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AUTOMATION IN POST CASTING OPERATIONS

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bringing excellence closer to home

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IMPRINT

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Others	4	11	4	19
Overseas	7			7
Pune	17	35	25	77
TOTAL	55	108	52	215

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Dear Readers,

Presently our country has put up a united fight against COVID-19 pandemic and the overall situation is slowly returning to normal. We all need to be extra careful in adhering to "Covid" appropriate safety behaviour for few more months, possibly till march 2022 or till such time the vaccination of the entire population is completed. As of now, there are some states reporting higher incidence of new covid infections and a lingering worry of the so called "third wave", the industrial activity in many parts of the country recovering to a slow normalisation. Though the lock down conditions is not fully lifted in many states, the economy is firmly on the path to recovery. Many industrial corporations have initiated mass vaccination program for their workers and staff. State governments too stepped-up their vaccination initiatives. With projected increased supply of vaccines in the month of August & September, major part of our country's population will be vaccinated at least once in the coming months. This will help us to prevent any "flare-up" of fresh infections and also will allow the state governments, enough elbow room to further, if not fully, ease out all restrictions. We are very hopeful that the worst is behind us and as you would have observed from several economic indicators and reports that our country is firmly on the path of economic recovery.

According to leading industrial managers, sale of commercial vehicles – an indicator of economic activity – is expected to post a robust growth in the second half of 2021 driven by replacement demand, a major pickup in construction activity amid easing of local lockdown across the country. Heavy duty trucks of 18.5 tonne and more capacity are expected to initiate the drive of the sales revival. Even though the commercial vehicle manufacturers may not be able to recover fully the volumes lost due to the impact of the second wave of the pandemic, sale of medium and heavy commercial vehicles in this fiscal year are expected to grow to more than number of units registered in the last financial year. With projected outlook of GDP being better, with reasonably good monsoon and heavy infrastructure investments the mining and construction industries are expected to do much better. Although the implementation of Bharat Stage-VI emission norms has raised initial acquisition cost of trucks, improved technology has lowered total cost of ownership of these vehicles. Further the makers of Volvo and Eicher brands of trucks and buses have added enough capacity to meet rising consumer demand as the market recovers. In the last December, a leading truck maker has inaugurated a new manufacturing facility in Bhopal. This shows increasing business confidence among major manufacturers.

Amid muted demand specially for two wheelers and automobile as a whole at home, exports offer some relief to major automobile companies. Two-wheeler exports

almost doubled and gathered a turnover of \$1.1 billion in the first five months of 2021 – making up for almost 63% of last year's business. As the auto markets in Latin America, Africa and South-east Asia remained largely unaffected, exports from India zoomed. Similar is the case with car and truck makers. For Maruti Suzuki, recorded a highest ever exports in June and in the first six months of 2021, exports increased by almost 138%. In the first five months of 2021, exports of two-wheelers and passenger cars rose 94% and 20%, respectively.

The next big thing of this century, in our automobile industry is "Hydrogen". Over 30 countries have released hydrogen roadmaps and governments worldwide have committed public funding in support of decarbonisation through hydrogen technologies. No less than 228 large-scale projects have been announced along the value chain, with 85% located in Europe, Asia, and Australia. These include large-scale industrial usage, transport applications, integrated hydrogen economy, infrastructure, and giga-scale production projects. If all announced projects come to realization, total investments will be massive in this field by 2030. This technology has a very bright future. There are four true zero-emissions technologies to power auto mobile vehicles. The first one is battery operated electric vehicles (BEVs), followed by hydrogen fuel-cell electric vehicles (FCEVs), hydrogen internal combustion engines (H2-ICEs), and biofuel internal combustion engines (if a sustainable source of carbon is used). Hybrid and gas engines represent bridging technologies to reduce emissions in the medium term. Batteries and hydrogen both require sacrifices on payload and/or space: batteries are heavy, and fuel cells and H2-ICEs require large tanks. Some companies, however, are trying to eliminate hydrogen storage altogether. Future technologies are being developed where hydrogen could be produced on-board, as per the demand of the vehicle. This would ensure the bridging of the technologies successfully and efficiently via advanced H2-ICE technologies. Our opinion is the next big thing of the century to happen in automobile technology - Hydrogen.



N. Ganeshan
Editor

Robotic Deflashing for Aluminum Die Castings: A Revolution in Alu-cast industry

- Sameer Kelkar, Grind Masters Machines Pvt. Ltd.

Preamble

Manufacturing Industry is undergoing a revolution in productivity, quality and EHS. The Foundry sector in general, and Aluminum Die Casting industry in particular, has been slower than other manufacturing sectors to adopt Automation and Robotics as a way forward. Deflashing is a particularly dirty application requiring lots of manual labour working in unsafe unhealthy conditions. A revolution is upcoming in this sector, with the advent of Robotic Deflashing for Aluminum Die Castings.

The Article

Robotic Automation has come a long way in the past 20-30 years. Robots have become the workhorse for Manufacturing setups in applications such as Welding and Machine Handling in Automotive Industries. Applications of Industrial Robots in Foundry and Alu-Cast Industries include Pouring, Extraction and Handling. Deflashing is a process in Aluminum Casting Industry which is almost entirely manual and labour intensive. It consists of removal of all extra material in the Casting after the Trimming Operation.

Automation of this process brings several key benefits to the manufacturers of castings – namely increase in productivity (2-3 fold), dramatic upgradation in quality and entirely healthy and safe working atmosphere.

Deflashing has been difficult to automate and prove, as demonstrated by numerous failures visible in the market in form of systems lying idle or underutilized. System and Application Engineering for Deflashing requires a domain knowledge, expertise in Deburring processes.

This article explains the technology behind Robotic Deflashing and how it may be successfully deployed across the Aluminum Casting industry. The references provided are from experiences from industry, and serve as guides of dos and donts for good executions.

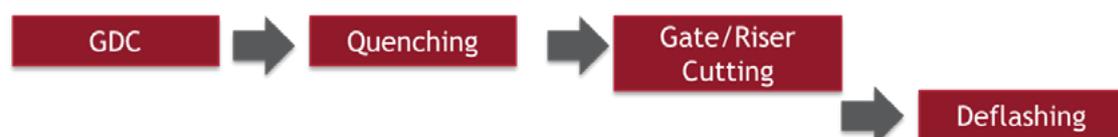
Deflashing Process

Typical Process Sequence followed in Aluminum Castings Shops is as follows:

For Pressure Die Castings:



For Gravity Die Castings :



Deflashing is the last process in most Casting shops. Subsequently the workpiece is sent for Machining to Machine Shop.

Typical Components before and after Deflashing :



Manual Deflashing of Aluminum Castings is done by operators using a variety of Tools, including Belt Grinders, Files, Pneumatic Deburring Tools, Chisels and Hammers.



Belt Grinders



Pneumatic Tools



Chisels/Hammers/Files

Challenges in Automation of Deflashing Operations

Complex Shapes: Aluminum Castings have some of the most complex shapes in manufactured parts, with holes, recesses, inaccessible areas and corners. Further, most Aluminum Castings are used in Automotive industry, where product lifecycles have been becoming shorter and shorter over the years. This necessitates changes in the design of components, and Automation must be ready for the same.

Hazardous Conditions: Temperature, Fumes, Dust are tough conditions for man and machine alike. With the advent of rugged Foundry grade industrial robots that can withstand the conditions in Die Castings shops Automation is possible. Machine selection must carefully consider the conditions specific to the deployment area to ensure reliability over a long period.

Consistency Required for Aesthetic Value Parts: Many Aluminum Cast Parts are visible Class A parts in Automobiles, Scooters & Motorcycles. Inconsistency in deflashing leaves marks, scratches, dents etc on visible surfaces. There is a very high consistency requirement for such parts.

