

## ASM International, Pune Chapter Chapter News Letter

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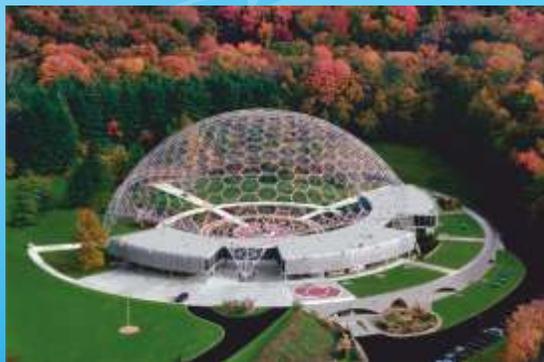
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Chairman, News Letter Committee - Louis F. Vaz

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### EDITORIAL...✍



Dear friends, it gives me great pleasure to connect with you all.

2017 is a Landmark Year for our chapter, it being our Silver Jubilee year.

Apart from our Monthly Technical programs, a large number of programs have been planned, year long, & we will keep you posted about the same through our newsletters and website.

**To begin with, 3 major programs already planned are "Abdul Kalam Memorial lecture" on 15th October, Teachers training program on 7th and 8th November, and "MNMT 2017, Focussed on dies and tools" on 9th and 10th November 2017.** Kindly reserve these dates in your calendar.

Our training programs on "Failure Analysis" & "Automotive Castings" have had a very good response. The pictures posted in this newsletter, speak for themselves!

Our membership is steadily growing and currently we are 149

members strong. I take the pleasure to introduce, materials engineer Ms. Mrunal Hatwalne and our Member Mr. Kalpesh Desai in this edition.

At this point I, earnestly request your kind co-operation to make the Chapter Strength Grow by increasing this membership further, especially availing the benefit of reduced annual membership fee of \$54 per year.

In fact if one uses the membership points, for downloading content from the ASM website, this membership comes virtually free!

Kindly feel free to contact us for any support you require for downloading the content.

In this bulletin, a very informative technical article on Rebar Industry by Mr. Shantaram Mahadeo has been included. I am sure you would enjoy reading the same.

My heartiest congratulations Mr. Gogate for the successful training programs, Mr S G Kulkarni for the technical programs and last but not the least to Mr L F Vaz and Hemant Zaveri for the great job they are doing in keeping everyone informed through the newsletter and website.

Yours in ASM

**Rahul Gupta**  
Secretary  
ASM International Pune Chapter

### FROM THE CHAIRMAN'S DESK

Dear ASM Members, Industrial Partners

Season's greetings!!!

Year 2017 is going to be a milestone in the journey of our chapter, as we will be celebrating this year as Silver Jubilee Year!!!!

Many exciting events are lined up throughout this year, starting with ASM Pune chapter, hosting "FIRST PROF ABDUL KALAM LECTURE & CELEBRATION OF MATERIAL DAY" on behalf of ASM India Council. This is going to be an annual feature of ASM India Council. ASM, Pune chapter is proud & honored to host this event on behalf of ASM India Council on 15th October 2017.

We will be celebrating our Silver Jubilee function in a grand way, On 9th November 2017 at the "THE ORCHID HOTEL". We will simultaneously have a Two day International Conference & Exhibition, M&MT2017, with specific focus on Automotive Dies !! at the same venue.

Also for the first time in India we are going to have Teachers Camp in association with ARAI & ASM International, Head Quarters. I am sure this will be a very significant event for our community as a whole. It will give a new direction to our "Science Teaching Faculty" and a Completely different Orientation. This in turn is going to benefit ASM in attracting students to choose Material science as a First Choice for pursuing their career.

Along with above, our regular technical activities viz technical training programs, networking lectures & sponsored technical talks are very well received.

My sincere appeal to all for re-dedicating ourselves in these activities with enthusiastic participation, active volunteering & spreading ASM further!!!



**With best Regards,**  
**Bhimsen R Galgali**  
Chairman  
ASM International  
Pune Chapter



## A Three Days Proficiency Improvement Programme on Foundry Technology



*Faculty and Participants of the Training Programme*

A Three Days Proficiency Improvement Programme on Foundry Technology was jointly Organized by ARAI, PUNE and ASM International, Pune Chapter.

