



ASM International, Pune Chapter Chapter News Letter

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EDITORIAL...✍



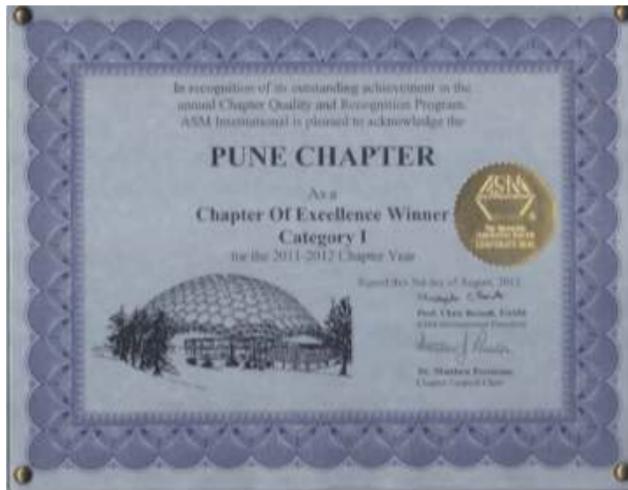
It is a great pleasure to bring this Chapter Newsletter with the announcement of Chapter of Excellence Winner Award for the second year in succession. Congratulations to the entire ASM Team and Members for their continuous and tireless efforts.

Our oncoming event of "Going Global – Gear Metallurgy & Gear Expo" has been elaborated in the Newsletter.

Automobile emissions is a big factor in air pollution. For this, Mr. K V R Babu and Mr. Dushyant Bhatt of Emitec have come out with the paper Advanced Metallic Substrates, which is incorporated in this edition.

Introduction of our member, Amit Aradhye, MD, Precicut Engineers is included in this Newsletter.

Louis Vaz
Editor



This is the second year in succession that ASM, Pune Chapter has got the Chapter of Excellence Award. This is the top most award given by ASM International for outstanding work done during the year 2011-2012.

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"Going Global - Gear Metallurgy & Gear Expo 2013"

India has now emerged as one of the most-preferred destinations for production of 2-wheelers, passenger cars & commercial vehicles with almost all the global automotive players located in India. Vis a vis Industrial, Wind Energy & Marine Gear Boxes and Gears is another upcoming market in India. Many Automotive and Engineering Component Manufacturers have geared up to supply "World Class Quality" parts and aggregates to these plants in India and abroad. One of the most important components viz. Transmission and Industrial Gears and Gear boxes are expected to perform at their optimal performance level to meet very demanding requirements imposed due to cost and weight optimization. These are global challenges. To meet these challenges lot of technology is being explored & innovated worldwide.

ASM International helps to contribute by bringing key information & knowledge to users and by building the required skills to understand and take on the challenges of the new materials & processes that these sectors demand.

The Pune Chapter of ASM International, as part of an effort to contribute to this effort, is bringing together experts in materials & manufacturing technologies along with the user industries, to help to initiate the required knowledge exchange. It is with this intent, the technical conference – "Going Global-Gear Metallurgy" along with concurrent exhibition "Gear Expo 2013" is being organized during Thursday 7th & Friday 8th Feb 2013 at Hotel Pride Executive Pune.

The conference will cover end to end topics related to Gear Metallurgy. The topics & sub topics are -

- Gear Materials –
 - Emerging Steels for High Stress Applications,
 - Steels for High temperature Carburising
 - Micro-alloyed steels
 - Steels for Vacuum Carburising
 - Steels for Engineering Gears
- Gear Manufacturing (Forming)
 - Near net shaping of Gears
 - Warm Forging of Gears
 - Cold Forging of Gears
 - Ring Rolling
 - Axial Forming
 - Spline / Gear forming during forging.
- Gear Heat-Treatment
 - Precision Process controls.
 - Fast Carburising
 - Nitriding, Carbonitriding of Gears
 - Induction Reheating & Press Quenching of Gears.
 - Austempering of Gears & Shafts
- Vacuum Heat Treatment
 - Recent Trends & advances
- Post HT Treatment operations
 - Shotpeening
 - Functional Coatings

Overall 15 papers will be orally presented in Five sessions.

