

Dedicated to Diecasting Industry



PARTNER IN PROGRESS
FOR ALUMINIUM AND
DIE CASTING INDUSTRY

ALUCAST[®]

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Issue 127 - December 2020



ALUCAST SHOW GOES VIRTUAL THIS YEAR AS THE SHOW MUST GO ON

ALUCAST2020 VIRTUAL CONFERENCE - 11th & 12th DECEMBER 2020

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EDITOR

N. Ganeshan | natganesan72@gmail.com

EDITORIAL COMMITTEE

B. B. Lohiya | bblohiya@compaxindia.com

R. A. R. Prasad | rajendra.prasad@alucast.co.in

Zubin Kabraji | zubin.kabraji@alucast.co.in

Rajesh Aggarwal | aggarwalrajesh 1972@gmail.com

Veena Upadhye | alucastindia@alucast.co.in

PUBLISHER

Aluminium Casters' Association (ALUCAST)

www.alucast.co.in

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Zonal Center	Corporate	SSI	Individual	Total Members
Bangalore	6	24	8	38
Chennai	8	11	9	28
Coimbatore	2	8	2	12
Delhi	14	29	9	52
Others	5	11	3	19
Overseas	8	-	-	8
Pune	19	41	28	88
Total	62	124	59	245

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ALUMINIUM CASTERS' ASSOCIATION (ALUCAST®)

Prasan Firodia
President

Zubin Kabraji
Secretary
zubin.kabraji@alucast.co.in

R.A.R. Prasad
Advisor (Technical)
rajendra.prasad@alucast.co.in

N. V. Toraskar
Treasurer
toraskar.nv@gmail.com

Bangalore Center

N. Sayajirao Nikam
Chairman
T: 080-26583053, 26586781
M: 9945480922
E: alucastblr@gmail.com

Lokesh Naik
Hon. Secretary
M: 9845205250
E: lokesh@loykast.com

B.S.Sudhakar
Hon. Treasurer
M: 9845023421
E: info@shreyasindia.in

Chennai Center

N. Prabakaran
Chairman
T: 044-67110300/67110304
M: 9500041300
E: diotech@diotechindia.com

Bakul M. Shah
Hon. Secretary
T: 044-45554224
M: 8838969518
E: bmwayauto@gmail.com

Delhi Center

Supreet Jain
Chairman
T: 91-124-6372275/276
M: 9811663230
E: supreet@srsdiecasting.com

Rahat A. Bhatia
Vice Chairman
M: 98112811785
E: rahatabhatia@ragaengineers.com

Anurag Luthra
Hon. Secretary
M: 9873149077
E: anurag.luthra@alucast.co.in

Pune Center

Suhas Palekar
Chairman
T: 020-27477180
M: 9890691221
E: palekar.suhas@gmail.com

G. Vasudevan
Hon. Secretary
T: 91-20-27477390/ 27470045 Ext: 212
M: 8550993344
E: vasu@ultrasealindia.com

B. B. Lohiya
Hon. Treasurer
M: 9890663390
E: bblohiya@compaxindia.com

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Dear Readers,

The COVID-19 Pandemic is far from over. In many cities in our country, a second wave is peaking. Notwithstanding many steps taken by the state and central government, the epidemic is yet to come under control. However, the death rate has come down and this is mainly due to increased investment in healthcare infrastructure and better knowledge gained about the virus itself. We, as responsible citizens, should co-operate with government authorities and follow all the guide lines set by them, from time-to- time. This will help to control and moderate the spread of this deadly virus. A viable protective vaccine is expected to be made available by middle of next year. Further it may take a year and half more to vaccinate the public at large. Hopefully before the end of year 2022, we would have vaccinated entire population of our country. This is going to be a mammoth task and a kind of health care initiative, never undertaken before in world history. Till the time the mass vaccination is complete, it is our duty to take care of ourselves and also of the most vulnerable sections of our population. We need to learn to live with this pandemic and at the same time keep the economy ticking.

India is one of the worst affected major economies due to COVID19. Speedy recovery is dependent on government investments since private sector is not in a good shape. Prolonged slowdown and falling demand have impacted all sectors other than those in the essential category. But off late, domestic demand recovery is visible in many sectors and has surpassed most market consensus estimates. Fertilizer and tractor sales are a silver lining, indicating better economic fundamentals in the rural economy. Agriculture, with a good monsoon, is likely to witness a good harvest and has emerged as a resilient sector in the current scenario. This relatively puts the rural economy in less of a distress situation. Rural India is relatively less affected by this pandemic, but still not enough to drive overall economic growth. The same thing cannot be said about urban economy. With private investment, consumption-led demand and exports, all looking weak, the thrust to revive growth would have to come as, said earlier, from government-driven expenditure. National infrastructure projects, if implemented correctly as per plan, will provide a necessary boost to the ailing capital equipment and allied sectors. EV adoption is gaining momentum and increased activity seen in the overall ecosystem. The auto sector outlook for the FY 20-21 indicates a 25-30% decline in overall production and sales volume. Reforms and production linked incentives are being proposed for the electronics sector to attract investments. A large domestic market and global priority to diversify the supply chain, offers good opportunity. Labour intensive sectors like textiles, apparels and leather are

gradually seeing increased orders and economic activity. The export outlook and visibility is also increasing, which is a good sign for these sectors. The economic stimulus package announced under the Atmanirbhar Bharat Scheme has not been sufficient to revive confidence and liquidity. More direct assistance is required to revive small and medium scale industries, which are the mainstay of the urban economy and giving out large scale employment opportunities to poor migrant labourers.

When we reflect back on 2020, it will be remembered as a year that forced us to grow, change, and evolve with our environment. It also taught us a lesson that our environment can change at any time and we need to be ready to change with it ! Sometime during middle of this year, due to prevailing pandemic situation, the Trustees of our Association wisely decided to cancel the once in two year mega event of an International Conference and Exhibition which was scheduled to be held in December at the Chennai Trade Centre. However, the show must go on and we all need to move forward. Hence we decided to go ahead with the technical conference around the same dates on web by the way of a virtual seminar with the theme "Aluminium Casting Technology for the 20s". The initial response for this idea was very encouraging and lot of support poured in from many of our industries. In spite of a short duration of time available for planning, hosting and conducting this seminar, the organising committee and ALUCAST secretariat have spared no effort to conduct this event seamlessly. It took lot of effort - starting from upgrading the infra facilities available at our office, calling for papers from Indian and International Authors and reaching across our aluminium die casting fraternity to get participation. This was a great learning experience for all of us.



N. Ganeshan
Editor

Unique Binder System for Aluminium GDC / LPDC Castings A Hybrid Binder Process

- R. D. Dhumal (Director) & Amar Gharmode (GM Technical), Thermochem Processes Pvt. Ltd.

Abstract:

Thermochem Processes Pvt. Ltd. company started work on developing new Resin Sand Binder technology to improve de-coring and to take care of casting defects related to gas porosity and sand sticking to Aluminium castings produced by Sand/GDC /LPDC process.

Presently most of the Aluminium castings are manufactured by using Shell/hot Box/Warm Box/Cold Box/Pepset cores. Few foundries are producing Aluminium Castings with Alpha Set and Phenolic Acid No-bake processes.

Conventional Binder:

1) Most of the compounds of organic binder system/processes are toxic, irritating, etching and always needs to wear protective equipment's.

2) Irritation and smell at the time of sand preparation and core making.

3) Generates smell, fumes, smoke of toxic gases like NO₂, NO, CO, CO₂, NH₃, SO₂ and sometimes aromatic hydrocarbons during the casting process because of pyrolysis. All these elements are very much hazardous to ecosystem and indirectly to human being.

Basic difference between Aluminium and ferrous castings is the pouring temp. which is around 700°C for Aluminium where as more than 1350°C for ferrous castings. All the organic sand binders start losing the strength after 550°C. In case of Aluminium castings it is not possible to burn 100% conventional binders at casting temperature. Thus more amount of binder bonds remains unburnt resulting in major issue of shakeout/ de-coring.

For removing organic binder sand from the Aluminium castings foundries has adopted either vibration or heating the casting more than 400°C for longer time irrespective of heat treatment. Shake out with vibrator may sometime damages the castings.

Retention of sand inside the castings prolongs the heat treatment cycle and indirectly high energy cost. To maintain on time delivery of castings foundries has to build-up inventory of semi finish and finish castings.

Though existing binders are the best process for preparation of moulds and cores for producing aluminium castings. These processes certainly has demerits.

- 1) High gas evolution.
- 2) Hard decoring.
- 3) Sand sticking.
- 4) Reclamation and disposal of used sand.

Considering these constraints, we started developing a new binder system.