It was held from 22nd to 24th February 2017 at ARAI Chakan. Pune

The training was intended for all industry professionals, who need to have a comprehensive understanding of Casting / Foundry Technology (Sand & Die casting), its fundamentals, operations, quality assurance and product design & development and best practices followed in it.

The course faculty consisted of well known personalities in the Foundry, Metallurgical and Academic field., with vast experience and expertise in their respective fields.

The course introduced the process of metal casting and

provided a broad picture of casting production from designer's perspective. It illustrated the technology, complexity involved, types of castings, casting design, process selection, casting tools &

Equipments & quality assurance. Key safety and environmental regulations & competitiveness were discussed A detailed coverage of iron melting, solidifications & related processes, metallurgy of casting process & product and identifying casting defects & remedies were discussed. Properties of iron & aluminium alloys and their general applications along with decision making process were also discussed.

There were 36 participants for Three Days Proficiency Improvement Programme, of this 12 participants were from the design field..It only goes to show how much importance is being given to the programme by the various industrial houses that have sent these participants.



*A training Session in progress*

## Knowledge Sharing and Networking Meetings

As part of "knowledge sharing and networking meetings" conducted by ASM International, Pune Chapter on a regular basis, a meeting on the "Benefits and economics of going solar and various applications for solar energy" was conducted on 22.02.2017, at 6.30 pm. at ASM International Pune chapter office.

Mr N K Joshi - Retired General Manager from Bank of India was the speaker.

Mr.Joshi presented a Case Study on economics of financing Solar Energy Projects.

In a well documented presentation, Mr.N.K.Joshi outlined the need for solar Energy, being the Most plentiful source of available energy on earth, Power generation is clean, renewable, flexible, scalable and can be deployed relatively quickly.

He demonstrated how solar energy can be put to use in countless applications.



*Mr.N.K.Joshi giving his presentation*



## SOME THOUGHTS ON SECONDARY REBAR PRODUCERS

BY MR. SHANTARAM MAHADEO

- This article presents some pointers and thoughts on possible steps that secondary producers of reinforcement steel bars (rebar's for short) may take to compete with primary producers. They do not have comparable quality product. They also do not have economy of scale like primary producers. They do not have pricing power. This fight has to be taken to the primary producers in terms of quality and branding both.
- Author, who is a metallurgist, has worked and is still working in areas of mentoring, training, and process optimization for some secondary rebar producers. He is an active member of ASM International, Pune Chapter

### INTRODUCTION

- Reinforcement Steel Bars, or rebars for short, are long steel products that are used as reinforcement in RCC construction. In India, rebar industry (about 35 million tonnes per year) is divided into a few integrated primary producers (about 10 out of 35 million tonnes) like TISCO, SAIL, JSW; and a large number of secondary producers. Primary producers use iron ore as raw material while secondary producers are small in size, large in numbers; and use steel scrap as main raw material.
- Primary producers are geographically national level players while the secondary producers are regional players, most of whom cater to users within a radius of about 150 km. Primary producers have very large production capacities; TISCO for example produces in excess of one million tonnes of rebars a year. Secondary producers in contrast have an average capacity of 150000 to 200000 Mt per year.
- Rebar has become a commodity product for most of secondary producers. Primary producers have however built their products with a certain brand image, and they also command a premium in their pricing over secondary producers.
- Steel ministry, by their order dated 12th May 2016 has said that no steel producer is to be classified/certified as primary or secondary producer. Thus, although this classification does not exist on paper, in reality the classification seems to persist and the ministry order does not make any difference to the brand image of so called primary producers.

### QUALITY OF REBARS FROM PRIMARY AND SECONDARY PRODUCERS

- All secondary producers produce their rebars to conform to IS 1786. As per this standard, the rebar steel is a low carbon steel product with carbon content varying from 0.25 to 0.30%. Sulphur varies from 0.040 to 0.060% and phosphorous from 0.075 to 0.105% for various grades. P+S percentage is capped at 0.075 to 0.110 for various grades.
- Minimum yield strength specified varies from 415 to 600 N/mm<sup>2</sup>. Percent elongation specified varies from 12 % 16% for. Bend tests are also specified. All secondary producers have ISI mark and give importance to testing of yield strength and bending based on their own norms of sampling.
- Since thermo-mechanical treatment is the last process after hot rolling, the standard recommends visibility of a dark tempered martensite ring around the periphery in an etched cross section. The standard does not specify any micro-structural examination, nor does it talk about inclusions or inclusion count.
- Some primary producers like TISCO have managed to build a brand and reputation for quality. Apart from conventional rebars as per IS 1786, TISCO goes a step ahead and produces two superior qualities of rebars, namely corrosion resistant rebars (having micro additions of Cu, P, and Cr, all together up to 0.50%) and super ductility rebars for resistance to seismic shocks. These two grades are still compliant with IS 1786 grade, but go further by giving better yield strength and