Special Session on Failure Analysis

A Special session on "Failure Analysis of Gears" is planned, wherein Two Classical Case Studies would be presented by renowned experts. Additionally, Three Failure Cases received from the Delegates would be discussed "In Live" by panel of Eminent Metallurgists led by Dr P G Renavikar.

An excellent opportunity for the Materials and Manufacturing Engineers to present their work and share their knowledge at this premier Conference on any of the topics listed above!

Abstracts can be submitted to Mr. Udayan Pathak, Convenor on GearMetallurgy2013@gmail.com on or before 15th October 2012. Authors will be communicated about selected abstracts through email.

Gear Expo 2013: Co-located gear expo will show case consumables, equipments, technology to improve Gear Processing, New Materials in addition Industrial Gear Boxes, especially to meet needs of Projects & Maintenance Professionals. Entry to Expo is free. Around 500 + visitors are expected to visit this expo.

Who should attend?: The conference will be specifically useful for Designers, Manufacturing Professionals, Technocrats, Buyers, Equipment Suppliers, R&D Scientists as well as academicians. Also people involved in Engineering Gears & Gear Boxes will get benefited.

The exclusive visit to expo will be very useful for Buyers dealing Gear, Gear Materials, Gear Equipments; Maintenance – Engineering / Industrial Gear Boxes, Gear Designers / Gear Manufacturing Professionals / Quality Assurance Professionals.

To make this event resourceful & covering wide topics related to Gear Metallurgy many eminent personalities of National & International repute are guiding us as Advisory Council Members. Few of them are :

- R N Bakshi, MD, Unitherm Furnaces, Mumbai
- Sandeep Balooja, GM, Anand Group, Pune
- S K Behera, MD, RSB Group, Pune
- Dr Christopher Berndt, Chairman, ASM International, USA
- M Gopal, MD, High Temp Furnaces, Bangluru
- Dr Arun Jaura, Head, Eaton Technology Centre, Pune
- Surinder P Kanwar, MD, Bharat Gears, Mumbra, Thane
- Dr Vikas Manjrekar, Vice President, AVTECH, Indore,
- Prof David Matlock, Colorado School of Mines Golden, USA
- Dr P G Renavikar, Chairman, India National Council, ASM International
- Pankaj Sonalkar, MD, Mahindra Navistar Engines, Pune
- Arvinder Singh, MD, Punjab Bevel Gears, Gaziabad
- Sanjeev Tambolkar, MD, Sanjiv Auto Parts, Aurangabad
- Dr George E Totten, International Expert on Gear Heat Treatment, USA
- Dr Ravi Vilupanur, Trustee & India Ambassador, ASM International US

Appeal : This major event needs your support & active involvement. You may do so by presenting a paper, booking your stall in the exhibition, availing of sponsorship opportunities & deputing delegates.

Your help and co-operation is also solicited in spreading information about the conference amongst your colleagues and professional contacts

Organizing Committee: Whole team of ASM International Pune Chapter is dedicated to make this event successful. They are well supported by all other Chapters in India & India National Council of ASM International. For focused responsibilities Organising committee is formed. The Organising Committee is -

Chairman: Christopher Dias

Convener: Udayan Pathak

Members: B R Galgali, Dr Sanjay Arole, Rahul Gupta, Prem Kumar Aurora, D G Chivate, Pankaj Deval, L D Deshpande, Vikas Dhamankar, K C Gogate, Y S Gowaikar, Harshwardhan Gune, Vishwas Kale, S G Kulkarni, R T Kulkarni, N R Madke, Vineet Marathe, N R Menon, Bhausaheb Pangare, Sudhir Phansalkar, Swaroop Udgata, Hemant Zaveri, L F Vaz.



SECOND PART OF DR. CHRIS BERNDT'S INTERVIEW - "WORK HARD AND ENJOY THE PROCESS"...says ASM President to its members!

The first part of the interview titled 'TEAM ASM WILL WIN: CHRIS BERNDT' has made curious minds wonder about the way towards this victory of team ASM. Here's the second part revealing the answer. There is only an infinitesimal part of the general population having a very close connection between their profession and their own quintessential style. Thirty-one years past the completion of his PhD in thermal spray, today, with same passion you can hear him say "Love thermal spray"! Second part of the interview brings you an opportunity to know Mr. President, his views, his dreams better and thus to try to follow his footprints leading towards this "Victory" that we all seek.

