contact angle measurement.

Thi-Thu-Loan Doan, Hanna Brodowsky Edith Mader in (2006), [5] studied the thermal, dynamic mechanical and aging behavior are critical issues for the application of jute/polypropylene composites.

H.M.M.A. Rushed, M. A. Islam and F. B. Rizvi in (2006), [6] experimented on natural fibers such as flax, hemp, jute, kenaf. In the research work, jute fiber reinforced polypropylene matrix composites were developed by hot compression molding technique with varying process parameters, such as fiber condition (untreated and alkali treated), fiber sizes (1, 2 and 4 mm) and percentages (5%, 10% and 15% by weight). An attempt was made by U. S. Ishiakul, X. Y. Yang, Y.W. Leong, H. Hamada, T. Senba, and K. Kitagawa in (2007), [7] at increasing both toughness and rigidity by simultaneous toughening and reinforcement.

E. Sinha, S.K. Rout, P.K. Barhai in (2007), [9] all together treated the jute fibers with argon cold plasma for 5,

10 and 15 min. Structural macromolecular parameters of untreated and plasma treated fibers were investigated using small angle X-ray scattering (SAXS), and the



  
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# INVESTIGATION OF OPTIMUM STACKING SEQUENCE IN GLASS FIBER REINFORCED POLYMER STRUCTURES USING CLASSICAL LAMINATE THEORY

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**Abstract-** The popularity/usage of composites has increased recently in the aerospace, automobile and defense industries due to their lower production costs, light weight, higher fracture toughness, low thermal expansion, corrosion resistance and better control over the thermo-mechanical properties. The demand for improved performance of these structural materials makes it necessary to evaluate these materials under axial loading. Fiber-reinforced composites show strong anisotropic mechanical behavior due to their fiber orientations. These orientations cause a variety of failure mechanisms, which are more complex under axial loading conditions. In these work the stress, strain and deformation value has been evaluated to know the better understand and behavior of laminate of different unidirectional fiber orientation under plane stress conditions using MATLAB and ANSYS software. The graphical representations have been made to understand behavior of GFRP composite material.

Keywords-Matlab, Ansys, GFRP, classical laminate theory.

## 1. INTRODUCTION

### A. Composite Materials

Over 95% of the fibers used in reinforced plastics are glass fibers, as they are inexpensive, easy to manufacture and possess high strength and stiffness with respect to the plastics with which they are reinforced. Their low density, resistance to chemicals, insulation capacity are other bonus characteristics, although the one major disadvantage in glass is that it is prone to break when subjected to high tensile stress for a long time.

Therefore, data on the effects of moisture on retention of the mechanical properties of GFRP during long term environmental exposure are crucial for them to be utilized in outdoor applications. The environmental stress cracking characteristics of GFRP were studied using fracture mechanics samples under constant tensile load and water environment. For GFRP the characteristics of crack length as a function of exposure time. Ductile aramid fibers seemed to project the glass

fiber reinforcement from stress cracking due to higher chemical resistance and complex failure mechanisms. In addition to the prediction of load transfer in the joint stress analysis was conducted to investigate the effect of bonded on the peel and shear stress distribution in the adhesive. The main objective of this work is to investigate the effects on flexural strength of GFRP composite materials subjected to hydrothermal aging and its life prediction by mathematical modeling. In this work, the effects of environmental ageing on retention of flexural properties of GFRP are studied and qualitative correlation to between results from ageing and accelerated ageing is discussed [1].