Hybrid Resin Binder System (HRBS)

Silent Fetures:

- 1) Eco-Friendly
- 2) No-Hazard to users during handling resin components and Cores.
- 3) No Smell, Fumes, irritation
- 4) No Need of sand reclamation, just screen from water
- 5) Bench life of prepared sand is in days.

Being 100% eco-friendly binder system, nothing is toxic, irritating or harmful to eco system or human being.

Only water vapour generates during core preparation.



Since there is no charring or burning of binder components during casting process, nothing is generated.

Comparatively too low gas evolution, no smell, no smoke during casting process.



Sand removal will be carried out by dipping castings in water/ by water jet.



Sand Quality Requirement:

Most of the Organic Binders required sand with low clay (<0.5%), No Acid demad value, No Chlorides, Zero moisture content and high Silica content. Where as the newly Hybrid Binder system is very less susceptible to the quality of sand.

Silica sand: AFS 50-75

Preparation of cores with HRBS:

Silica Sand: 100 Parts

Hybrid Resin: 4-5% of Sand

Catalyst: 25-35% Of Hybrid Resin.

HRB Additive: 20-30% Of Catalyst.

Curing of Core : 250-300°C

Air Pressure for core shooting: 6 -8 Bar.

Core Curing time: 3-5 minutes.

Gas Evolution of Prepared core@900°C: 2 – 3 cc/gm.

Curing process can be accelerated by passing the hot air of temp. 180-200°C.

After removal the sand from the castings the same sand can be used for making the cores. Sand can be reused without reclamation is the one of the major advantage of this binder system.

PARAMETERS	HRBS	SHELL SAND	Hot-Box	Cold Box
HTS in kg/cm2	6-12	7-25	8-12	8-12(CTS)
Gas Evolution/gm	2-3	10-25	8-12	8-12
Pin hole defects	Nil	Yes	Yes	Yes
Smell during core Preparation	No	Yes	Yes	Yes
Smoke during casting	No	Yes	Yes	Yes
Sand Reusability	Yes	Yes/No Yes- After Thermal Reclamation	Yes/No Yes- After Thermal Reclamation	Yes/No Yes- After Thermal Reclamation
Sh Shelf Life of Resin Binder	1 Year	6 Months	2 Months	6 Months
Shelf Life of product mixed with sand	Limited	Un-limited	Limited	Limited
Resistance to moisture	Low	High	Low	Low
Flow-ability of Sand	Low	High	Moderate	Moderate
Air Pressure for core making in Bar	6-8	3-5	5-7	5-7
Section thickness of cores produced	8 mm and above	3 mm and above	3 mm and above	3 mm and above
Hollow cores	No (Artificial Mandrill)	Yes	No (Artificial Mandrill)	No (Artificial Mandrill)

Authors are thankful to Thermochem Processes Pvt. Ltd. Management for presenting the unique paper on Hybrid binder sand process.



Author:
R. D. Dhumal
Director



Author:
Amar Gharmode
GM Technical

Thermochem Processes Pvt. Ltd., F 58, MIDC, Gokul Shirgaon, Kolhapur

Aluminium Casters' Association (ALUCAST) - Membership Fee

Structure w.e.f 16 December 2016 (Tax updated w.e.f. 01 July 2017)

Membership Category	Admission Fees (₹)	Annual Fees (₹)	Total (₹)	Final Amount with GST (₹)	Admission Fee (₹)	Life Membership (₹) - Annual Fees X 15	Total (₹)	Final Amount with GST (₹)
Ordinary Member	500	1500	2000	2360	500	22500	23000	27140
Ordinary Member (MSME)	1000	3000	4000	4720	1000	45000	46000	54280
Corporate Member	1000	15000	16000	18880	1000	225000	226000	266680
Coporate Member (Overseas)	US \$50	US \$150	US \$200	US \$236	US \$50	US \$2500	US \$2550	US \$3009

Renewal Charges

Membership Category	For Renewal	Total with GST @ 18%
Ordinary Member (Individual)	1500	1770
Ordinary Member (MSME)	3000	3540
Corporate Member	15000	17700
Corporate Member (Overseas)	US \$150	US \$ 177

Please send cheques in the name of Aluminium Casters' Association (ALUCAST) payable at Pune along with the membership form.

Membership form and details of membership are available on our website: www.alucast.co.in

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Revised w.e.f. 01 June 2016 and with GST @ 18% from 01 July 2017

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	Basic (₹)	Total with GST (₹)	Basic (US \$)	Total with GST (US \$)	Basic (₹)	Total with GST (₹)	Basic (US \$)	Total with GST (US \$)
Back Cover Page	100000	118000	2200	2596	-	-	-	-
Inner Front Cover	80000	94400	1800	2124	-	-	-	-
Inner Back Cover	70000	82600	1550	1829	-	-	-	-
Inside Pages	35000	41300	770	909	7300	8614	175	207

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Back Cover Page	95000	112100	2090	2466	-	-	-	-
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Inside Pages	33250	39235	730	861	6935	8183	166	196

Advertisement Size & File Format

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Aluminium Casters' Association (ALUCAST)

702, AMar Neptune, Baner Road, S. No. 6/1/1

Plot No. 45, 46A, 46B Pune 411045

T: +91 20 27290014

E: alucastindia@alucast.co.in

Strategy: What? Why? and How?

- Shivprasad Mantri, Consulting Strategist

The word Strategy is often used interchangeably with terms such as plan, planning, goal, tactic, policy, objective, to-do list and so on and misunderstand as being synonymous with the term strategy.

The dictionary meaning of Strategy is "skill of planning movement of Armies in a war; warfare (रणनीती, युद्धनीती, व्यूहरचना). The word Strategy is derived from the Greek word 'strategos' which means - army (resources) movements (deployments).

Though the age of traditional incessant armed warfare is now long gone for the most part it has been replaced by business and economic competition. Analogous to armed warfare, competition today involves fighting for market share, for acquiring key customer/ accounts, new marketing channels/territories, technology thus gaining winning advantage over your competitors. It therefore follows that the conceptual framework behind strategies evolved and deployed in traditional warfare is still relevant and applicable to today's business situation. No wonder that some of the principles enunciated by the renowned Chinese general and military strategist SanTzu in his book "Art of War" written some 2000 ago are still used today in the business and corporate world. On the same note the strategies and principles advocated by our own Chanakya, from roughly the same period, in his tome on statecraft "Chanakya Niti" are also used by today's corporate leaders. Having noted the origin and the meaning of the word Strategy and its importance to be successful in today's context the word "Army" is to be replaced with Resources and "movement" with deployment.

Strategy is basically a design or an idea which serves as the foundation on which a plan is developed to accomplish a given task or a goal. Strategy therefore is different from a plan (योजना), planning (आयोजन), a goal (लक्ष्य), a tactic (दांवपैच), policy (धोरण) and objective (उद्देश) or to-do list (दैनन्दिन कार्य सूची). Furthermore Strategy does not by itself connote secrecy.

Perhaps the reason why these words are often used interchangeably with Strategy is that, when we first learnt the word Strategy in our schools its precise meaning and relevance was not explained. A pedagogical approach called the "Case study method" has been found effective in teaching management principles and practices. If the case studies are based on historical facts, called "Case stories" which help us to learn difficult concepts and principles. Learning from Case stories of our own history are not only

interesting, helps you to understand the concepts easily but also makes you proud about our own country.

There are several interesting learnings from the deeds, campaigns and accomplishments of Chhatrapati Shivaji Maharaj and Bajirao Peshwa from Maratha history. The accomplishments of lesser known contemporary generals and kings namely Lachit Borphukan of Ahom kingdom, Assam; Marthanda Varma, Ruler of Tavancore and the great Soldier Saint Guru Har Gobind Sahib are equally fascinating and educative. One can learn and use them to enhance their skills and competencies to enrich their careers and life.

One example of Strategy creation and its successful deployment by Srimant Bajirao Peshwa is given below.

Full name: Pantpradhan Srimant Peshwa Bajirao Ballal Balaji Bhat



Bajirao I also known as Bajirao Ballal, transformed the fledging Maratha state into an Empire covering large parts of subcontinent. In his 20-years of career, he fought more than 40 battles and never lost one.

Born	18 th August 1700
Appointed Peshwa	17 th April 1720
Delhi strike	30 th March 1737
Died	28 April 1740

Goal – Transform fledgling Maratha state (स्वराज्य) into an Empire (साम्राज्य)

Strategy – Hit the trunk, branches will fall off



Bajirao Peshwa immediately after his appointment as a Peshwa of Maratha Kingdom his goal was to transform the rump state of 'Swarajya' into a 'Samrajya'. Everybody considered this to be an impossible task, except Bajirao Peshwa. And the goal was accomplished only because he had the right Strategy and determination to execute it. Renowned historian Grant Duff wrote – He had both head to plan and hands to execute”

Case Story -

Srimant Bajirao Peshwa belonged to that rare breed of men who envisioned expansion of the Maratha state into an Empire, an impossible sounding proposition against The Mighty Mughal Empire that ruled most part of the continent at that time. Also, against the Portuguese, the Sindhis and the British who had established their footprint on the entire West Coast of India. However, the main flight was against the Mughals. The Mughal Empire at that point of time was in shambles and was controlled by a motley of powerful regional Satraps i.e. Subedars and Sardars. Bajirao recognized that instead of confronting and fighting numerous regional satraps separately he argued convincingly to his king Shahu Maharaj the case for his strategy to strike at Delhi which will help induce the regional Sartaps to come to terms instead of wasting time and resources to fight them individually.