1. How did you get associated with ASM?

ASM attracted me as a professional organization due to my interest in materials; particularly within the topical area of thermal spray coatings. ASM organized a number of conferences that focused on my special interests and this was very special to me. I appreciated the opportunities to network and advance my own professional career.

2. Now that India and China are emerging as major players in global economy, do you have any special plans for these countries?

INTERNATIONALISATION is a prime need for ASM. We have something like 20-25% of our members in non-North American countries and thus catering to their needs is very important. My special plans have always been to outreach to ALL members of ASM regardless of their location. For this reason, for example, I made it a special priority to visit the sub-continent of India very early on in my Presidency.

3. How do you see the global recession affecting Material world & ASM activities?

The GFC has affected every part of our lives; not just ASM and other professional societies. The GFC has given us the opportunity to focus further and refine our product and benefit packages to serve our members better with quality products.

4. What are your plans to reach out to every corner of India?

It is important that I delegate certain areas of responsibility. To this end, an Ambassador to India was appointed by me very early on in my Presidency. This person has the core charter of being the prime interface of the ASM Board to India. This is part of the "Focus" mantra that I am pushing. Of course I am still personally connected to many friends in India and this conduit is being used on a weekly basis.

5. You talked about 'ASM: ONE', but how do you plan to do it with diverse cultures in different countries?

Location and diverse cultures are not an issue since we all have the same grounding in materials. Our common "language of materials science and engineering" far outweighs any perceived differences from cultural aspects. That is, we have more in common than differences and I would strongly suggest that there are no barriers.

6. Do you plan to publish ASM literature in different languages so as to reach out to max no. of people?

This will happen at the local Chapter level for the time being since the local members are best-placed to make such decisions. All please recall that ASM has limited resources and that we need to continually focus. If the membership requires any needs then these will always be seriously considered by the ASM Board for consideration by Staff.

7. What are the megatrends you see in the material world?

Of course new materials for electronic applications are a hot topic; as are biomedical materials, surface coatings, heat treatment and many other niche topics. The one

all-encompassing megatrend revolves around computational materials science, data base development for the interrogation of materials properties and education. There are several materials megatrends into which ASM and local chapters can play important roles.

8. It has been predicted that India will be facing acute shortage of skilled manpower in the days to come. Does ASM have any role to play to solve this problem?

This issue is a world-wide one and not just limited to India. For instance, my home country of Australia has the same issue. ASM's role is to make sure that we have "products and opportunities" that can close the gap between "customers and consumers". ASM needs to be clever and smart so that our products can serve appropriate needs concerning skill shortages. To this end ASM has a very broad array of educational products; e.g., workshops, conferences, literature, that allow members (and non-members) to up-skill themselves. I am particularly proud concerning these elements of ASM since we are concertedly reaching out to help members in these important areas.

9. What has been your inspiration that turned you to the path of metallurgy?

Metallurgy was my entry into the wonderful world of materials engineering. I worked in a steel plant as a young man. I was amazed that this technology, what seemed to me at the time to be a chaotic process, could actually be described in mathematical terms. That is, I learned to love thermodynamics and, through this, understand the magic of phase equilibria. I am still excited about metallurgy and materials science since it is the root of our technical civilization.

10. Would you like to share any incident from your high school/graduation school days that has influenced you to choose metallurgy?

To tell you the truth, metallurgy only became an option because I was able to receive a scholarship from a large company that allowed me to study. I must say that my decision-making process was not very rigorous; but I was very lucky to find that I loved the topic and I have absolutely no regrets.

11. If you were asked to mention 'one' person who has been your mentor, guide, teacher, whom would you mention?

My senior lecturers at University, Drs. Uhl and Slattery, guided me early on and encouraged me to do my very best. They both ignited my interest in laboratory-based work; and I have found this most satisfying and rewarding. That is, they were both quite patient and provided facilities and positive feedback at critical times.

12. Would you like to share any event/experiment related to metallurgy which you found conceptually wonderful and a completely new experience?

The most fulfilling event has been to visit plants and factories where "things are actually made". To see a useful object come off a production line is quite exciting since this would not be possible without the input of materials scientists and engineers. This is a quite rewarding part of our careers and I always ask to visit factories when I visit Chapters since this recharges my own internal batteries.