Very High Production Volumes: Most Aluminum Die Casting components are made in volumes of more than 2000-3000 parts/day, specially ones catering to the 2-wheeler industry. Any Automation system must be scalable, fast producing & extremely reliable to cater to this requirement.

Component – Component Variations: Deflashing operation is done on “As Cast” parts, which have part to part variations inherent to the Casting process. These variations pose challenges in Deflashing Automation – starting from Location and Fixturing, to uniformity of pressure application during deflashing, to making adjustments for part variations.

Robotic Deflashing – Tool Selection: Robotic Deflashing Systems deploy a combination of Tools for completing the requirements. A knowledgeable System Integrator is able to choose wisely the tools to be used for a specific job requirement. Tool Selection is critical because process reliability, Cycle time, and Running cost of the system is majorly based on the type of tools used. In certain cases it is observed that selecting an “Optimal” tool can reduce cycle time and runnings costs by as much as 90%.

The most commonly used tools in Robotic Deflashing include:

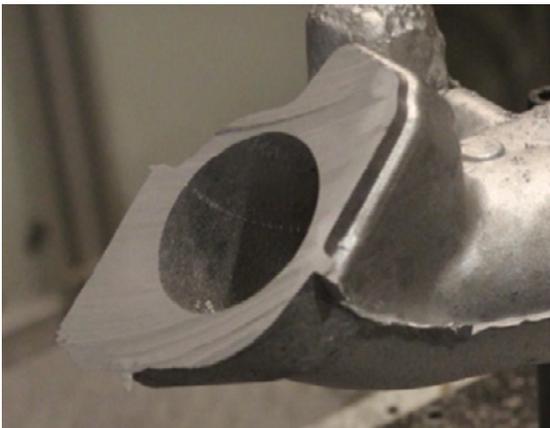
Flexible Pneumatic Deburring Tool



Flexible Belt Grinding Tool



Gate/Riser Cutting Sawing Tool leaves a very clean cut on the material



Milling Spindle Tool

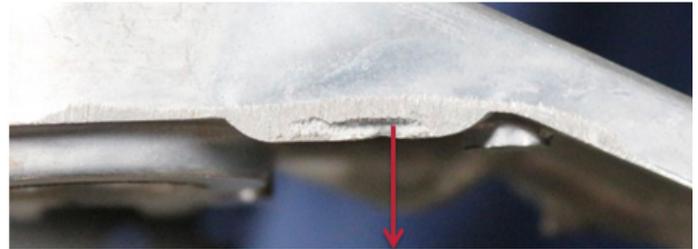


Note: Tools for Drilling and sometimes Polishing can also be combined into Deflashing cells. Such tools are not a part of this article/study.

Robotic Deflashing – Quality Improvements

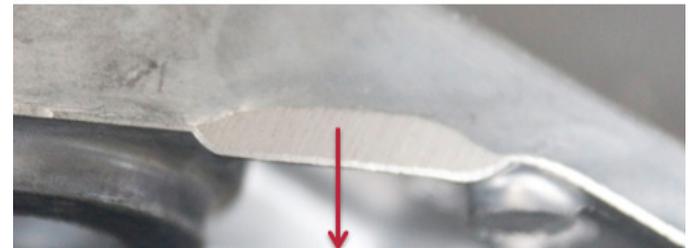
Robotic Deflashing gives tremendous improvements in the consistency and completeness of deflashing. Manual Operations are subject to numerous variations through the days, weeks and months of the year. Also 2 operators are never working in exactly the same style. Component handling with a Robot is much nicer and leaves no marks/dents/damages. The images below illustrate the differences in quality:

Manual Deflashing



Uneven Finish, Variation in Angle/Chamfer

Robotic Deflashing



Uniform Finish, consistent Angle and Chamfer

Manual Deflashing



Incomplete Deburring. Corners not deburred

Robotic Deflashing



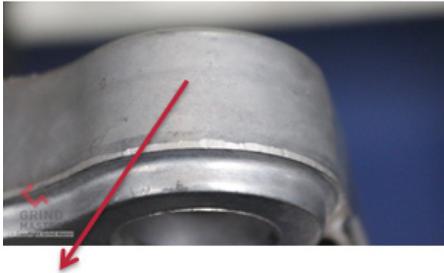
Complete Consistent Deburring. Always.

Manual Deflashing



Scratch Marks, Dents, etc
Digging into Base Material at Corners etc.

Robotic Deflashing



No Damage to Part Geometry or Surface

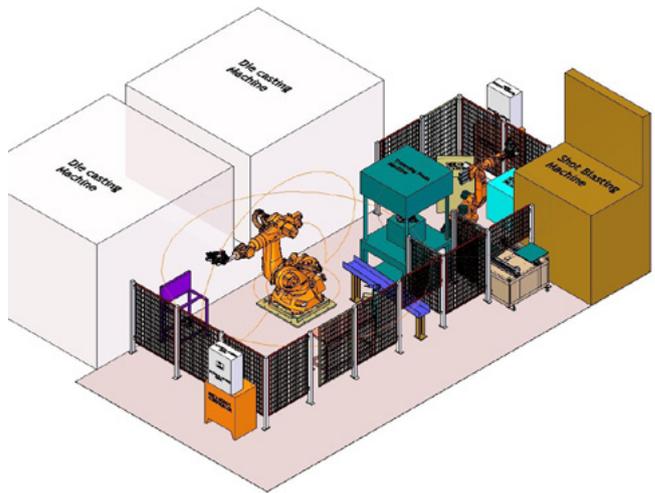
For High Volume Manufacturing requirements of more than 4-5 Parts/Minute, 2 or more Deflashing Machines may be combined using Automation (typically another Robot) for Handling.

For Several PDC parts, instead of having standalone machines, it makes more sense to integrate Deflashing Operation as a one piece flow from the Casting Machine. In such cases, Robotic Deflashing Cells include robots performing multiple operations such as:

1. Extraction
2. Checking/Testing
3. Quenching
4. Handling in Trimming Press
5. Deflashing

The advantage of such a setup is that the entire Die Casting line is Automated, and one piece flow is reliably ensured.

The schematic below depicts a typical "Integrated Casting Deflashing Cell".



Robotic Deflashing – Cell Configurations

Robotic Deflashing Systems can range from simple Single Robot Deflashing Machines to multiple Robot High Volume Manufacturing Systems.

The basic modular element is a Robotic Deflashing Machine with one Robot Deflashing a component loaded on a Fixture. Such a setup operates just like any other machine. An Operator Loads/unloads the component manually, and the Robot completes the Deflashing operation in an automatic cycle. Different Parts can be processed in the same machine by changing the fixture and selecting the part program. Such machines give cycle times between 20-60 sec for components upto 500mm in size, typical components include "Back rest" of 2-wheelers and Alloy wheel rims.

Selection of the correct Configuration is critical for operational and economical success of the system.

Robotic Deflashing – cost of Operations and Economic Feasibility

Robotic Automation Systems have various costs associated with them which have to be considered in calculating Cost per Piece over the long run:

1. Maintenance Costs (Annual Maintenance, Spares etc)
2. Energy Costs
3. Air Costs (most Automation Systems use Pneumatics for Gripping and Deburring tools)
4. Consumables Costs (use of customized tools for Robotic Application can save significantly this cost)
5. Retooling, Reprogramming costs
6. Labour Costs (including future rise in the same)

Significant improvements in Quality must be considered while calculating the Investment Returns of a Robotic Deflashing System. A drastic reduction in rejection rate, and removal of rework/checking stations required also brings about Space Savings.



Correct selection of application, and wise implementation can ensure a Return on Investment of Robotic Deflashing Systems within 2 years.