Though Bajirao finalized his Strategy “**Hit the trunk and the branches will fall off**” in the beginning of 1720 as Peshwa, he bided his time for its implementation. In the beginning he was in a Catch 22 situation because his Strategy was at odds with King Shahu’s soft corner for Delhi arising out of his long captivity and time he spent in Mughal custody, the so called ‘Stockholm Syndrome’. Further, as per the terms agreed on which he was released from captivity is that he will not undertake any activity against the interest of the Mughal emperor. Nonetheless Bajirao managed to find a way out of this dilemma over the years. Initially he focused on raising a formidable Army of over 70,000 – 80000 infantry and cavalry, groomed a cadre of extremely

capable generals and officers, then gradually and steadily expanded the Maratha state northwards and appointed competent administrators in the newly acquired regions. Next few years he further extended boundary northwards so that Delhi was within reach. Eventually in 1735 he received a signal from his representative in Delhi court that the time was right to make the strike. In his first campaign after defeating the regional Sartaps on the way he reached Delhi outskirts and communicated his demands to the emperor giving him an opportunity to concede when this did not work, he returned. Next year he again marched to Delhi along with his generals Shinde and Holkar to make the final Strike. The emperor ordered all his generals, Sartaps and the Armies to assemble at Agra and stop Bajirao Army reaching Delhi. Bajirao Peshwa however by his clever maneuvering outflanked the Mughal forces and managed to reach Delhi Gates bringing The Emperor under tremendous pressure. Had he not made a commitment to Shahu Maharaj not to attack Mughal emperor he could have easily taken over Delhi at that time. But as an honest and loyal Peshwa he once again gave his final demands and the opportunity for the emperor to conceive and returned to Pune. With this successful strike at Delhi most Mughal Sartaps finally accepted the Supremacy of Bajirao and sought cordial relations with him, the Nizam being the only notable exception. In subsequent developments Nizam was, however, defeated second time by Bajirao at Bhopal.

The strike at Delhi and the associated successful campaigns struck awe and fear in the established powers at the Mughal courts and further enhanced capabilities of Maratha sardars, leaving the Mughal emperor only a powerless titular head of state.

From this case story we can easily understand the concept of what Strategy is. The success of the Bajirao Peshwa in transforming the tiny state of Marathas into an empire was a result of the Strategy of hitting the trunk instead wasting time energy and resources in fighting with their original numerous satraps, of course this did not happen in a day, it took almost 7 -8 years for Bajirao Peshwa to finally hit the trunk, but had he not envisioned this Strategy and worked on it, the dream of having a Maratha empire covering the continent would have never realized.

Unfortunately, Bajirao met an untimely death at the age of 40 in 1740 but because of the foundation led by him the Marathas conquered much of northern India in the next decade.

Remember the strategy creation and its application is a universally sought-after skillset.

The economic damage due to CORONA pandemic is already evident and represents the largest economic shock the world has experienced in recent times. The deep recessions triggered by the pandemic are expected

to leave lasting scars on most businesses. Learning and understanding of Strategy is therefore important and must. Creation and formulation of appropriate strategies are essential for near term survival and long-term business success.

Shivprasad Mantri is Consulting strategist to several SME. Former CEO Tata TOYO has worked with MNC's for thirty years and then as Faculty & Vice president at VIT institutes, Pune. Has worked with renowned historian Late Ninad Bedekar on Maratha history and has co-authored / authored books on Chhatrapati Shivaji Maharaj, Srimant Bajirao Peshwa titled as What to Know? What to learn? In Marathi, English and Hindi.



Author:

Shivprasad Mantri

Consulting Strategist

Contact: sbmantri@gmail.com, sbmantri@vit.edu

SIAM - Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April-September 2020 with % Change

Report I - Number of Vehicles

Category	Production			Domestic Sales			Exports		
	April-September			April-September			April-September		
	2019-20	2020-21	%Change	2019-20	2020-21	%Change	2019-20	2020-21	%Change
I Passenger Vehicles (PVs)*									
Passenger Cars	11,51,102	5,74,189	-50.12	8,15,214	5,06,367	-37.89	2,86,618	1,00,529	-64.93
Utility Vehicles(UVs)	5,40,443	3,77,782	-30.10	4,46,843	3,37,831	-24.40	77,309	54,375	-29.67
Vans	74,883	33,040	-55.88	71,247	35,768	-49.80	1,320	252	-80.91
Total Passenger Vehicles (PVs)	17,66,428	9,85,011	-44.24	13,33,304	8,79,966	-34.00	3,65,247	1,55,156	-57.52
II Commercial Vehicles (CVs)** - M&HCVs									
Passenger Carrier	20,602	2,006	-90.26	18,181	852	-95.31	3,838	1,178	-69.31
Goods Carrier	1,16,715	33,473	-71.32	1,04,170	28,103	-73.02	7,415	2,955	-60.15
Total M&HCVs	1,37,317	35,479	-74.16	1,22,351	28,955	-76.33	11,253	4,133	-63.27
LCVs									
Passenger Carrier	25,464	5,980	-76.52	26,390	4,623	-82.48	2,073	539	-74.00
Goods Carrier	2,48,088	1,35,031	-45.57	2,26,742	1,31,582	-41.97	17,318	8,866	-48.80
Total LCVs	2,73,552	1,41,011	-48.45	2,53,132	1,36,205	-46.19	19,391	9,405	-51.50
Total Commercial Vehicles (CVs)	4,10,869	1,76,490	-57.04	3,75,483	1,65,160	-56.01	30,644	13,538	-55.82
III Three Wheelers									
Passenger Carrier	5,24,625	1,79,163	-65.85	2,73,389	33,086	-87.90	2,52,868	1,50,990	-40.29
Goods Carrier	60,750	27,429	-54.85	57,307	25,576	-55.37	3,525	1,782	-49.45
Total Three Wheelers	5,85,375	2,06,592	-64.71	3,30,696	58,662	-82.26	2,56,393	1,52,772	-40.41
IV Two Wheelers									
Scooter/ Scooterette	33,33,260	15,76,833	-52.69	31,17,358	16,86,348	-45.90	2,01,327	66,372	-67.03
Motorcycle/Step-Throughs	79,82,250	49,94,086	-37.44	62,45,996	40,45,461	-35.23	15,84,419	10,37,221	-34.54
Mopeds	3,39,976	2,44,953	-27.95	3,32,284	2,51,166	-24.41	7,342	2,485	-66.15
Electric Two Wheelers	0	802	-	0	703	-	0	0	-
Total Two Wheelers	1,16,55,486	68,16,674	-41.52	96,95,638	59,83,678	-38.28	17,93,088	11,06,078	-38.31
Quadricycle									
Quadricycle	4,021	905	-77.49	816	-27	-103.31	3,446	985	-71.42
Total Quadricycle	4,021	905	-77.49	816	-27	-103.31	3,446	985	-71.42
Grand Total of All Categories	1,44,22,179	81,85,672	-43.24	1,17,35,937	70,87,439	-39.61	24,48,818	14,28,529	-41.66

* BMW, Mercedes and Volvo Auto data is not available ** Daimler & Scania data is not available

Society of Indian Automobile Manufacturers (16/10/2020)

Structural Aluminum Castings For Automotive Using High Pressure Die Casting

- Advait D. Athavale, M. S. Mechanical Engineering

Abstract:

In this fast growing world, where the demand for being more efficient is increasing every day, for cars we expect to drink less fuel and run more miles. From government side there is a great push to increase vehicle mileage [3, 4, 5]. This demands the vehicles to be lighter in weight.

Aluminum part can be 70% less in weight than similar part made out of steel; and if aluminum part satisfies the strength requirements, then BINGO!

Nevertheless, making a thin walled robust aluminum part using HPDC, to replace steel parts in cars, turned out to be a nightmare for the casting companies rather than a sweet dream. It involves a thoughtful die cast die design, advanced cooling techniques, special heat treatment, straightening process and much more. The paper will shed some light on this new emerging technology.