13. Any incident that has changed your way of thinking towards science as a whole?

Using statistics in an honest fashion, and speaking to colleagues who are mathematically inclined, has shaped my understanding of materials engineering and microstructures. Such approaches all us to place numbers behind qualitative data such as images; and these numbers can be translated into increasing manufacturing efficiencies.

14. What influence has the invention of the Thermal Spray technique made on the industries?

Of course "Love thermal spray" since this is where I focus my research. Thus, my input to this type of question is quite biased. In short, thermal spray is but one surface coating technique that allows engineers to modify the surface of an object to extract the best efficiency and productivity.

15. As you mentioned before, there are some technical challenges necessary to transition the science to an engineering reality. Could you mention some measures ASM is taking to bridge this gap?

ASM has a huge data base of materials properties as well as case histories. These are essential elements for any engineering design process. Thus, ASM is a true enabler of technology and engineering. ASM is ramping up such activities via a computational materials approach.

16. What would you say about the current engineering scenario?

Engineering is an honorable profession that provides a great deal of intrinsic satisfaction. It is also rewarding from the financial perspective. There are many opportunities to progress within the engineering sector. That is, many of the current issues and problems with society have technological solutions and engineers will be the enablers of these solutions.

17. Is there something you would like to mention about 'ideal career' and guide youngsters in choosing their career?

The "ideal career" cannot be formularized since we are all individuals who come to professional careers via many routes. I would suggest that youngsters speak to more mature professionals and discover those topics that really hold their interest. Plant visits, reading newspapers and more scientific publications, and speaking to professionals all play an important role in choosing your vocation. It is rare that there is an instant connection to your ultimate profession. Thus, be careful and do not be afraid to change tracks early on if the fit is not good. After all, decisions are made in the early and late teens that guide your entire life experience.

18. How is ASM working towards creating an interest regarding metallurgy in students?

ASM runs Material Camps around the world. Since 2000 ASM has run 185 camps for high school students that have impacted 7,477 students. We have also run 160 teacher camps for a total teach impact of 3,778 individuals. In 2011, ASM held 24 student camps and 34 teacher camps. Of the 7,477 students, our tracking data has shown that (i) 84% entered science fields, (ii) 56% of the total students enrolled in engineering disciplines and (iii) 23% of the total students entered materials science fields. These are remarkably strong numbers that show several metrics concerning the high impact of ASM initiatives into educating youngsters.

19. How has been your experience as an ASM President till now?

I have enjoyed my Presidency immensely. There is no doubt that the days are long. However, I have had a great deal of support from my Board, especially Past President Dr. Mark Smith who has been an excellent mentor, as well as the continuing support and encouragement of ASM Staff; especially Mr. Stanley Theobald who is our Managing Director. The membership continually inspires me to "do better and give back" to our wonderful society.

20. Last but not the least, what message do you have for ASM members, especially for student members like me?

WORK HARD AND ENJOY THE PROCESS. You have unlimited potential and your career is in your hands. Do not be put back by any set-backs. But jump up straight away and get on with the job.



“Metalit™: Advanced Metallic Substrates from Emitec”

Authors: K V R Babu, Dushyant Bhatt

Abstract :

Emitec Emission Control Technologies India Pvt. Ltd.

Emitec was founded in 1986 in a town called Lohmar in North West Germany. Emitec stands for "emission" control technology. Today, the company is a world leader on the metallic substrate, widely known as Metalit™, for exhaust gas catalysts and metallic diesel particulate filters for vehicles and mobile machinery. Emitec has the plant in Pune, India since 2006.

Introduction to Catalytic Converter

A catalytic converter is a device used to reduce the toxicity of emissions from an internal combustion engine. A catalytic converter provides an environment for a chemical reaction wherein toxic combustion by-products are converted to less-toxic substances. This is normally located under the hood of the vehicle in the engine exhaust system as shown in Figure 1.