### 2. LITERATURE SURVEY

To understand the physical changes that take place at the bonding interface between the fibres matrix, as it is of prime importance due to its link to the stress transfer, distribution of load and it also governs the damage accumulation & propagation[1]. Work describe the development and mechanical characterization of new polymer composites consisting of glass fibre reinforcement, epoxy resin and filler materials such as TiO<sub>2</sub> and ZnS. Experimental [2]. The classical lamination theory is very important in analysis of laminate because it will predict the stresses, strains, forces and moments relationships with reasonable accuracy. The composite materials are widely used in military aircraft, civil aircraft, space and automobile applications. ANSYS 11 software is used for analysis of composite laminate. First order shear stress deformation theory is used for the analysis of laminate in finite element technique [3]. The mechanical properties such as tensile, flexural, compression and Impact properties are studied as per ASTM standards. From the Experimental analysis, it was observed 20% ash reinforced polymer composite is having better tensile strength in comparison with other ash percentages [4]. desired properties by reducing the weight as much as possible [6]. The objective of this research was to gain a better understanding of tensile properties of epoxy resin composites reinforced with glass fiber. The effect of



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## DESIGNING THE HVAC SYSTEM FOR A SHOPPING MALL

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**ABSTRACT;** The objective to design Heating, Ventilation & Air conditioning (HVAC) system for a commercial Building, with simultaneously controls its temperature, humidity, cleanliness, proper distribution, noise level, heat load calculation, fresh air, exhaust, duct design, pipe design, equipment selection and layout of accessories such as indoor and outdoor unit of the project. Cooling load will be calculated on E20 form.

Indeed, today the emphasis is no more on understanding air conditioning 'products' but on creating 'solutions' and not just solutions, but 'customized solutions' that suit specific cooling needs of specific business and establishments.

Every air-conditioning application has its own special needs and provides its own challenges. Airports, hotels, shopping malls, office complexes and banks need uniform comfort cooling in every corner of their sprawling spaces and activities involving computers, electronics, aircraft products, precision manufacturing, communication networks and operation in hospitals. In fact many areas of programming will come to halt, so air-conditioning is no longer a luxury but an essential part of modern living.

With reference to the building plan and requirement of the case problem air-conditioning load is estimated for seasonal conditioning. The project is carried out on "Designing the HVAC system for a Shopping Mall". To provide human comfort, it is very essential to maintain steady temperature at public places like malls.

### 1. INTRODUCTION

HVAC (heating, ventilating, and air conditioning; also heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality. HVAC system design is a sub discipline of mechanical engineering, based on the principles of thermodynamics, fluid mechanics, and heat transfer. Refrigeration is sometimes added to the field's abbreviation as HVAC&R or HVACR, or ventilating is dropped as in HACR (such as the designation of HACR-rated circuit breakers). HVAC is important in the design of medium to large industrial and office buildings such

as skyscrapers and in marine environments such as aquariums, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

Ventilating or Ventilation (the V in HVAC) is the process of "changing" or replacing air in any space to provide high indoor air quality which involves temperature control, oxygen replenishment, and removal of moisture, odors, smoke, heat, dust, airborne bacteria, and carbon dioxide. Ventilation removes unpleasant smells and excessive moisture, introduces outside air, keeps interior building air circulating, and prevents stagnation of the interior air.

Ventilation includes both the exchange of air to the outside as well as circulation of air within the building. It is one of the most important factors for maintaining acceptable indoor air quality in buildings. Methods for ventilating a building may be divided into mechanical/forced and natural types.