Introduction

Aluminum die casting industry is mostly involved in making non-structural parts for auto industry. Usual parts are transmission cases, transmission housings, oil pans, steering housings, etc. Wall thicknesses is higher in these parts, averages about 8-10mm. Porosity is a concern, only if it opens up on machined surfaces causing leak/sealing concerns. Traditionally since 25-30 years, this business has become backbone of aluminum die cast industry.

With advent of electric vehicles and with increasing need for vehicles to give better mileage, aluminum die casting industry is trying to jump into a new product line in automotive industry. "Structural castings".

Electric vehicles might make transmission, engine block redundant. They brought new products for casting industry like battery tray. For vehicle to be light weight, aluminum industry has developed structural components like hinge pillar, front and rear shock tower, rails, torque boxes, etc. They found new alloys that can give similar mechanical properties like steel. A single high pressure die casted Aluminum part can replace multiple steel parts, saving welding / riveting operation, reducing assembly time and thus reducing production cost.

On the down side though, the structural automotive aluminum parts are costlier to manufacture, than similar steel stampings. To satisfy mechanical properties required, manufacturing process needs to have tight control on metal chemistry. Also, most aluminum alloys require heat treatment which drives up the manufacturing cost.

Stringent quality checks for internal porosity, mechanical property conformance, dimensions and traditional die casting defects like open porosity, cracks, poor flow, die breaks, etc. increase the piece price of structural casting. Die cast industry understands this shortfall, and is investing in to research for reducing these costs.

Developing alloys that do not require heat treatment will significantly drive down the manufacturing cost. Presently, smaller steps are taken for immediate cost reduction like picking correct component in cars that does not have high strength requirement, using alloys that need low cost heat treatments (Like T5, rather than T7) and educated part design. According to spotlightmetal.com [1], cost reduction is already achieved up to 20%. OEMs are demanding 20-30% more cost reduction, for the structural automotive parts to be viable for mass production.

Manufacturing process-flow for structural castings

On manufacturing floor, making structural casting involves quite a few different steps than conventional die casting.

Precise control on metal chemistry is very important. Special alloys are bought in form of ingots. Ideal process would be to only melt these ingots and reduce the chemistry variation to minimum. But scrapped parts and gates-and-runners have to be remelted to save the cost. Thus metal chemistry has to be checked multiple times at set frequency. This has to be done in main furnace as well as holding furnace.

At beginning of casting run, die cast die cannot be heated

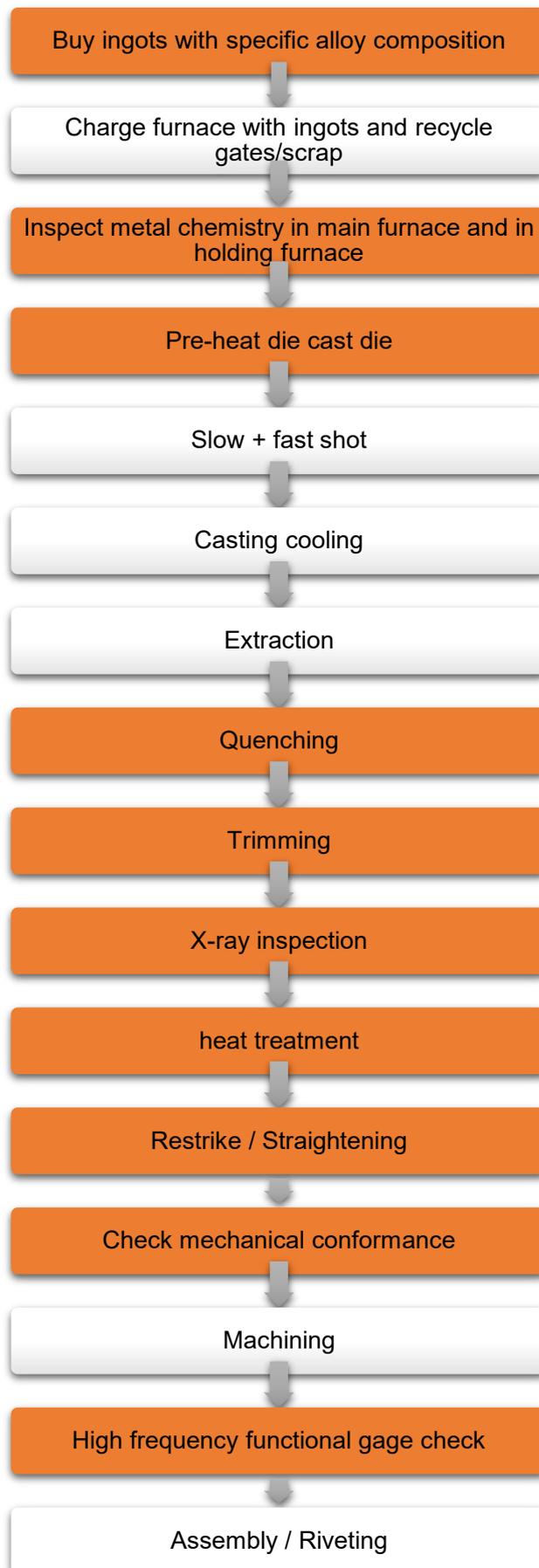
using slow shots. Hence when die is cold, it has to be preheated using thermal control units.

Moreover, X-ray inspection, heat treatment are the additional steps in making structural castings. Due to heat treatment, castings warp and lose their form. Hence it has to be followed by a restrike or a straightening process.

Mechanical properties are checked after heat treatment. They need to conform to customer specifications.

As castings are thin walled, they are easy to bend during manual handling like loading-unloading in racks, x-ray fixtures, CNC fixtures; along with dimensional nonconformance that might be introduced in manufacturing processes. Hence structural castings are 100% checked for key assembly features, before shipment.

Below flow chart shows these new steps highlighted in Orange.



Contribute Articles for ALUCAST Journal

Themes for the year 2021

Issue	Theme
February 2021	Energy Optimisation
April 2021	Die Design and materials
June 2021	Recovery & Recycling of Aluminium Scrap
August 2021	Automation in Post Casting Operations
October 2021	Die Cast Products in E-Vehicles
December 2021	ALUCAST 2021 Special

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Differences between traditional die casting and structural die casting:

Non-Structural die casting	Structural die casting
Metal chemistry need not be monitored at high frequency	Metal chemistry is very important parameter to maintain. It decides the mechanical properties attained by casting after heat treatment. Metal chemistry is checked at fixed hourly frequency in main furnace as well as holding furnace.
No need to monitor remelt ratio	Remelt ratio needs to be decided as remelted castings have higher iron percentage; as well as the remelt has chemical composition of previously melted batch which may be high or low on certain elements. It might throws out metal chemistry of the current batch.
Not so high tonnage machines are needed	High tonnage machines with high shop speed are required. Thin walls castings need this for better filling.
Die preheating not required. Slow shots are used to heat the die, before starting fast shots	Die preheating is required. If shot is made in a cold die, aluminum gets severely stuck in thin sections of the die.
Quenching is not needed. Parts are air cooled	Quenching is needed to lock the dimensions. Air cooling warps the casting.
Trim die is easy to design. Gates usually are located on thicker sections	Trim dies need to give robust support in the bottom die halve. Gates are located on walls with same thickness. If walls are not supported while trimming, they bend.
X-ray inspection is required only on audit basis.	100% X-ray inspection is needed to confirm internal integrity.
Heat treatment not required	Heat treatment is required.
Restrike / straightening not required	Restrike / straightening is needed to fix bending during heat treatment

Major scrap reasons in structural castings

Biggest scrap is porosity. Porosity gets detected in X-ray inspections or opens up on machined surfaces or inside threaded holes.

OEMs specify porosity requirements using a standard, like ASME E-505. These standards specify porosity levels based on pores size and density. Standards have reference radiographs. X-ray inspectors need to be trained and certified for using these reference radiographs and for using x-ray machines in general.

Though imaging is automated inside the x-ray machines, making the decision if casting is good or bad is still manual. X-ray machine manufacturers are working on softwares that can decide if porosity is acceptable or not. Few softwares are already in market.

Mechanical property nonconformance is another high reason for scrap. Tight control on metal composition, porosity, metal temperatures, casting process and heat treatment process are key things in preventing this scrap. Tensile stress, yield strength and elongation are measured to assess mechanical conformance.

Dimensional nonconformance is also high. Structural parts being thin walled bend easily. This can happen during extraction, quenching or trimming inside DCM itself. Once the part is out on DCM conveyor, one can design a functional gage that can check important dimensions right at DCM. This will prevent a scrap part moving up in value chain.

Dimensions also go out during heat treatment. They can be brought back within specifications using straightening press. Straightening press needs to be high tonnage to make a significant impact on part dimensions.

Apart from these three top reasons, cracks, die breaks, wrong inserts, trim damages, wrong machined features, etc. are some other important reasons for scrap.