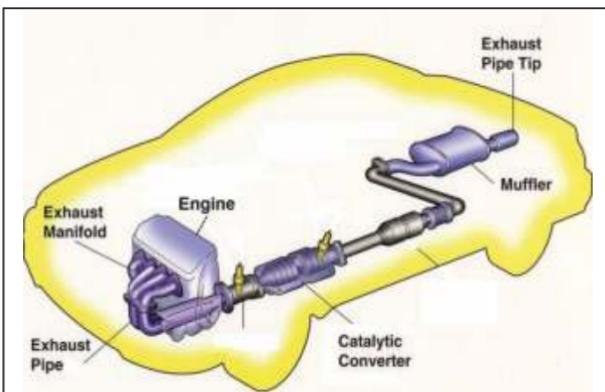


Figure 1: Typical layout of an engine exhaust system

A catalytic converter is made in 3 stages. The core (substrate) of a catalytic converter is made in the 1st stage. In 2nd stage the substrate is coated with wash-coat & precious metal e.g. Pt, Pd, Rh which acts as catalyst in the catalytic converter. In the 3rd stage it is integrated with the engine exhaust system so that the all of the exhaust gas pass through the catalytic converter. Heat inside the catalytic converter helps to oxidize and/or reduce exhaust gases very fast. The catalysts bring about a chemical change in the elements of the exhaust gases converting them to harmless exhaust vapors. Different kinds of catalyst coating have different effects on pollutants like palladium or platinum which react with HC (Hydro Carbons - e.g. Gasoline exhaust) and CO (Carbon Monoxide) to form H₂O (water) and CO₂ (carbon dioxide), whereas metal rhodium reduces NO_x (various oxides of Nitrogen) into harmless N₂ (Nitrogen) and O₂ (Oxygen). Reactions within the catalyst produce additional heat that reaches temperatures of 900oC which is required for the catalyst to operate at high efficiency. Emitec is into developing & manufacturing metal based substrates for various IC engine applications like 2-Wheelers, 3- Wheelers, passenger car, commercial vehicles, generator sets, off road vehicles Etc. and has been developing technologies for improvement in efficiency over the years.

Matrix



Figure 2: Structure of a metal catalytic converter

Structure of a Catalytic Converter with Metal Substrate

The metal substrate is made of two metal parts, i.e. Matrix & Mantle. The matrix is made of flat and corrugated metal foils. The material is stainless steel (Alloys of Fe, Cr, Al, and Y). These are stacked in layers and are wound into a cylindrical or elliptical body. This body is then pressed into a metal casing called 'Mantle', further mantle & matrix are joined by the Emitec patented high-temperature brazing process.

The mass transfer coefficient and catalytic surface area are the two most important aspects of a catalytic converter substrate, the alternating flat and corrugated layers produce a channeled structure which can be coated in order to increase its surface area.

Among the metallic substrate producers, Emitec was the first to introduce serial production of S (Figure 3) and SM (Figure 4) winding types instead of spiral rolling in order to increase mechanical durability of a metal substrate. This was the 1st generation of metallic substrates.