elongation than what the IS specifies. Their product is priced higher than that of secondary producers. There is difference of Rs.5000.0 per MT between their list prices. In fact, most government projects seem to buy their needs for rebars from primary producers only.



- Secondary producers suffer in terms of quality of raw materials, their level of technology and equipment, skills of their manpower, and, lack of branding. This is depicted in the graphic below:



## PROCESS ROUTE OF SECONDARY PRODUCERS

- Secondary producers use coreless induction furnaces (5 to 30 MT in size) for melting, continuous casting to cast sizes of 100x100 to 130x130 mm, followed by hot rolling and thermomechanical treatment [TMT for short], using Thermex process. Quite a few secondary producers have adopted direct rolling which involves taking red hot billet at about 1000°C from caster and feeding it directly into rolling mill. Earlier, billets were reheated in pusher furnaces and then hot rolled.

## RAW MATERIAL USED BY SECONDARY PRODUCERS

- All secondary producers use steel scrap as major raw material, supplemented by small amounts of

cast iron scrap and Direct Reduced Iron [DRI] in pellet or lump form. Ferroalloy additions mostly comprise silico-manganese and ferro-manganese. Some plants use aluminium for deoxidation.

- Although considerable scrap is generated in the country, imports have to be resorted to supplement indigenous supply. Steel scrap is bought at cheapest possible rates and comprises all sort of junked steel items, turnings/borings, sheet metal scrap, low alloy steel scrap, and so on. Shapes and sizes of these scrap pieces can vary from tiny to very large pieces. Many producers use scrap shearing machines and compacting machines. Scrap compacted into bundles or bales is preferable for efficiency of melting and reduced burning losses; but proportion of these bundles in total charge is very limited.
- Many elements like Ni, Cu, Cr enter the induction furnace through low alloy steel scrap. There is no way to remove them during melting in an induction furnace; and their content above certain limit in final product creates quality problems. Melters try to overcome this by 'dilution'; that is adding sufficient amount of good quality scrap. Hand held X-ray based analysers are available for the purpose of composition-wise sorting of scrap, but it seems these instruments are not being used.
- Many producers do have a practice of carrying out spectroscopic analysis of a sample of scrap from a truck even before the truck is unloaded. This helps melting department to know beforehand the type of composition they will have to deal with. The sampling method is very crude and analysis results are therefore not very reliable. Some plants have a small 5 kg induction furnace which is used to melt a representative mix of scrap followed by spectroscopic analysis.
- Scrap sorting and handling is mostly manually done by contract labour; and there seems to be little effort to train these workers/supervisors in scientifically sorting of scrap. Significant amount of scrap is contaminated with paint, oil/grease, dirt, and so on. Non-ferrous items also occasionally find their way into the scrap. All these contaminants should be avoided and sorted out; but many plants



have little choice.

- Many a times certain dangerous and undesirable items like shock absorbers, LPG cylinders find their way in the incoming scrap. There also have been instances of unexploded mortars and similar ordnance causing explosions while handling and sorting the scrap. Most of these workers / supervisors have little training and producers employ them based on their 'experience'.
- Scrap handling is mostly done with help of electromagnets suspended from EOT cranes. A few plants use charging buckets also. There is almost no practice or means of weighing scrap before charging into furnace. Crane mounted load cells could be used for this purpose.