Key Precautions to be taken for Deployment of Robotic Deflashing

Most Aluminum Casters have a large number of manual operators for deflashing operation. In order to successfully implement Robotic Automation across the manufacturing setup following key steps must be considered:

1. Long Term Commitment to Deploy Automation

Deflashing Automation will go through learning, implementation, horizontal deployment phases and Management must have long term commitment to do this.

2. Reliable Partner for Deflashing

Deburring and Grinding Process Know-how are key ingredients of any success in Robotic Deflashing. Robotic Deflashing is more like a "Machine Tool" than an "Automation System". Choose a competent Machinery maker with this expertise as your partner for Robotic Deflashing.

3. Selection of First Applications

Pluck the low hanging fruits first. Your partner will help you identify the components which will give fastest economical return and impact. Successful implementation of the first application is a key for confidence in the team about Robotic Deflashing.

Conclusion – Robotic Deflashing – A Revolution in Aluminum Casting Industry

Robotic Deflashing is a revolutionary technology in Aluminum Casting industry. It leads to key benefits such as consistency in quality, high productivity and health and safety on shop floor. Aluminum Casters can deploy this technology in Foundry by taking certain precautions to ensure success. In the near future Robotic Deflashing is likely to sweep the Indian Alu-Casting industry setting new benchmark for shop floor practices and methodologies, especially for deburring and deflashing.

About Grind Master Robotic Deflashing Solutions

Grind Master is already an established Trusted partner to some of the largest Aluminum Die Casters in India for Deflashing, providing Total Solution including Machine, customized consumables, support and process know-how.

Grind Master has a history of building Special Purpose Machines for Metal Finishing and Deburring Applications. For components requiring complex motions for processing, Robotics opened a new avenue for Automation. Grind Master Automation group was started to provide customers with Robotic Applications in metal finishing, deburring and fettling/deflashing.

Grind Master launched Products for Iron Casting Fettling (RCF Series) and Aluminum Deflashing (RCP and RMT Series) in 2015. These state of the art technologies were developed through Research over 2-3 years with rigorous process trials and development. Partnering with key cus-

tomers, the first machines with these technologies are already in operation and many orders are under manufacturing stage.

All 50 Robotic Automation solutions delivered to date are in operation, including 30 Deflashing Solutions. Grind Master Automation Team has adopted a Goal for 2020 – "Being a Passionate team transforming foundries and human lives around" clearly demonstrating the Commitment and Intent in this field.

Grind Master is a trustworthy partner to its discerning customers.

With a state of the art Tech Centre with a Robot for R&D, Grind Master conducts process research for difficult to automate applications before conceptualizing a solution. This ensures clarity and confidence on process capability. Our Product Management Team offers very sound advice for successful Automation Deployment from its experience in the field.

A dedicated team of Engineering, Build, Installation and Commissioning undertakes the turnkey project to delivery quality solution in committed delivery time. With a capacity to complete 30-40 projects per year, the team is very fast growing and developing. The young team takes pride in completing startups in very limited time frame.

Grind Master Abrasives/Tools group completes the solution package by providing consumables required on the solutions – Coated Abrasives and Deburring Tools. The Service and Support team at Grind Master is providing timely quality spares and value added services including Training, AMC and Process Optimization options.

This COMPLETE ONE STOP SHOP SOLUTION for our partners makes Grind Master a trustworthy partner.

About the author:

Sameer Kelkar, Silver Medallist and Graduate of IIT Bombay, and MS in Robotics from University of California, Berkeley, is CEO and R&D Head of Grind Master Machines Pvt. Ltd, pioneers Robotic Metal Finishing Technologies. "Explorer" at heart, Sameer Kelkar is venturing into new horizons of Robotic Applications such as Grinding, Deflashing, Fettling, Machining and many others. This article is written using research, data and application experience over the past 5 years.



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Porosity, remote support and diagnostics – bringing excellence closer to home.

By saving time, effort and money, remote diagnostics had already begun to transform industry long before COVID-19. Social distancing and restrictions on travel have simply reinforced their importance and value. Here, John Holmes, Applications Sales Director, at Ultraseal International looks at what this means for the die casting industry in particular, and shares a vision of a digital future.



Digital has touched virtually every aspect of modern life and manufacturing is no exception, with Industry 4.0 and the Internet of Things (IoT) driving many significant improvements into products and processes. In their quest for less waste and higher quality parts, die casting manufacturers are increasingly embracing digital technologies, and as the market leader in vacuum impregnation, Ultraseal has been closely involved. This was a trend that was always going to happen, but COVID has undoubtedly brought the benefits to light and accelerated adoption. Remote diagnostics has been at the forefront of this wave and will inevitably grow in intensity over the coming years. For good reason.

Quite simply, COVID has limited international travel, meaning that in many cases key personnel – including qualified engineers – have been unable to be on-site for either installation or maintenance. Remote technologies have not only helped counter this problem, they've actually delivered a wide range of benefits including greater control, reduced cost and downtime and improved productivity.

They're also contributing to the sustainability agenda in surprising ways too.

Alternative approaches to installation and maintenance.

Vacuum impregnation equipment is sophisticated and complex, requiring professional installation and commissioning. To ensure optimum results, this is ordinarily overseen on site by Ultraseal's engineers. In COVID times however this has been largely impossible, and so alternative approaches have been necessary including reliance on local partners and contractors. While these professionals are all familiar with the equipment, they often don't have the depth of specialist experience an Ultraseal engineer would have. However, virtual meetings, remote PLC access and remote diagnostic technology meant that Ultraseal's engineers were able to support local teams by monitoring the installation at every step.

This meant that projects could go ahead as planned, bringing the promised benefits to customers in the agreed timeframe. Ultraseal's engineers could also work from their

home base in the UK, bringing important environmental benefits as there were zero airmiles incurred and a zero-carbon footprint.

Immediate access to engineering support.

The same benefits apply to repair and maintenance, but perhaps even more so. In a typical scenario, manual inspections would require the physical presence of qualified engineers with the attendant flights, deadtime and costs – and all the while, the equipment would be out of service creating backlogs and production inefficiencies. With remote diagnostics, access to expert engineering support is immediate. Ultraseal's engineers identify the problem and help local engineering teams resolve it, minimising downtime and saving significant time and costs in the process.

So, the benefits are huge in terms of efficiency, cost and sustainability – all helping manufacturers meet their productivity and CSR commitments.

So how does remote diagnostics actually work?

The technology, and security.

Clearly, remote diagnostics involves a digital link between the customers' equipment and Ultraseal. This is achieved with a high-performance industrial modem such as the EWON NetBiter, which is incorporated within the equipment. The customer plugs into the ethernet, which gives Ultraseal's engineers the ability to monitor and interrogate individual components in real-time, as well as enabling device health feedback via an IO link.

The digital link is used purely for Ultraseal engineers to access if an issue arises and gives the engineer the ability to interrogate the PLC, and fault history without being onsite. The link to the equipment can be via a separate internet connection, which is standalone and discreet from the other enterprise system, or via a 4g/5g mobile network SIM card. Both methods only allow accessibility when permitted by the customer.

In other words, it delivers powerful benefits without compromising system security or integrity.

Augmented and virtual reality – delivering next-generation diagnostics today.

Remote support and diagnostics are closely associated with augmented and virtual reality (AR and VR), two powerful technologies which can be used to either replace or enhance real-life. Both technologies have huge potential for industry, and Ultraseal is pioneering their use in the Vacuum impregnation sector, including for the machine acceptance of new equipment by a Japanese customer before dispatch to Japan. At the heart of this is Microsoft's HoloLens 2. Worn by a user on site, these relay visual images back to teams who in effect undertake the work by proxy, issuing advice and instructions based on what they see. This solution enables the customer's engineers to undertake remote acceptance testing on the equipment. The same technology can be used for installation, inspection, maintenance and repair, opening up the way to undertake more sophisticated procedures and drive further cost and productivity improvements.

The tip of the digital iceberg.