Advantages of structural castings

Being light weight, and with similar strength as steel part, structural castings can make body-in- white light weight by up to 70%. The cited study [8], achieved 23.5% reduction in their prototype vehicle weight.

Casted part can be of a larger size than a stamping. It was observed that 2 to 4 stampings can be combined in to one aluminum casting. This saves assembly time, and costs related to it.

Aluminum parts are 100% recyclable, unlike any other composite, fiber or plastic component in this aspect.

As an inherent feature of die casting process, once the process is set, castings can be made at a high production rate. A manufacturing floor can ship up to 800-1000 pieces per DCM per day, depending on size of casting.

Opportunities for support companies

Process control is a key in making good quality structural castings. The industry is still struggling to make the process stable and efficient. It is a driving factor in making these casting cheaper and thus using them widely in automotive.

Raw material and Melting

As structural castings are made using special aluminum alloys, ingot suppliers will have higher demand for these special alloys. In future, ingot manufacturers can offer to buy scrap, gates and runner at cheaper price from die casters, and use them for making ingots. Requirement for metal additives like Si, Fe, Mg, Mn, etc. will also increase as they are needed in melters to adjust the chemistry.

Melting furnaces need to control the metal chemistry more precisely than before. Top of the line melt furnaces equipped with modern technology will be required by die casters.

Argon and Nitrogen are preferred for degassing. Their suppliers will also experience increase in demand.

Die cast machines (DCM)

High tonnage DCMs are needed for casting thin walled structural parts.

Precise control on die temperature is needed to make the required quality structural castings. This can be satisfied by using 'Thermal control units', flow control valves, etc. in DCMs.

Water based die lube gives high chances of porosity in structural castings. Porosity requirements are stricter in structural castings than non-structural castings. Industry is trying to shift to no-water/dry die lube. Also, specialized spray heads for each product can be made which will apply die lube efficiently and effectively.

Quenching operation is needed to be part of DCM to lock in the dimensions.

Trim die needs to cut the gates carefully without bending the thin walls of the casting. Hence the bottom trim die needs to be designed specifically to give support to the casting in required areas to prevent them from bending.

New process control softwares are in demand which can

take feedback from different sensors and also from DCM operator, and tweak the process parameters at shot end.

All above opportunities are and will generate business for die cast support companies.

Heat treatment

Presently, most of the structural alloys need heat treatment. After casting, the parts need to be heat treated to relieve stresses and gain the required mechanical properties.

Simple heat treatment like 'T5' can be used which requires the castings to be held at 400-500 OF for 1-2 hours. This heat treatment is also called 'Aging'. If not done, castings will automatically gain these mechanical properties as they age. Heat treatment facilitate this aging process and parts are ready to use immediately.

There are more complicated processes like T7 heat treatment. It is a two stage process. First the castings are heated up to 850-950 OF, very close to melting point. Then they are quenched at a very high rate of cooling. This reduces warping

and also prevents developing stresses due to slow cooling.

Industry is currently looking at faster heat treatment ovens with higher production capacity.

Major disadvantages of heat treatment process are added cost and possibility of ruining a whole batch of parts if any mistake happens in heat treating the batch.

Die cast industry is trying to find alloys that need minimum or no heat treatment.

Conclusion

Light weight structural parts is a new requirement in auto industry. Die cast industry being highly dependent on automotive industry, needs to tweak in its product line to support this new demand.

There are many challenges on the way. They need to be addressed. Willingness to jump in this new product line, support for research and conducting trials are main things than die cast industry can offer, which will be mutually beneficial to auto industry as well as to the die cast industry.

Acknowledgement

Thanks to Ryobi Die Casting and Cosma Castings Michigan (part of Magna International) for giving me opportunity to work in die casting environment for 8 years.

Special thanks to Mr. Vivek Joshi for getting me started to work in die casting industry.

Thanks to ALUCAST team for giving a push to write this paper and organizing the technical paper presentation conference.

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(Paper presented in ALUCAST2019 in December 2019)



Author:

Advait D. Athavale

M. S. Mechanical Engineering

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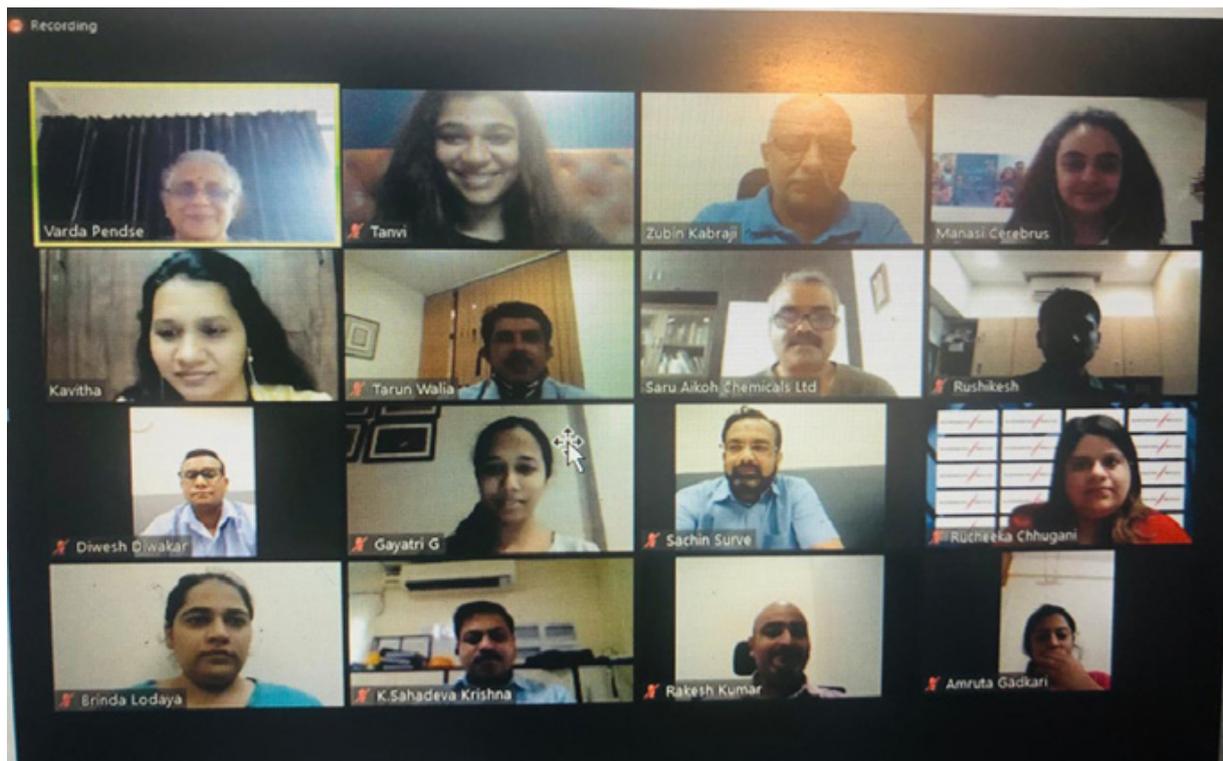
ALUCAST in Co-ordination with Cerebrus Consultants conducted a webinar on “HR initiatives for the New Normal.”

The Speaker/Trainer: Ms.Varda Pendse, Director Cerebrus Consultants

Dates: Online sessions of 2 hours each on 13th and 14th October 2020 | Total 19 participants

Brief Description: The unprecedented situation we are facing today has taken many organizations back to the drawing board on many fronts including how they manage their employees and their changing aspirations and there will be significant changes in the way organizations make decisions. In an uncertain and evolving business environment, the need of the hour is for HR Professionals to make timely, effective and pragmatic decisions.

About the Trainer: Varda has over 22 years of Consulting experience in her 32 year career. During this period she has led wide a wide range of assignments in areas of Organization Transformation, Reward Management, Performance Management, Leadership Assessment and Development, across different industry / sectors.



Key Takeaways :

1. Understanding changes during COVID times from employee and employer perspective.
2. Awareness of HR Best Practices during COVID times
3. Framework to deal with the change effectively

Program Outline:

Session 1 – What has changed?

Impact of COVID on Business

Changing employee aspirations and insecurities.