### **FURNACE LINING AND MELTING**

- Induction furnace is basically a melting furnace and any possibility of refining [from point of view of sulphur and phosphorous removal] does not exist because acidic lining [silica ramming mass] is used. Silica ramming mass is used by all secondary producers for not only lining of induction furnace but also for lining ladles. This type of lining needs to be re-patched/reinstalled every 20 to 30 heats. S and P removal needs basic lining which is costly; and since producing lowest cost rebars is the objective, no efforts are made to go for better lining.
- Some refractory producers have made efforts to introduce neutral [alumina] lining, even by offering free supply and installation for trials. Life in terms of number of heats during these trials have shown improvement by 3-4 times the life of silica lining. But all these efforts have not been successful because of very high cost of alumina ramming mass. While silica ramming mass costs about Rs.1500 per tonnes, alumina ramming mass costs at about Rs. 55000-60000 per tonnes. Difference in costs is too high to be compensated by increase in lining life. Refractory producers need to seriously address this higher price.
- Use of silica ramming mass in furnaces and ladles and silica boards in tunic on caster leads to a large amount of inclusions in molten steel and then in the

rebar itself. The BS standard 1786 to which all rebars are produced by secondary producers does not say anything about inclusion content. So, this harmful effect of silica lining is just ignored.

- Some producers do add aluminium in the charge for the purpose of de-oxidation. However, in view of large amount of oxygen capture during various stages of molten metal transfer starting from furnace tapping to the last stage when molten metal enters the mould of the caster, this aluminium addition in furnace is probably a waste.
- Electrical power management technology used by secondary producers is however usually the best available, possibly because energy cost is single biggest cost in rebar production. Being forced to be cost competitive, secondary producers have enthusiastically embraced the best available technology in this regard.
- All secondary producers have spectroscopes and melters periodically analyse samples of molten steel so as to control final composition by adding suitable materials to the furnace. Temperature measurements are taken by means of disposable thermocouples

### **LADLE FURNACE**

- Since the induction furnace is only a melting furnace in which refining cannot be done, concept of a ladle furnace for refining operations has been introduced. Ladle furnace is an electric arc furnace with a difference. A basic lined ladle (into which molten metal has been transferred from an induction furnace) takes place of a shell of conventional electric arc furnace. All necessary refining can now be carried out in this set up. Combination of induction furnace as a fast melting unit with a ladle refining furnace can give better overall productivity and also flexibility to produce various types of steel.
- Primary producer's advantage of better and uniform quality raw material and also refining capability can be countered by going in for a ladle refining furnace. Secondary producers are yet to grasp this fact and embrace this technology. This





of heat transfer. Earlier the secondary producers realise this, better it will be for their productivity as well as quality.