These examples of remote support and diagnostics represent just the tip of the iceberg, and there is the potential to align diagnostics with other tools and innovations to bring added value to porosity sealing applications.

As an example, Ultraseal has developed a 'plug & play' system for its equipment which has simplified factory strip down and installation within the customer's site. Instead of needing to hard wire every single component to the control panel, Ultraseal can make use of Profinet/ Ethernet IP to interconnect these components allowing only one connection into each process module. This means on a typical installation there would be 4 cables to connect rather than 50 or more.

Use of this technology enabled a remote team in Spain to undertake an installation in just 30 hours compared with an expected time of 200+ hours. With similar savings made during factory strip down prior to dispatch.

On another recent installation in Germany, Ultraseal was able to allow the customer to view machine parameters, displayed on the HMI both locally on a large plasma screen visible across the factory and also remotely via a mobile device, using a networked SCADA system. This gave the customer 24-hour real time equipment information visible from anywhere in the world. Ultraseal has also incorporated technology within robotic front-loading equipment using single part flow to record part traceability and process parameters - a vital aspect of modern manufacturing. On one particular project the robot would present the part's QR code to a scanner before and then after impregnation, allowing the detailed process data, such as tank temperatures and process vacuum levels, to be recorded for full process-control visibility and data logging.

Conclusion.

The scope to use remote support, diagnostic and other digital technologies is huge, effectively allowing manufacturers to bring specialist expertise in-house, giving them all the reassurance without unnecessary downtime, delays and cost. This represents a potential step-change for the die cast industry, and by helping manufacturers improve productivity, cost-effectiveness and environmental performance, Ultraseal is at the forefront of this drive.

For more information about Ultraseal and its remote diagnostics capability, please visit Ultraseal International's website, www.ultraseal-impregnation.com.

About Ultraseal International

Ultraseal International, a Quaker Houghton company, is the global leader in sealing porosity in die cast, sintered and electrical components. From the development and manufacture of best-in-class sealants and impregnation systems, through to a global network of service centres and the provision of fully managed on-site facilities, Ultraseal's offer is totally focused on meeting its customers' porosity sealing challenges.

For more about Ultraseal International, please visit www.ultraseal-impregnation.com

Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April-May 2021						
Report I - Number of Vehicles						
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April - May		April - May		April - May	
	2020-21	2021-22	2019-20	2020-21	2019-20	2020-21
Passenger Vehicles (PVs)*						
Passenger Cars	13,806	2,30,412	14,460	1,82,730	13,995	44,423
Utility Vehicles(UVs)	15,248	1,90,539	17,347	1,54,029	5,048	29,313
Vans	266	13,226	1,739	12,919	-	99
Total Passenger Vehicles (PVs)	29,320	4,34,177	33,546	3,49,678	19,043	73,835
Three Wheelers						
Passenger Carrier	28,080	1,00,528	1,406	9,960	24,685	89,114
Goods Carrier	1,437	9,633	1,054	5,019	141	1,784
Total Three Wheelers	29,517	1,10,161	2,460	14,979	24,826	90,898
Two Wheelers						
Scooter/ Scooterette	20,926	4,46,010	69,196	3,50,756	4,886	66,150
Motorcycle/Step-Throughs	2,71,327	16,45,926	1,97,378	9,63,098	1,37,160	7,19,675
Mopeds	4,073	43,833	13,088	33,112	370	4,242
Electric Two Wheelers	-	1,444	20	848	-	-
Total Two Wheelers	2,96,326	21,37,213	2,79,682	13,47,814	1,42,416	7,90,067
Quadricycle						
Quadricycle	66	902	-27	-	140	960
3,55,229	26,82,453	3,15,661	17,12,471	1,86,425	9,55,760	41,28,928

* BMW, Mercedes, Tata Motors and Volvo Auto data is not available. Society of Indian Automobile Manufacturers (11/06/2021)

Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April-June 2021						
Report I - Number of Vehicles						
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April - June		April - June		April - June	
	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
Passenger Vehicles (PVs)*						
Passenger Cars	76,406	4,35,618	80,051	3,37,191	31,873	79,376
Utility Vehicles(UVs)	65,215	3,40,853	68,025	2,86,092	11,707	47,151
Vans	3,430	24,188	5,658	22,989	39	588
Total Passenger Vehicles (PVs)	1,45,051	8,00,659	1,53,734	6,46,272	43,619	1,27,115
Commercial Vehicles (CVs) - M & HCVs						
Passenger Carrier	567	2,263	221	1,086	268	920
Goods Carrier	6,102	39,395	4,182	28,072	966	5,082
Total M&HCVs	6,669	41,658	4,403	29,158	1,234	6,002
Commercial Vehicles (CVs) - LCVs						
Passenger Carrier	1,093	4,912	860	4,297	217	210
Goods Carrier	21,177	90,356	26,373	72,345	2,419	9,794
Total LCVs	22,270	95,268	27,233	76,642	2,636	10,004
Total Commercial Vehicles (CVs)	28,939	1,36,926	31,636	1,05,800	3,870	16,006
Three Wheelers						
Passenger Carrier	56,137	1,49,616	6,919	15,769	50,427	1,34,392
Goods Carrier	6,195	12,367	5,841	8,607	204	3,190
Total Three Wheelers	62,332	1,61,983	12,760	24,376	50,631	1,37,582
Two Wheelers						
Scooter/ Scooterette	1,58,231	6,93,260	3,39,008	5,92,445	14,696	90,145
Motorcycle/Step-Throughs	10,47,037	27,23,345	9,01,743	17,40,198	3,22,528	10,41,989
Mopeds	44,684	63,486	53,708	69,009	759	4,968
Electric Two Wheelers	80	2,203	50	1,939	-	-
Total Two Wheelers	12,50,032	34,82,294	12,94,509	24,03,591	3,37,983	11,37,102
Quadricycle						
Quadricycle	431	1,648	(27)	-	397	1,625
Grand Total	14,86,785	45,83,510	14,92,612	31,80,039	4,36,500	14,19,430

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

Society of Indian Automobile Manufacturers (14/07/2021)

Decorating Of Aluminium Castings

- B.B.Lohiya, Director, Compax Industrial Systems Pvt. Ltd.

Introduction

In recent years, we observe increasing use of Aluminium castings in various applications in wide segments like Automotive Sector (especially for light weight vehicles), White goods & Consumer Durables, Household appliances and other engineering sectors. This is primarily due to light weight considerations, low investment and ease of manufacturing Aluminium components. The increasing demand of end products has led to increased demand of small as well as large Aluminium castings, to produce components of desired shape and size, in large volumes.

Sand cores are employed in Aluminium casting production to generate cavities of desired shape and size in the castings. The sand core breaks down as the casting process gets completed. The sand has to be removed before the subsequent process of component manufacturing. Decorating is the operation of removal of this sand from the castings.

Importance of Decorating operation

Since all subsequent operations on the casting to transform it to a useful component can be performed after the sand removal from the casting, an efficient Decorating operation helps to carry out operations like heat treatment, machining, finishing, surface coating etc more efficiently and in a cost effective manner. For example, at the heat treatment stage, the residual sand may lead to more process time as well as cost. Similarly such residual sand may add up more to machining time, tool wear, increased energy cost etc. Therefore productivity of Decorating process affects the productivity of subsequent operations and thus has a hidden impact on the cost of the component.

Decorating Process

Unlike steel castings- where the heat from high pouring temperature of the molten metal causes the sand layer adhering to the casting surface to burn and deteriorate, helping easy separation- low pouring temperature of Aluminium castings poses some challenges for sand separation from the castings.

Various techniques like Vibrating, shaking, hammering, Heating, waterjet etc are used to carry out the separation of sand from castings. In some cases, combination of

these techniques may prove to be more effective. The impact energy due to hammering or vibrating action breaks the bond (adhesion) of sand particles with the casting surface. The loosened sand particles can come out through available openings / holes in the castings. Shaking / swinging/ turning motions to the casting may further aid easy sand dropping from such openings.