Employer Challenges and Expectations

Best Practices during COVID Times

- Health, Wellness and Safety
- Ensuring Work & Productivity
- Employee Engagement

Session 2 – Being Future Ready

Long Term Implication and Rethinking HR Strategy

Organization Design - New Roles and Employment Models

Getting Teams to Deliver

Changes in HR Policies

New ways for Employee Engagement

Aligning Performance Management to Business

- Goal Setting
- New Behaviors required for success
- Re-thinking Reward Strategy & Career Growth Opportunities

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ALUCAST 2020 - VIRTUAL CONFERENCE - 11th & 12th DECEMBER 2020 - LIST OF TECHNICAL PAPERS & PRESENTATIONS

Sr. No.	Presenter	Designation	Company	Topic	Summary	About Author/Presenter
1	Christian Kleeberg	Managing Partner and founder	RGU Asia Pte. Ltd	Digital Is The (New) Normal – 10 Misconceptions When It Comes To Digitalisation Of Metal Casting Operations	“Christian Kleeberg, Managing Partner @ RGU ASIA PTE LTED, the leading provider of digitalisation and digital transformation solutions in the metal casting industry, explains the challenges associated with digitalization and digital transformation as well as the thought patterns that can cause a project to fail.”	Christian Kleeberg – Managing Partner and founder of RGU ASIA PTE LTD in Singapore, an APAC joint venture with the RGU GmbH company in Dortmund / Germany – the leading provider of digital transformation solutions for metal casting foundries in central Europe with more than 320+ installations under its belt. Christian brings along more than 20 years’ experience in digital software applications for metal casting operations and has profound knowledge in digital transformation applications including IoT for foundries.

ALUCAST 2020 - VIRTUAL CONFERENCE - 11th & 12th DECEMBER 2020 - LIST OF TECHNICAL PAPERS & PRESENTATIONS

Sr. No.	Presenter	Designation	Company	Topic	Summary	About Author/Presenter
2	J. M. Rathod	Sr. General Manager & Head - Engineering	Godrej Tooling Division	Changing Customer Requirement – Triggering Technological Transitions	The paper will provide details of changing needs of customers over the years and possible answers to it through available technologies when applied without questioning it.	Jayesh M Rathod is Sr. General Manager & Head - Diecasting Engg. Godrej Tooling Division, Vikhroli, Mumbai has 31 years of experience in Design and development of dies for 4-wheeler vehicles and for 2-wheeler parts. Dealt with Dies & Moulds Industries at Japan. Exposure to various Toolrooms in Japan, Korea, Taiwan, Germany, USA & France. Contributed Technical Papers at NADCA, ALUCAST, GDC TECH, ILZDA, AAI and IFC.
3	Bryan Nelson	Technical Manager- Nonferrous Metals	Allied Mineral Products, Columbus, Ohio, USA	Advanced Aluminum Refractory Technology For The 21st Century	Last 10 years refractory companies have developed even lower levels of silica containing refractories and have taken advantage of utilizing calcia in the formulations. Thermodynamically calcia (CaO) is not reduced by aluminum. This paper will highlight two of the latest technologies for containing molten aluminum and resisting the formation of corundum.	Bryan Nelson is a Ceramic Engineer from Missouri Science & Technology (1977-1981). He has 19 years of working experience for North American Refractories Company doing research, technical services and marketing in the Nonferrous Metals Market. Three years of working experience for National Refractories heading up the Nonferrous Metals Group. Nine years of working experience in sales for Spar, Inc. Since 2012 he has been working for Allied Mineral Products in sales and is now Technical Manager – Nonferrous Metals. He is an inventor of porous plug technology for injecting various gases in aluminium and copper.
4	Kaushik B	CEO	Kaushiks International	Developing High Quality Castings And Optimising Casting Processes Through Casting Simulation	"In this paper we shall discuss a few examples of simulation software technology for the High Pressure Die Casting (HPDC) process, which is believed to be one of the most complex of the casting processes. Plunger Speed or shot profile optimisation. Here we will discuss how the optimisation of the shot sleeve plunger velocity using FLOW-3D CAST's accurate free surface capabilities to push the air out of the cavity first before filling it instead of the standard shot profile used by the customer that was resulting in gas porosities."	
5	Philippe Kientzler	International Marketing Manager	Foseco International Ltd	Mts 1500 & Vmet Metal Quality Assessment	As HPDC becomes the preferred method of making aluminium casting, cost savings and inclusion removal can be successfully achieved using MTS 1500 and VMET Melt Quality assessment. Oxide removal is the most important step in improving melt quality and MTS 1500 together with VMET Melt Quality Assessment has made a significant contribution in Aluminium pistons, wheels and chip re-melting.	
6	Jagannath V	Business Head	M2NXT Solutions	Digitalization Application Alongwith Automation In Die Casting And Its Benefits	BFW/m2nxt IoT device named IRIS which is Conceived, Designed, Developed and Programmed in-house to integrate with any Die casting Equipment on the manufacturing shop floor, not only implements Digitization, but also extends as an smart intelligent device to monitor the Automation.	
7	Stephen Midson	President	Midson Group	Extending Die Life By Surfacetreatment	Dr. Steve Midson, President, MIDSON Group, Denver, USA, is empanelled with Nadca. he has authored books on Die Casting dies, with special emphasis on improving die life, He conducted two & three day training programs at different Centres (Pune, Delhi, Bangalore & Ludhiana) in 2018 and 2019, on behalf of ALUCAST. Dr. Midson is associated with research groups in USA and China (Where he is also a consultant).	
8	Jan Emmenegger		Fondarex SA	What Vacuum Level Is Needed For A Good Die Casting Part?	"When it comes to pressure die cast good and high quality die casting parts the use of vacuum automatically comes in mind of many die casters. Having a look closer into the vacuum pressure die casting production on of the key element is: "Which vacuum level is needed to successful produce a particular part"? This paper (presentation) will give an overview on recommended vacuum achievement in the die cavity as a guide line with basic explications. "	
9	Hemanth Kumar	Head of Sales	Carl Zeiss India (Bangalore) Pvt. Ltd.	How To Reduce Scrap In Aluminium Foundries Using X-Ray Technology	Hemanth Kumar, Head of Sales, Carl Zeiss India has 22 years of experience in Industrial Metrology. Bachelors in Mechanical Engineering - Bharathiar University. Joined ZEISS in 2006 and has worked at various positions in Sales, Product Development at global offices of ZEISS & as Product Sales Manager for X-rays. Worked closely with many OEMs and their suppliers to provide measurement solutions for their application challenges.	

(As on 03.12.2020)

ALUCAST SNIPPETS

53% in India willing to switch jobs to avail remote work: Survey

More than half of the office-goers are willing to switch jobs if it meant they could work remotely, said a new survey on Thursday.

There has been a heightened interest in online learning since Covid-19 with 83 per cent of survey participants from India saying they are more interested in online learning/training, according to the research by Cloud software firm Salesforce.

“Amid the global pandemic, companies have been leveraging technology to pivot their businesses at hyperspeed. This new all-digital world poses an opportunity for business leaders to rethink how they not only connect with their customers, but also their employees,” Dulles Krishnan, Area Vice President, Salesforce India, said in a statement.

India can beat China in low-cost manufacturing if industry, govt work together

India has the potential to surpass even China in low-cost manufacturing if the government and industry work in a cohesive manner, Maruti Suzuki India (MSI) Chairman RC Bhargava said on Thursday. Bhargava also said the government should focus on increasing the competitiveness of the Indian industry.

“India has the capability to become a lower cost country than China if the industry and the government work together,” Bhargava said. He was sharing his views on making Indian manufacturing globally competitive at an online event organised by the All India Management Association (AIMA).

Bhargava said the only objective of government policies should be to increase the competitiveness of Indian industry so that it can make things at the lowest cost along with the best quality in the world. “The more the industry can sell, the more jobs will be created in the economy,” he noted.

Bhargava pointed out that creating jobs across sectors was important for the overall growth of the economy. He, however, criticised states which have reserved jobs in manufacturing for locals. “It is an anti-competitive step,” Bhargava said.

He also said MSMEs have to be as globally competitive as the large companies because the entire supply chain determines the overall competitiveness.

Bhargava also noted that the industry cannot be competitive unless the promoters and managers treated workers as partners.

He pointed out that MSI owed its success to explaining to its workers that they will prosper if the company grew and backing that with policies and actions that delivered income and career growth to employees.

Aluminum Markets Flash a Warning for the Economy

When aluminum demand last contracted during the financial crisis and unwanted metal started flooding into warehouses, it took more than a decade to work through the glut. Now, the market is bracing for another sharp increase in inventories as demand growth grinds to a halt.

Aluminum has tumbled to a two-and-a-half-year low as slowing global growth and the U.S.-China trade war hurt demand for the metal used in airplanes, automobiles and beer cans. While stockpiles tracked by the London Metal Exchange fell to their lowest since 2007 last week, traders say inventories are building in the physical market as weaker order books leave consumers with more metal than they need.

That leaves traders preparing for a potential rebound in exchange stockpiles as the weakest demand growth since 2009 and tightening spreads encourage deliveries into warehouses. As was the case in the financial crisis, the supply imbalance could be exacerbated by producers who are loath to curb output in the short term, due to the heavy costs involved in bringing mothballed production lines back into service.