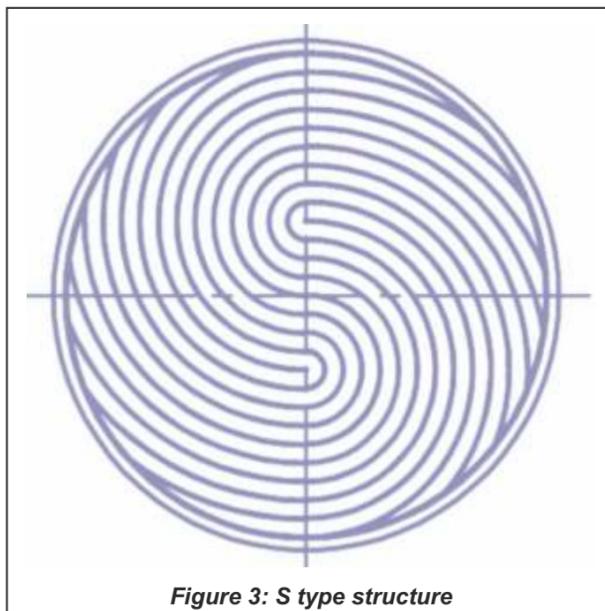


Figure 3: S type structure

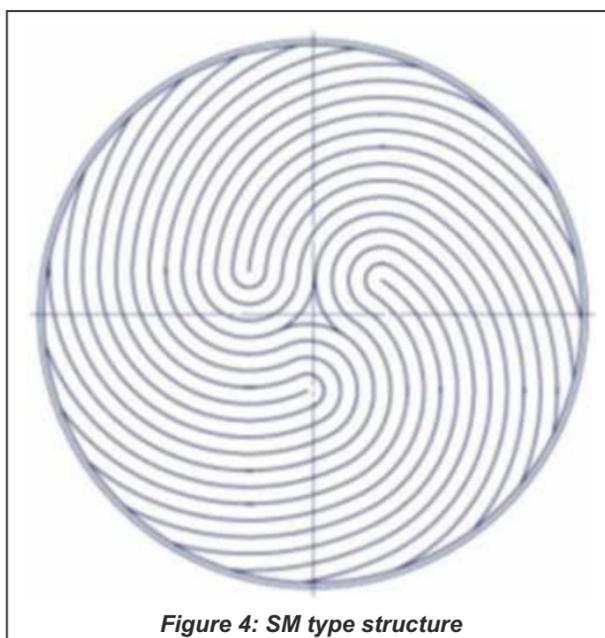


Figure 4: SM type structure

During recent years Emitec also introduced the structured foils technologies for substantial improvement in catalytic efficiency to reduce catalytic volume & then the cost.

Structured Foils Technology: Enhancing Turbulent Flow

Laminar flow conditions occur behind the first section of the catalytic channel where the flow is not fully developed. Under laminar flow conditions the catalytic process is governed by the mass transfer.

Figure 5 shows how the mass transfer coefficient asymptotically approaches a low value just behind the inlet zone length. This means that a large part of substrate, where the mass transfer coefficient is too low

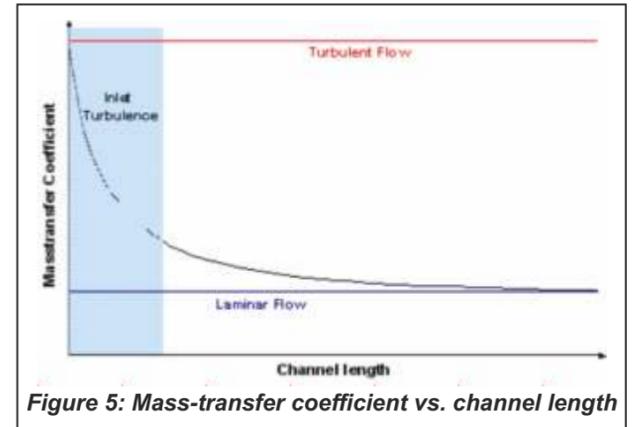


Figure 5: Mass-transfer coefficient vs. channel length

or, in other words, the diffusion process of pollutants from channel core to reacting wall is too slow, is only partially used. One way to increase efficiency is the creation of turbulent flow conditions. The following structures of Emitec are developed to induce turbulence inside the substrate flow channel.

- Radial flow near the wall in the channels (TS structure)
- A reduction of diffusion paths and the hydraulic diameter and a repeat of the entrance flow (LS structure)
- Radially open, perforated structures (PE structure)
- A combination of PE and LS structures (LSPE structure)

TS- Structure

Transversal Foil Structure (TS) catalyst is the second generation of metallic substrates. The first generation had straight and unstructured channels. In this type, the corrugated foils are embossed with secondary micro-corrugations, which are provided transverse to the direction of flow i.e. at 90 degree to the flow direction (refer figure 5).