The process of core making influences selection of the decorating technique. Co₂ silicate bonded cores are more challenging. No bake, Co₂ cured Phenolic resin bonded cores, Cold box and shell cores are comparatively easy to decorate. Cores made from Special cold box binders designed for use in aluminium casting production, also exhibit good decorating properties.

Use of vibrating tables is common for shake out of the castings. Hammering the casting with Pneumatic hammer at selected locations also helps to detach the sand from casting. Factors such as Amplitude, frequency & duration of vibration, Force & frequency of hammering, Weight, size & shape of the casting and sand mass, hammering locations etc. influence the performance and efficiency of the decorating process.

In some cases where critical & narrow sections in the casting prevent sand from loosening due to high adhesion, the casting may be preheated before being subjected to vibration & hammering action by pneumatic hammers. Multiple hammers may be employed for larger castings.

The latest generation of inorganic binders used for core making for aluminium castings, has ushered in the Water Jet decorating technique in the modern diecasting shops. Easy sand regeneration is an additional advantage in such case.

Decorating Equipment

A Decorating station employs one or more techniques explained above to carry out the removal of sand. Some decorating machines also employ a rocking motion additionally. A clamping fixture for mounting the casting (may need to be dedicated in some cases), a hammering and / or vibrating mechanism, sand collection arrangement etc are some of the basic requirements of any Decorating machine. The machine should cater to a flexible casting intake.

Since lot of dust is generated during this operation, an enclosure and dust collection system becomes an environment friendly feature. Also, the noise caused by the vibration and hammering actions necessitates shrouding the equipment with soundproof enclosure. The soundproof enclosure can thus protect the operating personnel from dust as well as noise.



Vibration & hammering



Hammering

Decoring Techniques

Use of sophisticated quick acting mechanisms for clamping the castings in a decoring fixture, mechanised handling & transportation of incoming as well as the decored castings, collection & transportation of the removed sand, for further processing, pressurised air blowing for casting cleaning etc are some of the features incorporated in a high productivity decoring installations.

High speed- high performance operations, call for incorporation of well designed and integrated operating controls and safety elements & interlocks in the system. Use of PLC (Programmable Logic Controller) along with a HMI (Human Machine Interface) is common to carry out the operating cycle as per specific needs of individual castings in a pre-programmed sequence. Automatic selection of decoring parameters & related programmed sequence linked with casting identification systems, is achievable now due to recent technological advances.

High level of automation at various stages in the decoring process can enable efficient sand separation of large volume of castings at high production rate with minimum human resource deployment. Highly reliable data acquisition and communication systems, use of wi-fi, availability of high response sensors etc. can facilitate comfortable navigation of a Diecasting shop to a culture of Industry 4.0

A Typical Decoring Installation

Considerations in planning Decoring installations

The variety and volume of the castings, intricacy of the sand cavities, the process of making the cores, nature of subsequent operations etc. are some of the factors that need to be considered while planning and designing any decoring installation.

Further the size & skill level of the human resource deployment needs to be taken into account. High level of automation must also be examined from reliability, safety and environmental perspective.

Financial considerations will play a major role in decision making as the investment level will go up with higher level of automation. The cost implications of such investment on the end product needs a careful study.

Conclusion

Efficient sand removal from aluminium castings means faster sand separation from the castings in a manner that reduces demands on subsequent processes on the castings -thus resulting in its transformation into a cost effective end product.

Volume of casting production and investment level will dictate employable degree of advanced automation of any installation. Ultimately the cost benefit analysis only can justify the level of the investment cost that the casting output can bear.

However, one has to always remember that Decoring being an important stage of the casting manufacturing process having impact on subsequent stages of the end product, an integrated view needs to be taken with careful consideration.



Author:

BB Lohia
Director
**Compax Industrial
Systems Pvt. Ltd.**



ALUCAST SERIES OF WEBINARS ON DIE CASTING FOR ROCKMAN INDUSTRIES

Virtual Training Programme on the Zoom Online Platform / July 16 - 17 - 19 - 20 - 21, 2021
11:00 am to 1.00 pm India

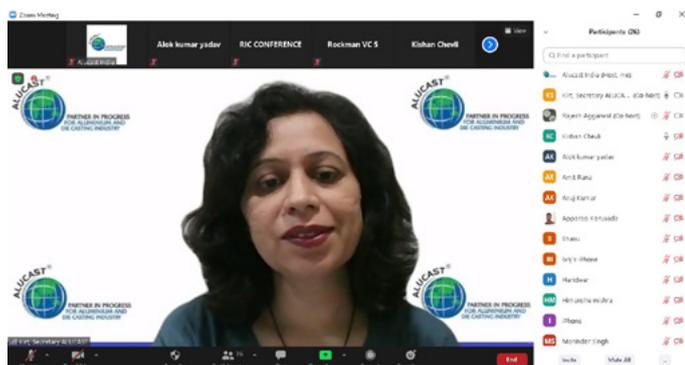
The **ALUCAST SERIES OF WEBINARS ON DIE CASTING** is an exclusive and comprehensive Training Programme conceptualized and designed by ALUCAST. The Training Programme is based on the fundamentals of Die Casting for the young engineers who aim to take the Die Casting Industry to the next level. The Training Programme is spread over 5 days and 5 Sessions that aims to develop basic understanding of various die casting processes and their interconnection among Die casting foundry engineers including design, simulation, tool room, production, die maintenance, quality inspection and measurement.

ALUCAST rolled out its first **SERIES OF WEBINARS ON DIE CASTING** for **ROCKMAN INDUSTRIES LIMITED, New Delhi** on 16-17-19-20-21 July 2021. The Programme received an overwhelming participation of **83 delegates** from the **6 Plant Locations of Rockman – Ludhiana, Bawal, Haridwar, Vadodara, Tirupati and Chennai**. The Programme kickstarted with an Inaugural Session on the 15th July 2021.

briefing about ALUCAST and the outline of the Training Programme. The Programme was inaugurated by -