**SOME THOUGHTS ON HOW SECONDARY PRODUCERS CAN INNOVATE AND BECOME COMPETITIVE WITH PRIMARY PRODUCERS.**

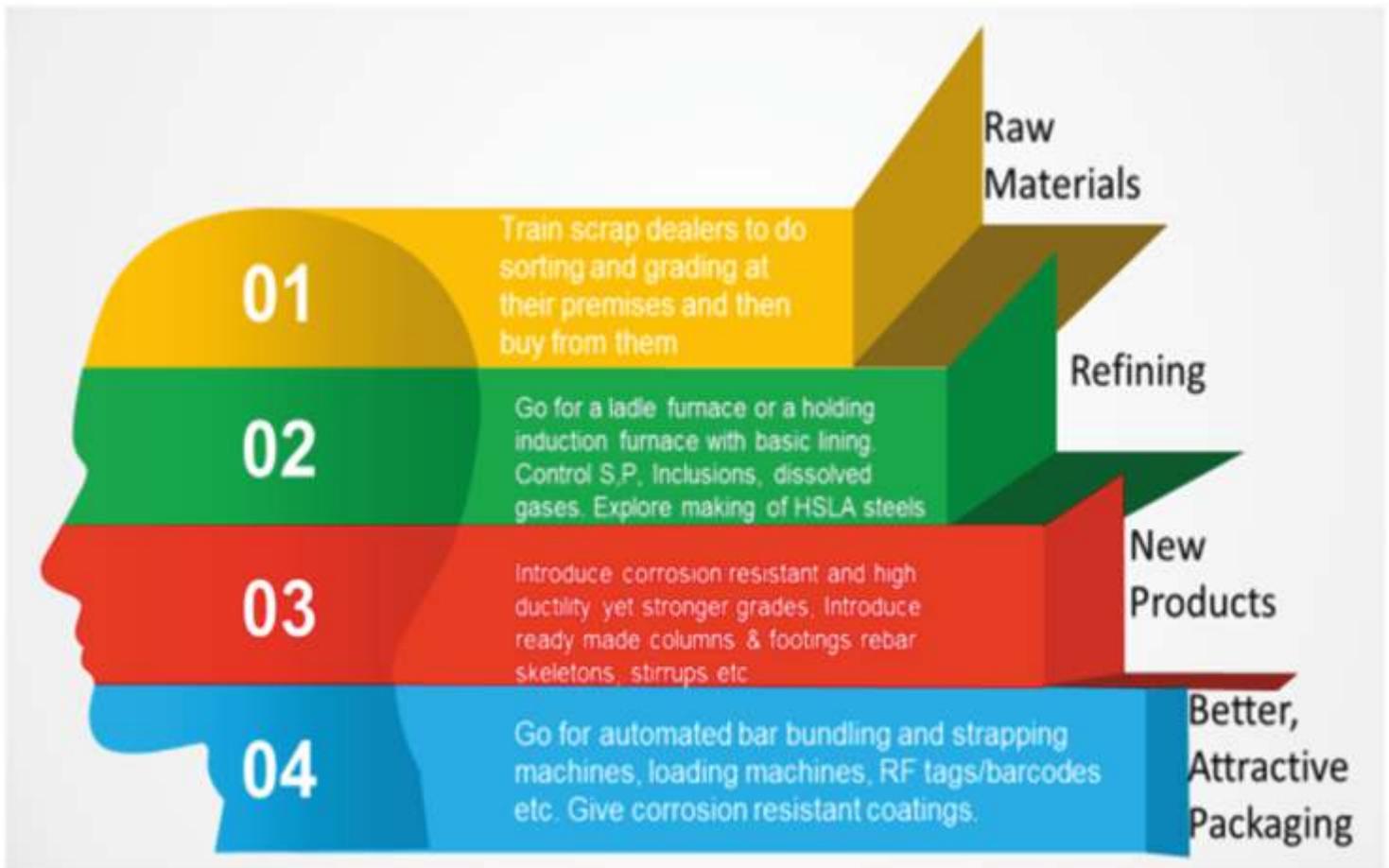
- While it is true that primary producers have better control and choice over their raw material and also better equipment and better processes; there is no reason why secondary producers should not try to come closer to the primary producers as far as quality is concerned. But secondary producers do not seem to be interested in this. One telling symptom of this is the fact that hardly any secondary producer wishes to employ a metallurgist, although they do employ scores of electrical, mechanical, electronics, and instrumentation/automation engineers.

- As regards branding, efforts can be made to inform/educate and build rapport with structural engineers and architects so as induce them to recommend the product, just the way medical representatives talk to medical practitioners. The quality of course has to be built into the product first. Consideration may also be given to market readymade column and footing skeletons for some common column sizes. Aggressive advertising in trade journals and conferences of architects and structural engineers will help a lot.
- Some possible ways in which secondary producers can become competitive are suggested next :



***MR. SHANTARAM MAHADEO***

Author, who is a metallurgist, has worked and is still working in areas of mentoring, training, and process optimization for some secondary rebar producers.





## WOMAN MATERIALS ENGINEER SPEAKS

ASM Pune Chapter recently interviewed Ms. Mrunal Hatwalne who is at present working as Divisional Manager, Materials Engineering, Engineering Research Center, Tata Motors, Pune,

She has done BE in Polymer Engineering and has a work experience of 14.5 years. The areas

worked so far by her are Polymer material development, Perceived Quality- Materials Recycling Vehicle, Interior Air Quality and Validation of polymer components & aggregates.



**Ms. Mrunal Hatwalne**

### 1. What part of your job do you like most?

New Challenges to face and overcome is on the topmost rung. Getting an opportunity to contribute positively on the end product namely the vehicle

My current role involves material specifications, advance material technology development and validation. I am also working on material aspects of perceived quality. In this role, we constantly face challenges. Challenges are not only engineering problems, but, also in terms of time management, people management, decision making, handling pressure. I am regularly dealing with our internal customers who all have different requirements. The skill is to balance technical requirements with other equally important requirements like cost, weight, and processing feasibility. Thus, every challenge becomes a unique one to solve. Also, to keep pace on all the advances in

polymer materials and processing techniques. Development of new materials, specifications and implementation is at the heart of this role. Having an opportunity to contribute in constructive/creative way towards improvement of the product drives me to work every day.