“In terms of all the economic indicators we’re looking at, everything is pointing to a further downturn,” Kamil Wlazly, an analyst at Wood Mackenzie, said on the sidelines of the Fastmarkets International Aluminum conference in Athens. “Next year could potentially be even worse because we don’t think the market has bottomed out yet.”

The slowdown in key sectors such as the European car industry is putting the aluminum industry on course for annual demand growth of 1% to 2% this year, according to

ALUCAST SNIPPETS

Wood Mackenzie. Rival consultancy CRU Group expects an even worse year, with demand rising just 0.2% globally and contracting 1.2% outside of China, marking the first decline in usage since the financial crisis.

Macro uncertainties are also hurting the outlook for producers. Goldman Sachs Group Inc. last week downgraded Alcoa Corp., the biggest American aluminum producer, to neutral from buy.

To be sure, demand is still holding up far better than it did during the crisis, but traders are cautioning that there could be swift knock-on effects in the physical market as the industry's previously impressive growth rates go into reverse. In the past, producers have been reluctant to make costly cuts to output in the face of declining orders and weak prices, exacerbating an imbalance between demand and supply.

LME aluminum traded at \$1,727.50 a ton as of 12:31 p.m. in London. Trading house Concord Resources Ltd. says prices may need to fall a further 10% or more before meaningful supply cuts are made.

With LME inventories near their lowest since 2007, market participants see the conditions for another surge in stockpiles, although to a less dramatic extent than was seen in the financial crisis.

While it's typically cheaper to store metal away from the exchange, traders on the sidelines of the Athens conference said the issue may come to a head toward the end of the year, as a spike in the spread between futures for December and January delivery is making it onerous for stockholders to keep hold of their positions over the period.

December aluminum traded at a \$10.50 premium to January contracts on Thursday, in a condition known as backwardation that often draws inventories into exchange warehouses as stockholders seek to cash in on the higher nearby prices. On Friday, spot contracts spiked to at an \$10 premium to the next day's contract, the biggest backwardation in more than a year, adding to the short-term pressure facing stockholders.

Persistent backwardations are widely viewed as a sign the market is running short of metal, but participants say this one could prove short-lived, given that many traders, producers and consumers have excess stock on hand. Alumi-

num traders polled by Bloomberg said it wouldn't be surprising to see 200,000 tons or more arriving on the bourse by year end, with top-end estimates seen at about 500,000 tons, if the backwardation creates a strong enough incentive for stockholders to deliver.

In such an event, the spread could quickly unravel back into a condition known as contango, where shorter-term contracts trade below those with later maturities. The rest of the forward curve has been moving into a widening contango as demand deteriorated over recent months, and the December-January spread could follow suit if metal does arrive on the bourse.

"I think the December-January backwardation will be a blip," Wlazly said. "The fact that we've consistently seen wide contangos for the past few months suggests that there is enough stock to deliver to overcome these periods of short-term tightness."

Exports keep auto factories running

It's a tiny sliver of a silver lining for the automobile industry. Given that the domestic slowdown is part of a larger global slump in automobile sales, exports of passenger vehicles in the April-August period, continued to be positive, up just over 4%. The sharp slowdown in the domestic market has freed up capacity for automakers to up their export game. Hyundai has seen a nearly 21% increase in exports in the April-August period at 86,300 units. In contrast, the company's domestic sales were down over 10% with August seeing a 16.5% drop. Maruti Suzuki saw its April-August domestic sales decline by 27% but exports in the same period were down just 1.6%. Ford India, saw more than 26% rise in its August exports compared to a nearly 31.4% fall in domestic sales. Exports as a way to keep the factories running and take minimum production cuts to tide over the domestic slump, sources said. Hyundai is using its "flexible" assembly line to balance capacity between exports and domestic sales. For Renault-Nissan too, it's the same logic. "In FY18, we exported 57,000 Nissan vehicles. We recently commenced exports of the Nissan Kicks to the Sub-Saharan region, Bhutan and Nepal. Our manufacturing plant near Chennai has optimised production schedule and resources to maximise capacity utilisation and maintain high efficiency levels. This has also helped us increase exports of power train and car body parts by almost three folds since FY17," said Biju Balendran, MD & CEO, Renault Nissan Automotive India.

Importance Of Engineering Change Management

- Chandrashekhar Deokar, Qualsiddh Consultants

What is Change Management?

“To improve is to change; to be perfect is to change often.” - Winston Churchill



Change management is a disciplined framework for driving business. It entails managing the effect of new business processes, changes in organizational structure, or cultural changes within an enterprise. The challenge is to apply effective practices to anticipate and minimize resistance. Engineering change management refers to the transformation of business systems.

It's not easy, but it is straightforward.

Engineering change management is often abbreviated as ECM. It's a systematic approach that provides an orderly, structured process for making changes within an organization.

Changes are inevitable throughout the manufacturing development process and it's important that these changes be managed effectively with a cross-functional team of engineering experts to avoid wasting time, money and resources on incorrect parts.

Why is it important?

Having an established change process allows a business to do several things:

- Track the status of change requests
- Prioritize requests
- Troubleshoot
- Process changes efficiently
- Document changes as they are completed

Change could be anything from a software upgrade, change in materials, design change to hardware and even manufacturing processes that change how the form, fit or function of the final product. Every change must be properly assessed by all the engineering and quality teams to determine the impact of the change and actions required to properly implement the change and notify the customers. Change management within engineering provides the discipline process to implement a change properly and with the least amount of disruption.

The engineering change process steps

There are very clear steps in the engineering change process that the engineering team will go through as they implement changes. Each step will have a varying amount of activity depending on what type of change the team is managing but in each case it is important to follow all the steps to ensure the change is implemented correctly and thoroughly.



1. Identify the issue / product / process that needs to be changed.

The first step in the change management process is identifying the issue that requires a change to be made, this could be a production process change to eliminate a quality problem or it could be a design change to improve the safety of the vehicle. Along with identifying the problem the problem owner will begin to scope out the impact of the problem.

2. Create an engineering change request.

An engineering change request (ECR) is the term used for the official request. The engineering change request is created that will begin to solidify the need for the change and the parts, components, documentation and resources, both people and costs, that will be needed to implement a change.

3. Build all details inside the change request.

To maximize the chances of approval and success, build as much details of the change to be carried out inside the request. Describe:

- Expected outcomes
- Reasons for the change
- Expected costs
- Potential obstacles

And anything else that can help you create a case for the request.

4. Form a cross functional team, discuss, review and seek approval.

The better the case you make for the change request, the more likely it is to be accepted. After the change request has been documented it is reviewed by a team of stakeholders. Many large organizations have a standing change request team with representatives from all key organizations within the company that reviews all incoming engineering change requests and then routes them to the appropriate organization for additional review as necessary.

5. Upon approval, the request is transformed into an engineering change order.

When the team and necessary experts have reviewed and approved the change, then a plan is put in place to implement the change. In some organizations an engineering change order (ECO) is used to document the plan for implementing the change. The plan is also reviewed and approved by the team before work begins.

6. Begin implementation and release changes

When the plan is reviewed and approved then it is time to implement the change. Those responsible for implementation use the information in the ECO and ECN to make the requested change. While an engineering change order is used for changes that are executed by engineering, other types of change orders may be used by other departments. These include the:

- Manufacturing change order (MCO) – A change order describing modifications to the manufacturing process or equipment.



- Document change order (DCO) – One of the core purposes of engineering change management is documentation. A change order detailing modifications to documents, specifications or SOPs. This documentation allows traceability for changes, for problems or issues, and enables more effective change implementations.

7. Training to concerned

Training the concerned process owners on the change required to be implemented is an essential part of the procedure. These could range from HR to manufacturing to IT to organizational development, depending on the nature of the change request.

8. Close the change order.

Upon completion, the engineering change order is closed.

9. Document the results.

After the change has been implemented the team should document and archive the key lessons learned, the information is available for future engineers if a similar problem is identified in the future.

The Seven R's of Change Management

Seven simple questions can help you assess change-related risk and gauge the effectiveness of your change-management process.

1. Who raised the change?
2. What is the reason for the change?
3. What return is required from the change?
4. What are the risks involved in the change?
5. What resources are required to deliver the change?
6. Who is responsible for the “build, test, and implement” portion of the change?
7. What is the relationship between this change and other changes?

Optimize change management today!

Changes initiated by customers provide an excellent opportunity to increase margins, but companies often fail to seize this opportunity. Change in any industry happens quite frequently and when managed correctly helps to improve the functionality, safety and efficiency of the process and end product.

Email : qualsiddh_consultants@hotmail.com



Author:
Chandrashekhar Deokar
Qualsiddh Consultants, Pune

Fusion. Next generation die casting.

Superior control, speed, and efficiency from a flexible, modular solution.