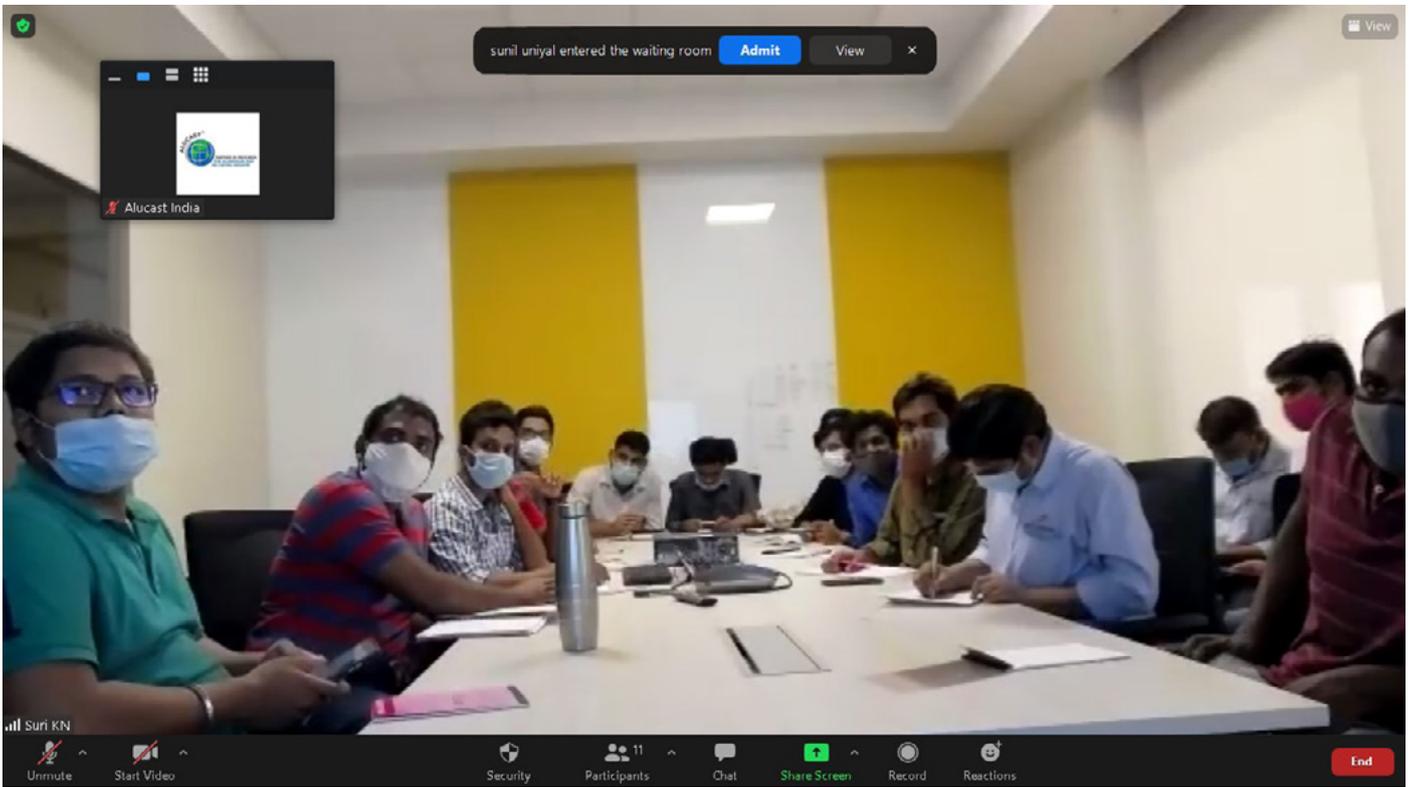
Kaushik Manna, COO - Rockman Industries and **Natrajan Ganesan, Hon. Trustee and Head – L&D, ALUCAST** in the presence of **Tej Bambra, AVP Rockman Industries, Shripad Bhalchandra, Chief General Manager, Rockman Industries, Arunima Mohanty, DGM Rockman Industries** and the **Trainer for the Programme -**



Kirti Ramdasi, Secretary - ALUCAST welcomed the delegates and the dignitaries present and presented a



Rajesh Aggarwal, Director - Techsense Engineering Services.



The Inaugural was followed by a PRE-ASSESSMENT TEST administered online from the ALUCAST Secretariat.

The Topics covered included:-

1. Cold Chamber Die Casting Machine Operation
2. Die Design and Calculations
3. Die Casting Process Simulation
4. Die Casting Process, Defects and Solutions
5. Inspection and Measurement

Day 1 - Cold Chamber Die Casting Machine Operation

Introduction to various Die casting processes

- Gravity die casting
- Low pressure die casting
- High pressure die casting
 - Hot chamber
 - Cold Chamber

Elements of die casting machine

- Die Mounting and closing system
- Injection unit
- Shot sleeve
- Plunger and Plunger Rod
- Ejection unit
- Spray unit
- Extractor unit

Day 2 - Die Design and Calculations

- Basics function of dies
- Steps of die design process
- Gating design – calculations and methoding

Day 3 - Die Casting Process Simulation

- Need and purpose of simulation in Die Casting
- Elements of die casting process simulation
- Inputs required for simulation process
- Interpretation of Simulation results
- Case studies for GDC, LPDC and HPDC

Day 4 - Die Casting Process, Defects and Solutions

- Understanding Die casting process parameters and optimization
- Defects classification for GDC, LPDC and HPDC
- Understanding root cause of each type of defect
- Solutions and precautions to avoid / eliminate defects

Day 5 - Inspection and Measurement

- Quality roadmap
- Quality Assurance Vs Quality Control
- What is data?
- What is variation and why it occurs?
- Basic tools of quality
- Problem solving and root cause analysis

The Trainer for the Programme, Rajesh Aggarwal's long and wide experience of 30+ years of rich experience in the field of product and tool design for Aluminium Die Casting components in the Automotive and the Non- automotive Sector on varied positions made the training sessions very informative and engaging. Many real time situations and scenarios and problems encountered were discussed through different Case Studies. Every Training Session was followed by an exhaustive Q&A Session. Every query and doubt from the participants were answered.

The Training Programme ended with a Post-Training / Valedictory Session on 22nd July, 2021. The Valedictory Session was attended by Arunima Mohanty, DGM Rockman Industries, Kirti Ramdasi – Secretary ALUCAST, the Trainer - Rajesh Aggarwal, Director – Techsense Engineering Services, the Plant Coordinators and the delegates from Rockman. The Training Delegates shared their feedback about their learning experience and the take aways from the Training Programme, The Valedictory Session was followed by the POST-ASSESSMENT Test administered online from the ALUCAST Secretariat to understand the degree of learning achieved through the Training Programme.

All the participants were presented with the Certificate of Participation and Certificates for 'Active Participation & Outstanding Performance as a Learner' were presented to appreciate the best participation from each Plant of Rockman. The 'Most Active Participation & the Most Outstanding Performance as a Learner' from Rockman was selected on the basis of the performance in the Pre-Assessment Test, Post-Assessment Test as well as the performance during the Training Sessions and was awarded with a Certificate of Special Appreciation.

Kirti Ramdasi – Secretary ALUCAST and Arunima Mohanty – DGM Rockman Industries coordinated the entire programme. Rushikesh Bhang, Technical Assistant at ALUCAST and his team at ALUCAST provided the needed technical support and assistance and K.N. Suri from the Tirupati Plant, Rockman Industries coordinated with the participants from all the six plants of the Rockman Industries.

The Advisory and Organizing Committee for the event included **Ms. Kirti Ramdasi – Secretary ALUCAST, Niranjan Toraskar and Natrajan Ganesan, Hon. Trustees and Head – L&D ALUCAST.**

ANNOUNCEMENT

ALUCAST 2021 Virtual Conference for 2 days would be held in December 2021 on Zoom Platform.

The exact dates would be announced soon.

Contribute Articles for ALUCAST Journal

Themes for the year 2021

Issue	Theme
October 2021	Die Cast Products in E-Vehicles
December 2021	ALUCAST 2021 Special

Email : alucastindia@alucast.co.in

Surface Coating of Aluminum Components - Present & emerging Trends

- Rameshwar Lahoti

The use of aluminium components in Automobile manufacturing and other engineering applications is rapidly increasing. Therefore the demand for superior & durable finish with attractive colours and shades using suitable surface treatment processes, is driving the component suppliers to adopt new technologies and techniques to meet the quality requirements from this perspective. Electrodeposition; Powder coating and Paintings are popular technologies that reliably support this objective. In all the processes, 'Pre-treatment' of the components becomes the primary process requirement which is very important for life of the parts.

Surface coating is done for

- Corrosion resistance of metal
- Improve finish of the parts
- Parts look attractive in assembly condition, Matching etc.
- UV resistance paint or powder coated parts will remain in good finish and colour for long time.

For this there are following options are in painting & powder coating.

1. Pre-treatment and Primer Painting
2. Pre-treatment and Primer Painting + Finish Painting.
3. Pre-treatment and powder coating
4. Pre-treatment and CED coating
5. Pre-treatment and CED coating + powder coating

Depending on the requirement we have to choose the process.

- If only corrosion resistance is required then option 1, 3 and 4 can be used.
- If finish requirement is of higher level then option 2, 3 & 5 can be used and with this process we can match the colours as per requirement of components

Pretreatment and Cathodic Electrodeposition on Aluminium

Components & Castings

As per the recent global trends in the automobile manufacturing, most of the aluminum components (both alumi-

num and its die castings) are processed through cathodic electrodeposition painting systems for enhanced corrosion performance and durability.