### 2. LITERATURE SURVEY

#### 2.1 Types of Air-Conditioning Systems

2.1.1 Commercial Air-Conditioning According To Applications

2.1.2 Industrial Air-Conditioning

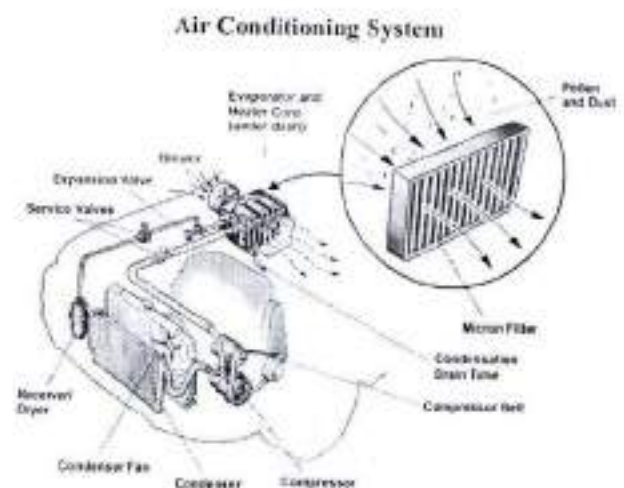


Fig 2.1: Air-Conditioning system



## EXPERIMENTAL DETERMINATION OF OPTIMAL PROCESS PARAMETERS OF FRICTION WELDED JOINTS OF DISSIMILAR MATERIAL BY USING DOE

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**ABSTRACT;** Friction welding is used in many fields because the procedure is easily automated and it is possible to weld similar and dissimilar materials. It can be used to weld the materials which can not be welded by resistance welding due to electrical and heat conductivity. One of the biggest incentives for choosing friction welding as joining process is that it allows you to combine dissimilar materials. Other conventional welding doesn't allow the joining of different materials, but friction welding does.

Friction welding provides a strong bond without the use of bolts and/or screws or the additional of extra weight from fillers. Friction welding tends to clean the surface between the materials- removing any debris or dirt. This usually eliminates a need to prepare the two joining surfaces prior to the friction welding process.

In this research the material which is selected it cannot be weld by resistance welding and arc welding due to high conductivity and it cannot be welded by friction welding at normal working parameters due to low coefficient of friction, but by controlling the parameters it is possible to weld with equally good tensile strength and other mechanical properties. Hence this research mainly concentrates on, The suitable friction welding parameters like RPM, friction pressure, frictional time, and quenching medium for the material by friction welding to attain the required hardness and tensile strength. Further, statistical analysis software like minitab is used to predict the optimal process parameters for basis of taguchi analysis.

### 1. INTRODUCTION

Friction welding machine (FWM) were utilized in different fields in light way that methodology was effectively robotized & it was conceivable to weld relative & unmistakable materials. It tends to be utilized to weld materials which can't be welded by obstruction welding because electrical & warmth conductivity. A standout amongst other main thrusts for picking pounding welding as joining process was that it stipends combining particular materials. Other ordinary welding doesn't permit joining various materials, yet contact

welding does. Contact welding gives a solid bond without utilization hooks or possibly screws or extra additional weight from fillers. Contact welding tends to clean surface between materials- expelling any garbage or soil. This all else fails disposes a need to setup 2 joining surfaces before pounding welding process.

i) sensible rubbing welding parameters for SS 431 & En-8 material by contact welding to accomplish required rigidity & hardness materials & make conceivable substitution SS 431 to a level 3/4th shaft material, to lessen expense. material investigation has running with properties their parent metals.

### 2. LITERATURE SURVEY

Shubhavardhan RN [1] researched mechanical & metallurgical properties rubbing welded AA6082 aluminum mix & AISI 304 stainless steel. In this paper these exceptional materials were joined by steady drive granulating welding process which consolidates shine produced using crumbling between 2 surfaces & plastic misshapening. Tests were composed with various welding process parameters. Outcomes were investigated by systems for flexible test, Vickers little scale hardness test, exhaustion test, Charpy v-score impact test, & SEM-EDX (centrality dispersive X-shaft) examination to pick stages that happened amidst welding.

Idea joints shifted with broadening pounding weight & contact time keeping upset weight & ponder time steady. joint quality expanded, & after that diminished ensuing to achieving a greatest respect, with developing granulating weight & pulverizing time. A section welds had low quality because aggregate alloying parts at joint interface. Right when thickness response layer stretched out over a major respect, joint was weak & broken at weld interface. joint was sound when there was no unbounded territory & a thin response layer shaped along whole weld interface.

