

Problems and Challenges in MMC Contributing to RP

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ABSTRACT

The principle of Metal matrix composites and manufacture is done by many authors. A number put forward to the limitations of MMC. This paper outlines the limitations of experimental MMC process and contributing the future of R.P process

KEYWORDS: MMC, Stir Casting, Erosion, Rp.

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I. INTRODUCTION

Manufacturing Industry requires innovative machining for the raising requirement of the market. Rapid Prototyping serves the purpose of light weight and precise components to reach the market strategies [1-33]. High strength and low weigh Al- based MMC lead a vital role in hydraulic and aerodynamic structures [34]. The objective of this paper is to give experimental values and limitations of MMC to further contribute to RP process.

II. EXPERIMENTAL SETUP

The material AlSiC is prepared in a stir casting machine with a melting temperature of 750^oc and cooled for two hours as shown in Fig.1 with weight percentage of Al 97.9 si 0.60, cu 0.28, mg 1.0, cr 0.20. The specimens are checked for erosion wear test as shown in Table.1

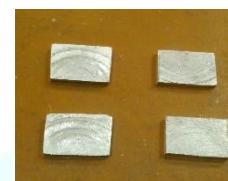


Fig. 1. Al Sic specimens

Sno.	Experimental Parameters	
	Erodent	Alumina Powder
1	Erodent size (mm)	80,100,120
2	Erodent shape	Angular
3	Diameter of jet nozzle (mm)	1.5
4	Jet velocity	50,60,80
5	Impact angle	45 ^o ,60 ^o ,90 ^o
6	Distance between nozzle and sample (mm)	15
7	Test temperature	27 ^o

Table.1.Al Experimental Parameters

III. RESULTS AND ANALYSIS

The worn out surfaces of composite shown that at 45° smooth and shallow grooves are formed and at 60° deep craters and lips are formed.

IV. LIMITATIONS

The potential for the application of MMC models is currently limited by number of factors. The efficiency depends on the quality of composite alloy, heat energy dissipation. In order to increase the future machining efficiency work should utilize Rapid prototyping vacuum process to reduce blow holes, dislocations and gaps, thermal problems and time in manufacturing.

V. CONCLUSIONS

Many factors like porosity gaps, metal solidification, thermal stress due to machining, heat/ energy dissipation and stress concentration reduce the efficiency. To further increase the efficiency of MMC process advanced manufacturing process such as metal prototyping is suggested to reduces the mechanical and thermal losses. This research provides a greater machining efficiency

REFERENCES

- [1] A.K.Matta, "Preparation and characterization of Biodegradable PLA/PCL polymeric Blends", elseiver, procedia material science 6 (2014) pp.1266-1270.
- [2] A.K.Matta, Dr.D.RangaRaju, Dr.K.N.S.Suman A.S.Kranthi "C-Based design methodology and topological change for an Indian Agricultural tractor component, 2017, Journal of institution of engineers (India), series-A, Springer.
- [3] A.K.Matta, "Preparation and toughness studies of Acetal (POM) & PTFE blend", vol.no.2,issue 12,IJMTST, dec 2016, ISSN:2455- 3778, pp 63- 67.
- [4] A.K.Matta, "Modeling of micro turbine for Rapid prototyping", vol.no.2,issue 7,IJMTST, july 2016, ISSN:2455- 3778, pp 19- 22.
- [5] A.K.Matta, Dr.D.RangaRaju, Dr.K.N.S.Suman "Modeling and optimization of Rapid prototyping for an Agricultural Tractor component", Discovery Engineering, 2016. vol.04, issue.13, pp.375-378, ISSN:2320- 6675.
- [6] A.K.Matta, D.Ranga Raju, K.N.S.Suman (2016). An approach to predict loads on Tractor rockshaft arm. ICAI, Space society of mechanical engineers,Gujarat, ISBN 978-93-85016-99-8, 5th to 6th april, PP.290-293.
- [7] A.K.Matta, Dr.D.RangaRaju, Dr.K.N.S.Suman, "3D Design support and software compensation for Rapid Virtual prototyping of Tractor Rockshaft arm", Taylor and Francis, CRC PRESS, Balkema publication, 2015. ISBN 978-1-138-02849-4, PP.91-94.
- [8] A.K.Matta "Optimization of Brake rotor by using Taguchi method and 3D Finite Elements ",IJAER, ISSN 0973-4562 Volume 10, Number 13, pp 33175-33177 (2015).
- [9] A.K.Matta, A.S.Kranthi "Fabrication of a six- Legged robot with crank and slotted lever mechanism using RF communication ", IJAER, ISSN 0973-4562 Volume 10, Number 13, pp 33170-33174 (2015).
- [10] A.K.Matta, "Optimization of operation parameters on a Novel internally ventilated cross drilled disc brake by using Taguchi Method " IJESTA ISSN 2395-0900 Volume 1, Number 5 (2015).
- [11] A.K.Matta, Dr.D.RangaRaju, Dr.K.N.S.Suman, "The integration of CAD/CAM and RapidPrototyping in Product Development A review", elseiver, procedia material science pp.3438- 3445,vol.2,2015.
- [12] A.K.Matta,Dr.R.UmamaheswaraRao,Dr.K.N.S.Suman,Dr.V.Rambabu, "Preparation and characterization of Biodegradable PLA/PCL polymeric Blends", elseiver, procedia material science 6 (2014) pp.1266-1270.
- [13] A.K.Matta ,V.Purushottam, Dr.R.Umamaheswara Rao, "Brake Rotor Design and Finite Element Analysis" IJMERE ISSN 2249-0019 Volume 4, Number 1 (2014), pp. 29-33.
- [14] Shasikumar.G.Totad, A.S.Kranti, A.K.Matta, "Sparse Social Dimension Based Collective Behavior Learning in Social Networks",Springer, ICCIDM-2014 20-21st Dec 2014.
- [15] A.K.Matta,V.Purushottam, "Analysis of Novel Brake Rotor using FEM", AIMTDR-2014 IIT Guwahati,12-14thDec 2014.
- [16] K.Prasada Rao, G.Anuradha, M.Anil Kumar, R.Umamaheswara Rao "The Six Sigma Approach To Reduce Specific Roll Consumption In Medium Merchant & Structural Mill"(IJREST) ISSN 2250-3676 Volume 2, Issue 1 July-Sept.,2013, pp 120-129.
- [17] A.K.Matta,R.Umamaheswara Rao,V.Rambabu, "Preparation and characterization of ternary blends composed of polylactide, poly(ϵ -carpolactone) and MWCNT", ICEMAP-2013,23rdMay2013.
- [18] A.K.Matta,A.S.Kanthi "Experimental Heat Transfer And Transient State Stress Analysis Of a Brake Rotor",APM-2013,CIPET,Lucknow,1-3 March 2013,PP 17.10-17.20.
- [19] A.K.Matta "Development and Impact Testing of a pultruded composite material highway guardrail" Research Journal of engineering and Technology(RJET) ISSN: 0976-2973 Volume 4, Issue 3 July-Sept.,2013, pp 132-135.
- [20] A.K.Matta ,V.Purushottam, R.Umamaheswara Rao, Dr.C.L.V.R.S.V.Prasad "Construction of a Test Bench for bike rim and Brake Rotor" IOSR Journal of engineering (IOSRJEN) ISSN: 2250-3021 Volume 2, Issue 8 (August 2012), PP 40-44.
- [21] A.K. Matta, R.B. Pothula and R.U. Rao "Design and Analysis of Steam Turbine Blades using FEM"