Typically, aluminum parts can be processed through the tri-cationic zinc phosphate line that is used for mild steel components if throughput of aluminum parts is less than 30% of the total production volume.

In case of higher percentage of aluminum components in total production, Nano pretreatment (thin layered conversion coating) coating is preferred over conventional zinc phosphate before electrocoat or any subsequent painting including powder coating.

It has been observed and proven that, Nano pretreatment coating works well on aluminum surface with electrocoat as a primer and meets various stringent performance requirements of automotive industry. This is mainly due to the effective etching of aluminum surface (which is passive by nature) that takes place during the Nano pretreatment process which further helps in better bonding of electrocoat with the aluminum surface.

Nano pretreatment coatings are very easy to adopt in the conventional pretreatment and electrocoat lines by making few modifications in the process.

Except for degreasing (chemical type), activation and phosphate stages, remaining pre-treatment process remains almost identical for both aluminum & mild steel components.

Usually, high temperature & strong caustic based alkaline degreasing chemicals generates smut / blackening of the surface of aluminum components which affects further pre-treatment process leading to quality issues after painting. Considering this,

1. Low temperature degreasing chemicals (Temperature < 50 deg.C) are preferred for aluminum substrates over high temperature degreasing chemical (temperature 50 -60 °C) used for mild steel degreasing.

2. Degreasing chemical should be weak alkaline. Caustic-free alkaline chemicals are recommended for Aluminum components whereas strong alkaline chemicals are

used for mild steel components based on the type of rust preventive oils used.

3. In case of tri-cationic zinc phosphate pretreatment, fluoride additives should be added in the phosphating bath for processing the aluminum components.

Typical Nano Pretreatment & electrocoat process for aluminum components is below:

- Alkaline Degreasing (Caustic free and low temperature)
- Water Rinse (Industrial Water)
- Water Rinse (Industrial Water). Conductivity < 200 MicroS/cms
- Nano PT
- Re Circulated DI Water Rinse
- Circulated DI Water Rinse
- Electrodeposition Tank
- UF rinses
- Oven baking

4. As aluminum is a better conductor of electricity, electrocoat coating voltage ramp up should be minimum 20-30 sec (to be as high as possible) and set voltage is usually much lower than that of required for mild steel parts to avoid gas pinholes.

5. Electrocoat bath should be free from ionic contamination again to avoid gassing in electrocoat film.

Pre-treatment and Powder Coating of Aluminium components & castings

For Powder Coating on Aluminium & Die Casting components, below process is recommended.

1. Alkaline Degreasing (weak alkaline, caustic free low temperature)
2. Water Rinse (Industrial Water)
3. Water Rinse (Industrial Water)
4. Desmutting / deoxidizing (Based on parts quality)
5. Water Rinse (Industrial Water)
6. Re-Circulated DI Water Rinse
7. Nano PT
8. Re Circulated DI Water Rinse
9. Re Circulated DI Water Rinse
10. Dry off oven 100°C-110°C
11. Powder Coating by using powder as per shade & quality requirement
12. Oven Baking.

Pre-treatment and Painting of Aluminium components & castings

For painting on Aluminium & Die Casting components, below process is recommended.

1. Alkaline Degreasing (weak alkaline, caustic free low temperature)
2. Water Rinse (Industrial Water)
3. Water Rinse (Industrial Water)
4. Desmutting / deoxidizing (Based on parts quality)
5. Water Rinse (Industrial Water)
6. Re Circulated DI Water Rinse
7. Nano PT
8. Re Circulated DI Water Rinse
9. Re Circulated DI Water Rinse
10. Dry off oven 100°C-110°C
11. Primer painting (PU base , Stoving , Epoxy etc)
12. Oven Baking / air drying as per type of paint used.
13. Finish Painting as per shade requirement (PU base , Stoving etc)
14. Oven Baking / air drying as per type of paint used.

About the author

Rameshwar Lahoti is an expert in Surface technology with rich professional experience. He had a stint of over 35 years at Tata Motors in various capacities in departments such as Metallurgy, Paint Kitchen, Production, Laboratory, Customer Complaint resolution, Supplier & Material Development, Supplier Quality etc.

During this period, he was associated with the Anodic Electro coat Plant & the Cathodic Electro coat plant, both established for the first time in India. He was also responsible for establishing the Mercedes painting line after having special training at Sindelfingen Germany for this purpose.

Subsequently (in 2015) he started Ameya Corrosion Solutions LLP & Pristine Surface coating LLP providing customized solutions for wide variety of engineering applications.



Author:
Rameshwar Lahoti

ALUCAST SNIPPETS

India expects major gains from multilateral global tax deal

India expects major gains for itself from joining a global tax deal that is in works under the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS).

Officials in the Finance Ministry said that the terms of negotiations of the global tax deal have taken all the inputs that India had shared over the years for equitable distribution of tax revenue by multinational enterprises to the market jurisdictions, especially in the digital world where companies may not have physical presence in all geographies but derive a larger portion of earnings and profits from there.

“With negotiations on multilateral tax treaty now largely focused on a two-pillared approach taken by the OECD (Organisation for Economic Co-operation and Development), most of the concerns of India have been taken into account. The shape of the deal emerging from here on would benefit India immensely,” said an official.

India has been levying withholding tax on contain earnings of non-residents. It has now also put an equalisation levy to tax income transfers by digital companies like Amazon, Flipkart and Google, which may not have complete physical presence in the country.

Exports grow 47% to \$32.46 billion in June; trade deficit at \$9.4 billion

The country’s exports rose by 47.34 per cent to \$32.46 billion in June on account of healthy growth in sectors such as engineering, gems and jewellery and petroleum products, even as trade deficit aggregated at \$9.4 billion during the month, according to the data released by the commerce ministry on Friday.

Exports in June last year stood at \$22 billion and \$25 billion in June 2019. In May 2021, the outward shipment was worth \$32.27 billion, while in April this year, it was \$31 billion.

Imports in June 2021 grew by 96.33 per cent to \$41.86 billion, from \$21.32 billion in June last year. In June 2019, imports stood at \$41 billion.

“India is thus a net importer in June 2021 with a trade defi-

cit of \$9.4 billion, widened by 1,426.6 per cent over trade surplus of \$0.71 billion in June 2020 (India was net exporter in June 2020) and narrowed down by 41.26 per cent over trade deficit of \$16 billion in June 2019,” the ministry said in a statement.

Exports during the April-June quarter this year jumped to \$95.36 billion as against \$51.44 billion in the same period last year.

“Exports during the April-June period are the highest ever merchandise exports in a quarter in history of India,” commerce and industry minister Piyush Goyal said briefing the media here.

India gives aluminum battery a chance to take on lithium in electric vehicles

A drive to reduce dependence on imported materials and technology, especially from China, is pushing India to invest in a battery technology that uses aluminum rather than lithium as the key ingredient. Indian Oil Corp., the nation’s largest oil refiner, has teamed up with startup Phinergy Ltd. to develop the Israeli company’s aluminum-air battery.

India has few exploitable options to produce lithium, the key metal for the current generation of electric-vehicle batteries, but its eastern jungles hold large reserves of bauxite, the ore used to make aluminum.

“Lithium is scarce in the country and we started scouting for an element which is abundantly available as a natural resource,” said Indian Oil R&D Director S.S.V. Ramakumar.

India is among the top 10 bauxite producers. It has some 600 million tons of the ore in proven reserves, according to the U.S. Geological Survey, though India’s mining ministry estimates that untapped resources may be many times that amount. Moreover, the country has invested heavily in production of aluminum over the years to become the world’s second-biggest smelter of aluminum.