A. Rajasekhar [2] researched about impact welding strategy & post weld warm medicines on microstructure & mechanical properties AISI 431 martensitic hardened steel. welding system was considered in this paper were pulverizing welding & electron shaft welding. Weld



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## FRICION STIR WELDING OF DISSIMILAR AA2014 AND AA6061 ALUMINIUM ALLOYS

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**Abstract:** Friction Stir Welding (FSW) is a solid state joining technique which is universally used for joining of aluminium alloys in marine, aerospace, automotive and many other applications of commercial importance. In this present study, the effect of FSW parameters on the weldability of dissimilar aluminium alloys such as AA2014 and AA6061 were investigated. The two plates were aligned perpendicular to the rolling directions and the welding was carried out. The main objective of the experiment is to find out the maximum tensile strength. The experiments were conducted on a milling machine. Three factor three levels Central-Composite matrix in Response Surface Methodology (RSM) is employed to carry out the experimental investigation. The "Design Expert 8.0", software was used for regression and graphical analysis of data collected. ANOVA was used to check the validity of the model. A designed FSW experiments were carried out to get a high strength welding by controlling the rotational, welding speed and tool pin diameter. The tensile tests were carried under tension at room temperature in order to analyze the mechanical response

**Keywords:** Response Surface Methodology Maximum tensile strength Design Expert 8.0 ANOVA

### 1: INTRODUCTION

#### 1.1 Introduction of the Friction Stir Welding Technique

In Today's modern world there are different welding techniques to join metals. They range from the conventional oxyacetylene torch welding to laser welding. The two types of welding can be divided as fusion welding and pressure welding.

The fusion welding process involves bonding of the metal in the molten stage and may need a filler material if required such as a consumable electrode or a spool of wire. Some processes may also need an inert ambience in order to avoid oxidation of the molten metal. A flux material or an inert gas shield in the weld zone protects weld pool to avoid defects. Examples of fusion welding are metal inert gas welding (MIG), tungsten inert gas welding (TIG) and laser welding. There are many

disadvantages in the welding techniques where the metal is heated to its melting temperatures and let is solidify to form the joint. The melting and solidification causes the mechanical properties of the weld in some cases to deteriorate such as low tensile strength, fatigue strength and ductility. The disadvantages also include porosity, oxidation, micro segregation, hot cracking and other microstructural defects in the joint. The process also limits the combination of the metals that can be joined because of the different thermal coefficients of expansion.

The solid state welding is the process where coalescence is produced at temperatures below the melting temperatures of the base metal without any need for the filler material or any inert ambience in many cases. Examples of solid state welding are friction welding, explosion welding, forge welding, hot pressure welding and ultrasonic welding. The three important parameters time, temperature and pressure individually or in combinations produce the join in the base metal. As the metal in solid state welding does not reach its melting temperatures, there are fewer defects caused due to the melting and solidification of the metal. In solid state welding the metals being joined retain their original properties as melting does not occur in the joint and the heat affected zone (HAZ) is also very small compared to fusion welding techniques where most of the deterioration of the strength and ductility begins. Dissimilar metals can be joined with ease compared to fusion welding.

Friction stir welding (FSW) is an advanced friction welding process. The conventional friction welding is done by moving the parts to be joined relative to each other along a common interface also applying compressive forces across the joint. The frictional heat generated at the interface due to rubbing softens the metal and the soft metal gets extruded due to the compressive forces and the joint forms in the clear material, the relative motion is stopped and compressive forces are increased to form a sound weld before the weld is allowed to cool.



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## Experimental Investigation and FE Analysis of CFRP Composites

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### Abstract

Composites are one of the most advanced and adaptable engineering materials. The strength of any composite depends upon volume/weight fraction of reinforcement, L/D ratio of fibers, orientation angles and other factors like curing temperature etc. The present work focuses on mechanical properties of carbon fiber reinforced epoxy composite material. Tensile testing of specimens are prepared and tested according to ASTM 3039. Composite properties like Young's modulus ( $E_1$ ), transverse modulus ( $E_2$ ), poisson's ratio ( $\nu_{12}$ ), failure stress ( $\sigma_1$ ) and strain ( $\epsilon_1$ ). The experiment is conducted on Computer controlled Universal testing machine with proper mounting of strain gauges and extension meters. Mechanical properties obtained from these samples are input to the FEM model to find the stress and strain distribution in each layer and at interface. Finally the numerical results are compared with experimental results. The variation between Experimental results and numerical results is less than 5%.