- Kedar Vaidya, Bühler AG

Bühler Die Casting is the global leader in the field of lightweight aluminum solutions for the automotive industry. 50 % of all new passenger cars around the world are equipped with die cast components manufactured on Bühler machines.

Buhler Fusion is the next generation three-platen die casting platform, designed to deliver exceptional OEE. Covering 3,500 kN to 14,000 kN locking force, Fusion's closed loop control, modular energy frame and Industry 4.0 automation capability helps to make it the flexible solution for your quality aluminium and magnesium die casting, now and long into the future. The machine is based on modular energy frame system for more flexibility and functions. With a new base levelling system the installations are shortened and simplified. The Integrated control cabinets also supports to shorten the installation time. Modular energy frame gives you the ultimate flexibility.



Closing unit – Fusion takes the three-platen closing unit to a next level. The optimized geometry of the three-platen system supports shorter cycle times, with an enlarged tie bar spacing for larger dies. The newly designed components offer improved rigidity with reduced weight, giving you faster, more precise closing, while using less energy. Reengineered movable and cylinder platen design allows more room for larger dies. Bühler also offers a new smoother servo drive, energy savings can be as high as 40 %. Fusion have an absolute stroke measurement systems as standard for movable platen and ejector positioning. Fusion have two choices of hydraulic drive systems designed for optimal costs and a sustainable production.

Basic drive hydraulic system - Asynchronous motor + fixed displacement pump.

Servo drive hydraulic system - Synchronous motor + fixed displacement pump. This saves more than 40% of your energy consumption. Thus Fusion servo drive is for a sustainable and cost efficient production.

Injection unit – Using Bühler's unique new closed loop shot control, Fusion measures the position, speed of the injection piston and the pressure on the injection cylinder. An algorithm assesses any deviation from optimum settings and provides real-time adjustments using servo valves and high speed pilot valves. This real-time control, during the movement of the plunger, rather than between shots, can enhance your reproducible quality and preserve your die for longer. New self-optimizing control algorithm makes the switch-over and metal pressure rise quicker and more stable. Energy efficient movement of the injection piston. Fusion injection unit enclosing makes the working area a safer place for operation and service. The new valve technology for better injection control and reduced component complexity. Fusion is capable of low speed casting with high force.

Energy frames - Flexibility beyond imagination.

The modular energy frames with standardized functions allow a wide range of customized solutions. This helps for easy access to all components for service and retrofit. Safe and ergonomic workplace for your operator and production change staff. The brand new and unique energy frame system contains all the interfaces for your die connections. The hydraulic core pull units, squeeze pin units, intelligent water cooling circuits, tempering lines, SmartVac, jet cooling, electrical connections, and many more functions are all housed in one place, making access and maintenance easier. This ready for repurposing, upgrades and enhancements. This innovative energy frame design protects your investment too. Repurposing a machine or introducing upgrades will now be straightforward. Connectivity from the energy frame is ready to support SmartCMS control.

Control system - Safe and intuitive operation.

DataView simplifies programming, control and analysis. All of Fusion's electro-cabinets are housed in enclosures for safety first operation. This also makes set-up, production changes, maintenance and servicing quicker and easier.

The DataView user interface and control panel are one entity – single point of access – less room for mistakes. The user friendly: multi-touch screen for programming – hand wheel for glove operations. It looks modern and feel – your operators and technologists will love it. Safety PLC system – makes your workplace even safer. SmartCMS cell control system for centralized operation and new data management possibilities is optionally available.

SmartCMS - The digital brain of your cell.

If we think of a die-casting cell like a human body, with lots of different tasks carried out by different parts, then SmartCMS is the brain, ready to coordinate all of that activity in the most effective way. SmartCMS lays the foundation for the smart management of your entire Fusion cell, with the capability to collect information from every component and peripheral in a single control system. This can deliver improvements through equipment connectivity, cell automation and operation, centralized alarms, data collection, flexible part flow and recipe management. It can also save you time and improve uptime in numerous ways. SmartCMS lays the foundation for the smart management of your entire Fusion cell, with the capability to collect information from every component and peripheral in a single control system. Using interfaces with a standardized protocol – called BühlerFlex – and based on the latest technology with specially designed connectors for older equipment where required, SmartCMS is designed to accept inputs from virtually any intelligent device, sensor or component. The configuration of the SmartCMS on your Fusion machine will be tailored to your specific cell requirements.

Ready for digital services.

Developed with and based on the Microsoft Cloud platform, our digital services provide a secure, globally available, fully supported data hub for an incredible range of services that will work with your die-casting cell to help you improve efficiency, productivity and OEE.

Our digital services include

Die Casting Dashboards – for a visual overview of your cell on a 24/7 basis.

Predictive Analytics – helping to scheduled preventive maintenance for your machines.

Downtime Analysis – providing a comprehensive performance analysis to help you reduce downtimes.

Easy to operate and maintain.

Fusion is designed to make life easier for your operators and engineers. Large unimpeded service doors on both sides of the machine give access to the toggle area and

the ejector system with plenty of room for production changes or maintenance work. A new crane system makes exchanging plunger rods and plunger tips faster and safer. Die-machine interfaces are well arranged and accessible through the safety gate. There is no need for your people to step behind the energy frame, ensuring that they always work in a safe and convenient environment. Centralized components requiring service and maintenance are all accessible at the rear end of the machine.

Global machine build and support.

Fusion is being built at our factories in Europe, Asia and the US, providing regional hubs for consulting, configuring, installation and support. Service and maintenance is available around the globe, with 24/7 service and maintenance contracts. You can access training and application support through four Die Casting Competence centres, ready to help you to improve processes, operations and overall productivity.

Contact:

Mr. Kedar Vaidya,
Head of Advanced Materials, Buhler South Asia
13D, KIADB Industrial Area, Attibele,
Bangalore District, Bangalore - 562107
Email : kedar.vaidya@buhlergroup.com

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Author:
Kedar Vaidya
Buhler South Asia

Expansion of Carat portfolio up to 84,000 kN locking force



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Uzwil (Switzerland), November 17, 2020 – Bühler Die Casting presented the latest additions to their die casting portfolio – the new Carat 560 and Carat 610 with locking forces of up to 61,000 kN. Additionally, Bühler announced the Carat 840 – with a locking force of 84,000 kN.

Structural components have clearly gained in importance in the automotive industry in recent years, with a trend towards ever larger parts. The last two years have also seen a tendency towards 5G parts being produced in the die-casting process, same for large battery housings for electric vehicles. These are clear opportunities for the die-casting industry, all of them with high volume potential.

Bühler has expanded its Carat portfolio to meet these market needs. The Carat 560 and 610 with locking forces of 56,000 kN and 61,000 kN and a shot weight of 105 kg aluminum are available now. The Carat 610 with 61,000 kN locking force is the currently largest die-casting machine on the market. Furthermore, Bühler announced the portfolio expansion to include the 84,000 kN Carat 840. This will open up completely new applications, allowing die casting to provide cost-effective solutions for even larger parts.

livered with Bühler's DataView control unit – which makes the control of the die-casting machine easier and more intuitive via its multitouch screen. Additionally, every machine is equipped with Bühler's new energy frame concept with a clear and distinctive arrangement of energy couplings. The Carat series also offers the option of servo drive technology.



Energy frame system on the Carat 560.



Bühler DataView Control unit for die-casting machines.



Bühler Carat 560 die-casting machine

About the Carat series: The Carat two-platen solution with minimum deflection and a high degree of dimensional accuracy has long-proven its value for the production of large and complex structural components. The unique Bühler shot control system, for real-time closed-loop control, allows for consistent high quality part production. All the machines in the expanded Carat portfolio are de-

Media contact:

Lucienne Sproll

Team Leader Marketing, Business Area Die Casting
Bühler AG, 9240 Uzwil, Switzerland

Phone: +41 71 955 23 05

Mobile: +41 79 912 61 94

E-Mail: lucienne.sproll@buhlergroup.com

About Bühler

Every day, billions of people come into contact with Bühler technologies to cover their basic needs for food and mobility. We strive for innovations for a better world, with a special focus on healthy, safe, and sustainable solutions. We contribute significantly to feeding the world's population, while setting the focus on food security and safety. Our solutions and technologies enable efficient and clean mobility.

We are a leader in processing grains, rice, cocoa, coffee, and other raw materials. Also, we are a leading solution provider of die-casting and surface-coating technologies in high-volume application areas, such as automotive, optics, and inks. As a leading technology group, Bühler invests up to 5% of its turnover every year in Research & Development. In 2016, its 10,640 employees in over 140 countries generated a turnover of CHF 2.45 billion. The globally active Swiss family-owned company Bühler is particularly committed to sustainability.

We want our customers to be successful. We want every human being to have access to healthy food. We want to protect the climate with energy-efficient cars, buildings, and machinery.

www.buhlergroup.com