“Clearly the special consideration here is that aluminum is in better supply than lithium,” said James Frith, Head of Energy Storage at BNEF in London. “But with the ever-falling prices of lithium-based systems, developers will be under pressure to find niche applications where Aluminum-Oxygen can gain a foothold.”

An aluminum-air battery could win advantages over its lithium-ion rival in three other crucial ways, Ramakumar said: It's potentially cheaper, vehicles using it would have a longer range, and it's safer.

Swapping Batteries

The battery works by tapping electricity generated when aluminum plates react with oxygen in the air. It has one of the highest energy densities for a battery. But the system has a number of drawbacks that have kept it from wide-scale use since it was first proposed in the 1960s.

Chief among them is the cost of materials that need to be added to the battery to prevent the power from dropping and the fact that the cells can't be recharged. Instead, Phinergy's plan is for users to be able to quickly swap in a new battery and send the used one to a recycling facility.

It takes just three minutes to replace the battery, about the time it takes to fill up at a gas station, Ramakumar said. The fuel retailer plans to use its network of filling stations as swapping points.

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

Innovation

- Vishwas Kale, Managing Director,
Vijayesh Instruments Pvt. Ltd.

Innovation is a new idea, more effective device or process. Innovation can be viewed as the application of better solutions that meet new requirements, inarticulate needs, or existing market needs. This is accomplished through more effective products, processes, services, technologies, or ideas that are readily available to markets, governments and society.

The term innovation can be defined as something original and more effective and, as a consequence, new, that "breaks into" the market or society. While a novel device is often described as an innovation, in economics, management science, and other fields of practice and analysis innovation is generally considered to be a process that brings together various novel ideas in a way that they have an impact on society.

Innovation changes an idea or invention into goods or services that creates value or for which customers will pay. An idea must be replicable at an economical cost and must satisfy a specific need, then only it is an innovation. In business, innovation often results when ideas are applied by the company in order to further satisfy the needs and expectations of the customers.

Two Categories of Innovations

1) Evolutionary innovations (continuous or dynamic evolutionary innovation): These are brought about by many incremental advances in technology or processes

2) Revolutionary innovations (also called discontinuous innovations) which are often disruptive and new.

Innovation is synonymous with risk-taking. Organizations which create revolutionary products or technologies face the greatest risk because these create new markets.

Innovation leadership is a philosophy and technique in itself. This motivates employees to produce creative ideas, products, and services. The key role in the practice of innovation leadership is the innovation leader. It is necessary for organizations to think innovatively to ensure continued success and remain competitive. Without innovation leadership, organizations are likely to struggle. The traditional view of organizational practices, which discouraged employee innovative behaviors is now changed. It now values

innovative thinking as a potentially powerful influence on organizational working.

A leader needs to promote a safe environment for employees to put forth novel ideas. He should also provide them with the resources to do so effectively. Open leadership should send a message that unconventional ideas are not only accepted but also encouraged.

Evaluation of Idea and its Implementation

In addition to providing a climate for idea generation, innovation leadership also needs leaders to ensure that the process of idea generation does not cast shadows on the evaluation and implementation processes. During these phases of leadership, leaders must support some ideas while discarding other ideas and put the supported ideas into production. The role of the leader must shift away from a transformational style to a more transactional style of leadership. This involves being more direct and critical toward the ideas generated.

A leader needs to ensure that constructive discussions of innovative ideas are taking place among their subordinates. This serves to evaluate the usefulness of each idea. Also eliminate those that do not appear viable to the organization or goal. This also pushes the ideas that do appear viable into the production phase. The leader must have closed leadership behaviors to achieve this. Instead of stimulating idea generation, the leader must shift focus from generating new ideas toward fine-tuning existing ideas. This will achieve progress toward the goal, and ultimately implement the idea. This challenge of balancing differing leadership styles when appropriate is called the generator evaluator paradox. It is important to consider the role of ambidextrous leadership. A leader must be able to switch between leadership roles and styles when necessary to successfully lead for innovation. The technological innovation system is a concept developed within the scientific field of innovation studies. The approach may be applied to at least three levels of analysis: to a technology in the sense of a knowledge field, to a product or an artifact, or to a set of related products and artifacts aimed at satisfying a particular function. The approach has especially proven itself in explaining how sustainable energy technologies have developed to diffuse into a society, or also failed to do so.

The entrepreneur has to transform knowledge into business opportunities, and eventually innovations. The entrepreneur can do this by performing market-oriented experiments that establish change, for the emerging technology. He should ensure about knowledge diffusion in all those involved in the process by meetings, workshops and conferences. Emerging technologies cannot be expected to compete with incumbent technologies. In order to stimulate innovation, it is usually necessary to create artificial or niche markets. Resource Mobilization refers to the allocation of financial, material and human capital. The access to such capital factors is necessary for all other developments. Typical activities involved in this system function are investments and subsidies.

The rise of an emerging technology often leads to resistance from persons with interests in the incumbent energy system. In order for a Technological Innovation System to develop, other persons must counteract this inertia. This can be done by urging authorities to reorganize the institutional configuration of the system.

A disruptive innovation is an innovation that helps create a new market and value network, and eventually disrupts an existing market and value network over a few years, displacing earlier technology. In contrast to disruptive innovation, a sustaining innovation does not create new markets or value networks but rather only evolves existing ones with better value, allowing the firms within to compete against each other's sustaining improvements. Sustaining innovations are innovations in technology, whereas disruptive innovations cause changes to markets. For example, the automobile was a revolutionary technological innovation, but it was not a disruptive innovation, be-

cause early automobiles were expensive luxury items that did not disrupt the market for horse-drawn vehicles. The market for transportation essentially remained intact until the debut of the lower-priced Ford Model T in 1908. The mass-produced automobile was a disruptive innovation because it changed the transportation market. The automobile, by itself, was not.

Competitive intelligence is the action of defining, gathering, analyzing, and distributing intelligence about products, customers, competitors, and any aspect of the environment needed to support executives and managers making strategic decisions for an organization.

Competitive intelligence essentially means understanding and learning what's happening in the world outside your business so one can be as competitive as possible. It means learning as much as possible, as soon as possible, about one's industry, competitors, country's rules. It empowers you to anticipate and face challenges straight head on.

It is always better be innovative and progress further.



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Why Die Casting is taking over body in white production at OEMs

New large die-casting machines now make it possible for a whole body in white section to be created as a single piece, allowing automotive OEMs to simplify production, reduce costs and create a more sustainable vehicle.

Why Die Casting?

Automotive OEMs currently spend billions of dollars shipping-in structural parts and assembling numerous stamped sheet metal and aluminum components to create a rear underbody or battery casing for electric vehicles (EVs). Now, new large die-casting machines can cast the whole concept as one piece, offering a compelling alternative.

- Potential cost-savings are significant
- Production is faster and simpler – with up to 300 less robots for each line
- Die Casting can take up 30% less valuable space
- Quality is more reliable and the accuracy higher
- Using recycled or primary aluminum extracted using renewable energies, casting can be CO2 neutral, improving the green credentials of the finished vehicle

Why is Bühler the ideal partner?

As the leader for large die-casting solutions with 50% of the installed market, Bühler makes the ideal global partner, delivering a complete cell and supporting OEMs throughout its lifetime.

1. Design and engineering of complete cells. Bühler can help OEMs specify and implement a complete turn-key custom solution. This includes optimizing processes, workflow, digital integration and peripheral equipment, from the melting furnace through the entire process chain, up to the finished part, ready for assembling. Space planning, commissioning, training, maintenance, servicing and support are all available – with professional project management to deliver against realistic timescales and budgets.

2. Local presence. With manufacturing hubs and application facilities in Europe, Asia and US, more than 100 local service stations, training and consulting, Bühler is ideally placed to support its customers around the world.

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