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Selection and peer-review under responsibility of the conference committee members of the 4th International conference on Materials Processing and Characterization.

**Keywords:** Fiber reinforced plastic; Composite; tensile strength; flexural strength; FEA; weight fraction

### 1. Introduction

An introduction of new technology follows the development and use of modern materials. Today, composite materials are the subject of an intensive development and use. These materials have significantly better mechanical and other characteristics than their constituent elements. Properties of composite materials that make them more specific than other materials are: large strength, high stiffness, small density and mass, resistance to corrosion and high temperatures, the ability to create complex shapes. Most of composites are created in order to improve the combination of mechanical characteristics of materials, such as stiffness, toughness and strength in conditions of environment influences, or at higher temperatures. These materials also have a considerable potential for absorbing kinetic energy during crash. The ability of these materials to meet the specific needs for different structures makes them highly desirable. Improvement in design, materials and manufacturing technology enhance the application of composite structures. Because of their extraordinary mechanical properties, composite materials have an important application in aircraft constructions. The technology has been explored extensively for aerospace applications, which require high strength and stiffness to weight ratio. Carbon/Epoxy composites are the most used composite materials in primary structures of the aircraft. They are usually used in a form of multilayer composites (laminates). For the implementation of composite materials in aviation, the most important feature is their behavior on the dynamic loads and resistance to fatigue. Nowadays the amount of composite materials in modern aircraft constructions is increasing. For example, fifty percent of new Boeing 787 structure is made from composites. Quantity and degree of damages created in aircraft

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## DESIGN ANALYSIS AND EXPERIMENTAL EVALUATION OF SANDWICH COMPOSITES SUBJECTED TO FATIGUE

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**Abstract**— The fatigue response of sandwich composite panels with an improved structure and different orientations to increase their fatigue resistance is investigated herein. In order to capture the fatigue performance of sandwich structures, a specific and instrumented half drop tester was designed and developed. Different sandwich structures are analyzed. Composite materials here compose of E-Glass fibre matrix composite skin and a foam core. Usually the foam core is Polyurethane (P.U) and Polystyrenotic. The latter structure is specially designed to improve crushworthiness for transport applications, aeronautical and space structures.

The main results of this study are evaluation of the absorbing energy performance of the sandwich structures, subjected to a repeated impact of the sandwich panels up to fatigue, and the development of criteria useful for materials selection. These sandwich panels have shown a better performance in terms of impact energy absorbing properties and strength respect to traditional sandwich structures. The predicted fatigue behavior of sandwich panel compared fairly well with results from finite element analysis. Analytical predictions of these were also found to be in good agreement with experimental data. Specimen deformation behavior and fracture features are correlated to deformation curves obtained during the testing. Extensive experiments are carried out to characterize different oriented sandwich panels for the mechanical behavior as well.

**Keywords**— composites, sandwich, fatigue, deformation.

### I. Introduction

Increasing performance demands for modern technology applications make it necessary to look for new materials. It is difficult to achieve high and strict performance standards using any one material, hence new materials are fabricated by combining two or more conventional materials. These materials named as composite materials give unique combination of properties, which cannot be obtained from any single conventional material. A formal definition of composite materials give by ASM Handbook [4] is microscopic combination of two or more distinct materials, having a recognizable interface between them. Composites are normally made by incorporating some reinforcement such as fibres in a bulk material known as matrix. Some of the main advantages of composite materials are high strength, modulus, bending stiffness and chemical resistance. Properties of composites can also be tailored according to specific design requirements, directional and spatial properties.