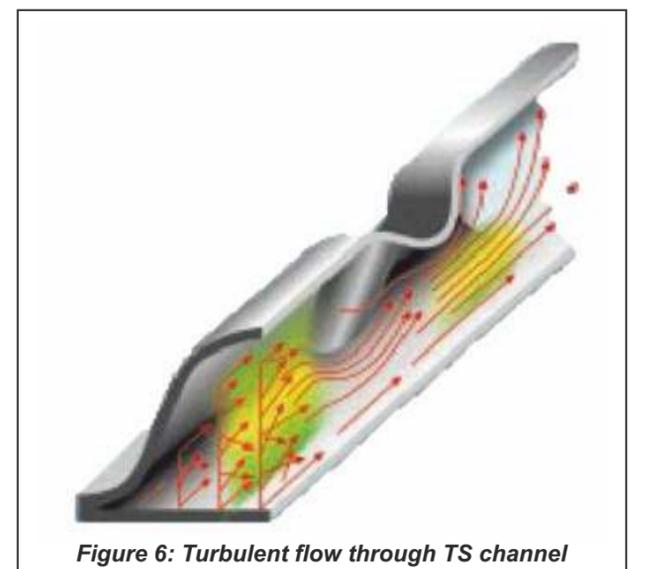


Figure 6: Turbulent flow through TS channel

These micro-corrugations help intense exchanges of unconverted gases in the core of channel with the converted gases close to the walls. This finally leads to increase in mass transfer.

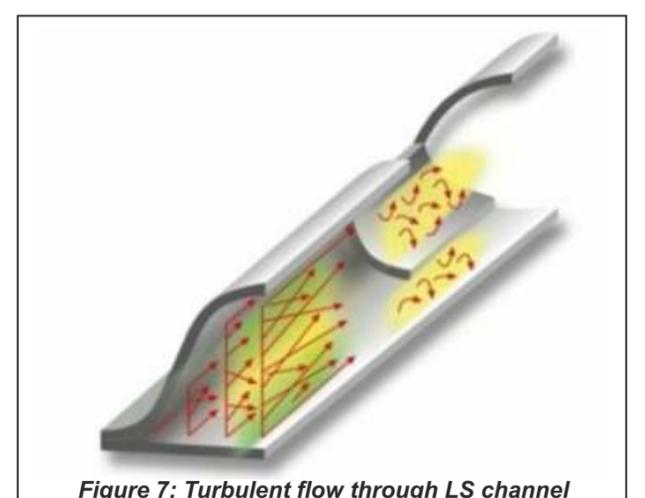


Figure 7: Turbulent flow through LS channel



LS- Structure

Longitudinal Structure (LS) structure, In the LS design the corrugated foil is characterized by additional cuts and depressions to provide shovel like shapes in the longitudinal direction i.e. same direction of the flow.

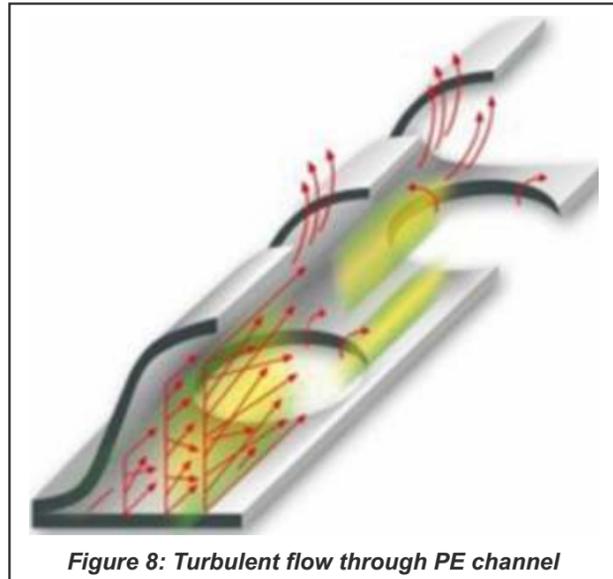


Figure 8: Turbulent flow through PE channel

These counter corrugations projecting into the basic channels create the effect of additional channels within the same given volume, which results in turbulent mass transfer to the channel walls and an increased catalytic reaction. Thus, without increasing the actual surface area of a catalyst, a higher catalytic efficiency is achieved by the LS design.

PE- Structure

Perforated foil (PE) technology uses perforated flat and corrugated foils to generate radial flow between adjacent channels. The loss of GSA (geometric surface area) is more than compensated for by the generation of locally turbulent flow.

The development of perforated metal foils offers advantages like radial mixing of the flow, reduction in weight & flow pressure drop.

LSPE- Structure

The success of implementing perforated foils to enhance the radial flow through catalyst led to an idea of combining both LS & PE structures to take advantages of both technologies. A corrugated LS foil is used in combination with a flat PE foil in this concept as shown in Fig. 9.

