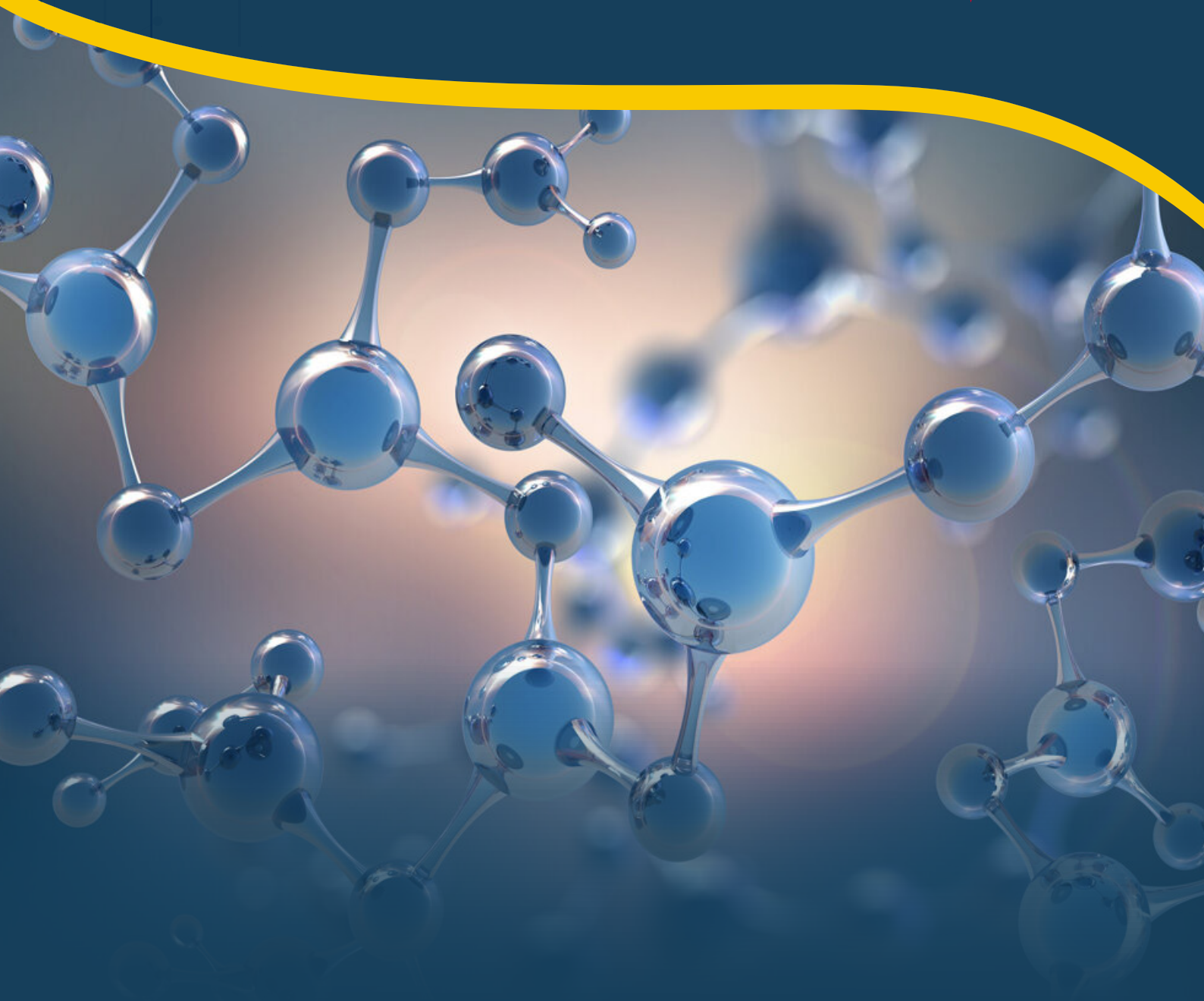
Issue | December 2022

PAWAPULSE



FOURTH EDITION

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From the Editor's desk

Dear Reader,

Here is the fourth edition of "PAWApulse" coming out in December,2022. We are in festive mood in this quarter where we celebrated Deepawali in full swing and end of calendar year where we are looking forward to celebrate Christmas and New Year 2023. Also, We are planning to conduct "Dptcon" conference at Karnataka Polytechnic in February,2023. The new plastic lab is being set up in KPT campus in full swing with coordination of HOD – Polymer Technology and relentless monetary contributions are being made by the PAWA members for the development of Plastic Lab at KPT. Also, I would like to mention here that our honourable PAWA President Mr. Sriganesh UP has taken efforts to get the donation amounting two lakhs and fifty thousand rupees from the industries for development of plastic lab in KPT.

Coming to Global affairs – the war between Russia and Ukraine are taking worst phase. The effect of oil price cap on Russian oil, Sanctions on Russia by the European countries and USA, is yet to be seen. The manufacturing industries in India are picking up in production, export to Russia and other countries are picking up and this is good news for India with importing oil with lower price.