Defining a composite material needs information on three aspects

- Matrix material: e.g. metal, polymer or ceramic
- Reinforcements: e.g. continuous or discontinuous fibres or particles
- Structure: e.g. laminated or sandwich

The matrix holds the reinforcements in an orderly pattern. Because the reinforcements are usually discontinuous, the matrix also helps to transfer load among the

reinforcements. Matrix materials are usually some type of plastic, and these composites are often called reinforced plastics. There are other types of matrices, such as metal or ceramic, but plastics are by far the most common. There are also many types of plastics, but a discussion of them is beyond the scope of this week's column. Suffice it to say for now that the two most common plastic matrices are epoxy resins and polyester resins.

**Metal Matrix Composites (MMCs)** - mixtures of ceramics and metals, such as cemented carbides and other cements

**Polymer Matrix Composites (PMCs)** - Thermosetting resins are widely used in PMCs

Examples: epoxy and polyester with fibre reinforcement, and phenolic with powders

**Ceramic Matrix Composites (CMCs)** -  $Al_2O_3$  and SiC embedded with fibres to improve properties, especially in high temperature applications

### II. Literature Survey

A. Russo, B. Zuccarello worked on the analysis of the mechanical behaviour of a class of sandwich structures widely employed in marine constructions, constituted by fibre-glass laminate skins over PVC foam or polyester mat cores. In detail, a systematic experimental study and numerical simulations have shown that the theoretical prediction of the strength and the actual fatigue mechanism of these sandwich structures can be affected by significant errors, especially in the presence of prevalent shear loading. Moreover, because of the low shear stiffness and the elastic constants mismatch of the skins and core

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## Experimental Investigation of the Suitability of Hydrogen with Cottonseed Oil as Alternate Fuel for IC Engines: A Review

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### ABSTRACT

As a renewable, sustainable and alternative fuel for compression ignition engines, blends of cottonseed oil (CSO) instead of diesel with hydrogen has been considered for review in this present paper. In this review paper, reports about cottonseed oil biodiesel and hydrogen when fueled in engine with respect to engine performances and emissions which are published by highly rated journals in scientific indexes were cited preferentially since the year 2000. From these reports, the effect of cottonseed oil biodiesel and hydrogen on engine power, economy, durability and emissions including regulated and non-regulated emissions, and the corresponding effect factors are surveyed and analyzed in detail.

**Keywords**-- Alternate fuels, Cottonseed Oil, Emissions, Hydrogen and Performance.

### INTRODUCTION

India is the second largest producer of cotton seed in the world next to china with the potential of 4.6 million tonnes of oil seeds per annum. With the rapid development of rural agricultural production and rapid growth of local industry in India, the discrepancy between demand and supply of energy has become an increasingly acute problem. Due to seasonality of farm work, a temporary shortage of fuel will bring about unexpected and irreparable loss to peasants. The limited (and fast diminishing) resources of fossil fuels, increasing prices of crude oil, and environmental concerns have been the diverse reasons for exploring the use of vegetable oils as alternative to diesel oil [1-4]. Vegetable oils offer almost the same output with slightly lower thermal efficiency when used in diesel engines [5-7]. Reduction of engine emissions is a major research aspect in engine development with the increasing concern over environmental protection and the stringent exhaust gas regulation [8-13].

Diesel engines are the most efficient prime movers. From the point of view of protecting global environment and concerns for long term energy security, it becomes necessary to develop alternate fuels with properties comparable to petroleum based fuels. Unlike the rest of the world, India's demand for diesel fuels is roughly six times more than that of gasoline, hence oil prices has led to the search for alternate fuels. Non edible oils are promising fuels for agriculture applications. Cottonseed oil has

properties comparable to diesel and can be used to run CI engines with little modifications. Usage of Cottonseed oil will allow a balance to be sought between agriculture, economic development and the environment [14].