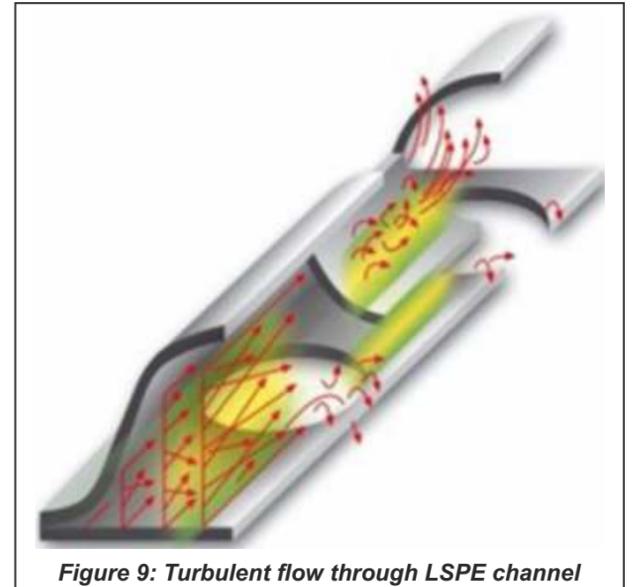


Figure 9: Turbulent flow through LSPE channel

Depending on the emission reduction requirements, space constraints, temperature, Etc. a required turbulent structure substrate is designed & applied to the exhaust system of a vehicle.

Students Outreach Activities



Lecture on "After Emission Control Technology" by Mr. Dushyant Bhat of Emitec India Ltd. was held Technical at Sinhgad College of Engineering (SCOE) on 23rd August 2012. The attendance was 80 participants. The Program was coordinated by Mr.L.F.Vaz & Mr.Hemant Zaveri.

Technical Lecture on "New Generation Duplex Stainless steels" by Mr. J V Patankar, Senior Metallurgical Consultant was held jointly with IIM & COEP at College of Engineering Pune. The attendance was 100 participants. This Program was coordinated by Mr.R.N. Gupta & Mr.L.D. Deshpande.

Technical lecture on "Heat Treatment" by Mr.K.C.Gogate, Senior Metallurgical Consultant was held at the Government Polytechnic, Pune. It was well attended and appreciated. The program was coordinated by Mr.Chivate and Mr.R.N.Gupta.



Annual Day

- Annual day was celebrated on 7th July 2012



- Chief Guest Mr. Pankaj Sonalkar MD Mahindra Navistar Engines, gave a presentation on Challenges in New Generation Engines.
- New sustaining members were felicitated and presented with the chapter sustaining member memento.
- Awards were given to student volunteers, supporting organizations / individuals & outstanding committees.
- Chapter News Letter for the quarter was released.

Training Programs

- Metallurgy for non metallurgist was conducted jointly with ARAI. The attendance was 50 participants. It was held at ARAI FID Chakan.



Know Our Members



Amit Aradhye, MD, Precicut Engineers.

After completing B.E Mech. ENGG joined M&M, Engine Division Igatpuri as a GET trainee engineer. After completing GET he pursued M.S. in Automotive ENGG from University of Leeds. After working in UK for two years on hybrid cell technology he decided to join his father and take on their existing business.

He is a second generation entrepreneur, MD at Precicut Engineers who are one of the leading manufacturers of shot peening and shot blasting equipments. The company's market niche is the premium and high quality equipments and as such they enjoy patronage of almost all the major OEMs, Tier I & Tier II manufacturers throughout India. The company

has a strong focus on research in machine and process development.

He is keen on product development and believes in creating unique and world class products which will enhance the performance and user experience of their machines. Currently the company holds one patent for EUOM® Valve and two more pending.

Until the end of his engineering he has been a professional cricketer and represented his state at various national and international tournaments. Now his hobbies include reading and deep sea diving. He makes sure to visit one major diving site at least once in a year.

Amit is married to Sheetal an MBA Finance graduate. After a major stint as a portfolio manager with various financial

institutions like BOA, Deutsche Bank & ICICI she has now joined Amit and looks after the accounts and commercial end of the business. They have a year old daughter and the family lives in Aurangabad.



I am Rajesh Gadale, student member of ASM.

The guest lecture organized by ASM on Catalytic Converter was held in Sinhgad College of Engineering, Pune. The lecture helped all the student members to understand the principle, construction & working of catalytic converter. So I hope that many such lectures on different topics will be held in our college.