- International Journal of Mechanical Engineering Research. ISSN 2249-0019 Volume 2, Number 2 (2012), pp. 67-73,2012.
- [22] A.K Matta, D.Venkata Rao, P.RameshBabu and R. Umamaheswara Rao “ Analysis of Gas Turbine blades with materials N155 and INCONEL 718” International Journal of Advances in Science and Technology, Vol.4,No.1, pp 46-50, 2012.
- [23] A.K.Matta, D.Venkata Rao and A.Swarna Kumari “Convective Heat Transfer Analysis of Gas Turbine Blades Using Finite Element Method”,IJMER , Vol1,no.3, pp 391-397 , 2011.
- [24] A.K.Matta,P.Ramesh Babu and A.Swarna Kumari “Convective Heat Transfer Analysis of Gas Turbine Blades Using Finite Element Method”,ICMM-2011,IIT Guwahati, Guwahati, 15-16 December 2011, PP 631-636.
- [25] N.Rao, Dr.P.Ravi Kumar, K.S.Raghuram,M.Anil Kumar, “T24-Experimental Investigation of Neem Oil as a fuel in CI Engine” , ACME, Erode, Tamilnadu, , 25-26 March 2010,PP 626-633.
- [26] A.K.Matta, A.S.Kranthi “Scallable learning of collective behaviour”,books, Lap Publishers, ISSN 978-3-330-35098-4.
- [27] A.K.Matta, A.S.Kranthi, K.Shyam Prasad “How to develop a component and file a patent”,books, Lap Publishers, 978-3-330-35098-4.
- [28] A.K.Matta, V.Purushottam “An improved disc brake system”, patents filed, Indian Patents, 2358/CHE/2014.
- [29] A.K.Matta, D.Ranga raju, KNS Suman “An Agricultural components”, patents filed, Indian Patents, Patents application no. 201641034578.
- [30] SP. Kodali etal “Simulation studies on a Genetic algorithm based tomographic reconstruction using time of flight data from ultra sound transmission tomography”, ICANNAGA,pp.253-262, 2009.
- [31] SP. Kodali etal. “Comparing GA with MART to tomographic reconstruction of ultra sound images with and without noisy input data”, CEC, pp. 2963-2970, 2009.
- [32] SP. Kodali etal. “Applicability of genetic algorithms to reconstruction of projected data from ultrasonic tomography”, ICETET, 2008.
- [33] SP. Kodali etal. “Modelling of high speed milling process using soft computing”, ICETET, 2010.
- [34] Li, etal. “Erosion mechanisma of monocrystalline silicon under a micro-particle laden air jet”, Jol. of applied physics, 2008.