Concern over the human health, environmental effect, availability, and cost of fossil fuels are motivating the researchers to investigation of alternative fuels for automobile industry. Among the various possible alternative fuels, hydrogen is found to be most promising due to its clean burning and better combustion properties. There are several reasons for applying hydrogen as an additional fuel to accompany diesel fuel in the internal combustion (IC) compression ignition (CI) engine. Primary; it increases the H/C ratio of the entire fuel. Secondly, injecting small amounts of hydrogen to a diesel engine could decrease heterogeneity of a diesel fuel spray due to the high diffusivity of hydrogen which makes the combustible mixture better premixed with air and more uniform. It could also reduce the combustion duration due to hydrogen's high speed of flame propagation in relation to other fuels [40].

### LITERATURE REVIEW

#### Use of Cottonseed Oil in Diesel Engine

##### Fuel Modification

The alternative diesel fuels must be technically and environmentally acceptable and economically competitive. From the view points of requirements,



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## A REVIEW ON OPTIMIZATION OF PERFORMANCE AND EMISSION CHARACTERISTICS OF C.I ENGINE OPERATED ON BIO-DIESEL FUEL USING TAGUCHI METHOD

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**Abstract** - In the modern day world the increase in Industrialisation and Motorization of the world has led to rapid increase of the demand of petroleum based fuels. As there is a reduction of fossil fuel resources, the evolution of biodiesel fuels for IC engines is existing.

In the present study of work, reports about bio-diesel engine performances and emissions published by highly rated journals in scientific indexes are referred. The present investigation attempts to address the study on optimization techniques were implemented to evaluate the performance and emission characteristics of diesel engine are presented.

Furthermore, many researchers worked in optimization of various parameters which may influence the IC engine performance. The trial and error method is a technique used to identify the best parameters. Lastly the conclusion has been drawn from various investigations that shown the taguchi method are suitable to solve the problems of performance and emission for diesel engine.

**Key words:** Bio-diesel, Diesel Engine Performance, Taguchi, Optimization techniques.

### 1. Introduction

There are a great variety of diesel engine designs using a wide range of applications, for example, automobile, truck, locomotive, marine, power generation and so on. However, diesel engines emit high level of NOx and smoke. In addition, energy and environmental issues are getting more serious concern in the public. As a result, researchers must find new ways of decreasing exhaust emissions from engines and alternative fuels for solving this crisis [1]. Bio-diesel, which can be used as an alternative diesel fuel, is made from renewable biological sources such as vegetable oil and animal fats. It is biodegradable, non-toxic and possesses low emission profiles. Also, the uses of bio-fuels are environmentally beneficial. The name bio-diesel was introduced in the United States during 1992 by the National Soy Diesel Development Board (presently National Bio-diesel Board) which has pioneered the commercialization of biodiesel in the US [2]. The problem of increasing demand for high brake power and the fast depletion of the fuels demand severe controls on power and a high level of fuel economy. Many innovative technologies are developed to tackle these problems. Modification is required in the existing engine designs. Some optimization approach has to be followed so that the efficiency of the engine is not compromised. As far as the internal combustion engines are

concerned the thermal efficiency and emission is the important parameters for which the other design and operating parameters have to be optimized. The most common optimization techniques used for engine analysis includes Taguchi method [3]. Taguchi technique has been popular for parameter optimization in design of experiments. DOE has introduced the loss function concept which combines cost, target and variations into one metric. The signal to noise ratio (S/N) is a Figure of merit and relates inversely to the loss function. It is defined as the ratio of the amount of energy for intended function to the amount of energy wasted [3, 4]. Orthogonal arrays are significant parts of Taguchi methods. Instead of one factor at a time variation all factors are varied simultaneously as per the design array and the response values are observed. It has the ability to evaluate several factors in a minimum number of tests. Design of experiments (DOE) approach is cost effective and the parameters are varied simultaneously and then through statistical analysis the contribution of individual parameters towards the response value observed also could be found out. The engine operating parameters play an important role to reduce the emissions the design and operating parameters are the main factors responsible for the engine emissions and fuel economy. The fuel injection parameters like injection valve opening pressure and the



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