### 2. What is your engineering background?

I have completed my Polymer Engineering (Bachelor of engineering) from Maharashtra Institute of Technology, Pune. Polymer engineering covers all aspects of polymers right from synthesis, processing, to part design and of course polymer materials.

I decided to focus on polymer materials after joining Materials Engineering in Tata Motors. In my current role, new material developments along with processing and design inputs help me deliver optimum and innovative solutions.

### 3. What attracted you to materials engineering?

My inclination towards analytical problem solving & logical approach were main reasons that attracted me to engineering field. Materials engineering is applicable universally as it cuts across almost all engineering domains. Material is the most critical part of any product for meeting the performance needs, as well as to control cost to give



optimum desired results. It's amazing to actually see how small tweaking in polymer structure or additives can affect the properties of a part in a vehicle. The ability of materials to influence design is extremely critical. This gives me huge opportunity to impact the product in an unique way at all times. The world of materials is constantly evolving and there's so much to explore!!

#### 4. How many people do you work with?

I work with my immediate team, however, as I am in central department which serves both passenger and commercial vehicles, I need to interact with almost all internal depts. i.e. product design teams, aggregate testing teams, styling, purchase and supply chain, Quality team, project managers and suppliers. While design teams look at design requirements, purchase and supply chain sets target for cost and project teams have timeline delivery targets, my job is to deliver material solution to meet required performance at optimum cost. The constant dialogue with all these departments is critical to understand the product requirements and thus ensure an optimum solution is delivered in a desired time frame

Also more importantly, regular interactions with suppliers, technology providers, academic & R&D institutions help to scan new technologies and customization/application of the same to TML vehicles.

#### 5. Tell us about your moment of pride in your career.

It was when the material developments which were driven by a our small cross functional team yielded positive feedback for our new range of passenger vehicles.

This development helped change the perception about the interiors of the vehicles.

This was a proud moment as the hard work paid off in terms of positive feedback directly from market. Felt a great sense of satisfaction as my contribution resulted in changing the perception (in a positive way) of TML vehicles by our customers.

#### 6. What challenges you are facing in materials engineering career?

Every day brings a unique challenge in the automotive sector.

However, localisation of imported material and having path breaking processing techniques at an optimum cost delivered in a short span is a big challenge.

#### 7. Which part of your job as materials engineer is not appealing you much?

Fortunately, I have not come across so far any situation which is not appealing to me as Materials Engineer.

#### 8. What are your Hobbies?

Listening to music, playing table tennis.

#### 9. Last book read?

“Connect the Dots” by Ms. Rashmi Bansal.

#### 10. What message would you like to share with materials engineers, particularly for female materials engineers?

As a female engineer, never underestimate yourself, be curious and give it your best each day.

Last but not the least --There is no substitute for hard work.



## Know Our Members

**Kalpesh Desai** a member of ASM International, Pune Chapter, is veteran in automation field and has served the industry for more than 28 years at various positions. Currently he is country head and General Manager for Gefran India Pvt Ltd. – a global sensor and automation company head quartered at Italy. Kalpesh spent close to 20 years at Eurotherm–Invensys-Schneider – multiproduct automation group at various levels and managed solution business incorporating products like controller/programmers / DCS/ Safety Systems / PLCs / Power Controllers / Drives / Field instruments etc.

In his journey he has managed several functions such as Sales, Marketing, Product management, Project execution & Vendor development, Channel Partner Management, Operations and P&L Management of the company. He has handled blue chip National and Global accounts as Sales Director closing multimillion deals for automation projects.

Kalpesh has effectively managed sales operation

of large Multinational by making use of internal processes such as qualifying opportunities, maintaining sales funnel, preparing business cases, getting internal/external approvals, legal review of contracts, Incentive programs etc.

Kalpesh successfully pursued manufacturing facilities of UK, USA, Italy and France in devising exclusive business policies for Indian market which has resulted in steady double digit growth.

Kalpesh is maintaining network of professionals throughout India and abroad. He is ready to help corporate houses and entrepreneurs setting up their operations, designing and implementing processes, building sales team, acquiring market intelligence etc.

He has also played critical role in helping Multinational Company acquiring JV operation by facilitating both the sides in smooth seamless manner in win-win situation. Thus he can help his client who are going through similar phase and are keen to work out smooth take over plans.



### ASM International Pune Chapter

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