In this newsletter, you would see a status of new polymer lab, a task under taken by PAWA, technical paper on Bladder Manufacturing volume 3 by undersigned, fourth edition on Fundamentals of Mixing Process by Mr. SV Rao., kavana in kannada by Mr. Bhat, communication skills by Ashwin Shetty, write up of industrial automation by Mr. Udupa, project write up about warpage automation by Mr. Gunjikar and finally information about rubber science and technology by Dr. S.M. Shetty. Also, You'll find write up in PPT format on Rubber Testing by Mr. Manoj Kumar. In this

edition you would find information in many areas. I thank all the authors for their contribution and our honourable PAWA President Mr. Sriganesh UP and Joint Secretary Mr. Bhat for their efforts to bring this edition within specified time period.

We always welcome your opinions about the newsletter and you may reach out to undersigned or our President Mr. Sriganesh U.P. and Hon Secretary Mr. Rao.
Wish you all a happy reading. Also, Wish you all a very happy and prosperous new year 2023.

Anil Pais

From the desk of PAWA President

My Dear Pawa'ites,

What a year gone by, all of us had a very challenging 2022 with multiple stress points. Year started with a bang of positivity & in February 2022, all hell broke loose due to War in Europe which was never expected. Russian aggression led to several losses to people& many lives too .This is still continuing & we all should seek end to war at the earliest. Global economy went for a toss, causing high energy prices, continued global logistics crisis, depreciation of currencies across countries, high inflation, increased cost of living to name a few . While demand situation worsened, the supply situation also came under pressure causing imbalances in supply chain. Hydro- carbons remain cause of concern for net importers like us.

Over to PAWA & we are in right path to develop our own well furnished Plastic process lab for our dear students of DPT . Valuable contributions from our members & external donors are being mobilised & lab set up is shaping up which is expected to be operational by the time our upcoming 2nd DPTcon duing Feb 2023.

We are fortunate to have ever supporting KPT principal Mr. Harisha Shetty on our side whom we would like to thank for his continued mentorship of DPT. Coming to the much coveted DPT-conference, we need to have wholehearted support from Alumni members to get enough ideas for a day long event. Scheduled to be on end of February 2023 at KPT Mangalore for which we are looking for valuable inputs . Please feel free to send your topics to any of the GC members. We may select format to have 2-3 technical papers, simultaneous workshop, panel discussion with experts & some booths as well from local companies . All depends on the ideas to organise the event calendar.

There was the International Rubber Conference organised by IRCO & IRI recently (24-26 November) in Bangalore which had over 3000 visitors/ delegates participated in workshops, lectures & exhibitions. From PAWA we used this chance to meet up many members & with our efforts two DPT'ans got opportunity sponsored by IRI to participate. Thanks to IRI Chennai & Mr. Rajesh Rao for getting a booth table space to give publicity of our activities to visitors.We could meet & explain PAWA activities to several Individuals/ Companies in the field of our interests. Inspiring responses were received from few companies to accommodate our students in their companies for plant training. Many distinguished personalities showed keenness to visit KPT to give guest lectures on our requests in future.

I call upon our DPT head to work on full year event calendar for visiting faculties to organise lectures on important topics. Several office bearers are working tirelessly to support the cause of PAWA & we need more younger PAWAites to come forward & spend at least 1or 2 hours per week virtually with GC team. After all giving back to society/ to the college we studied is of much importance too. Small contributions from individuals will help in a big way to improve the quality of education at DPT which we missed.

I wish all the best for the year ahead and am eagerly looking forward to see many of you in the upcoming DPT conference, 2023 at KPT, Mangalore.

Time to relax & reflect, enjoy vacations with family, be safe & healthy.

All the best.

I sign off.

Best Regards,

Sriganesh U P

Stars of PAWA

Mr. Sriganesh U P

Mr. Sriganesh UP is known to all tyre and allied industries in India and abroad. Mr. Sriganesh has more than thirty-four years of work experience in industries having worked with areas like manufacturing, technical sales, operation management, Mergers & acquisitions, business integration and people development.

Mr. Sriganesh UP was born in Badagannur Village near Puttur, Dakshina Kannada (South Canara) district in Karnataka. He completed his diploma in polymer technology in 1987. He also completed AMIE – Sec A and pursued his post-graduation in Marketing Management.

He started his working career with tyre industry and worked in Apollo Tyres, BKT and JK tyres for eight years. Later, he moved to Castrol India to develop Chemtrend Products in Indian Sub-Continent. He played pivotal role in developing new technologies in tyre release agents, Rubber and Polyurethane & composite segments. After working for eight years again in Chemtrend, he joined Lanxess as Head of Rubber Additives division to start manufacturing base for RheinChemie in India. He handles several segments over last eighteen years. Mr. Sriganesh was transferred to Shanghai, China as Head of Asia Pacific and Member of Global Management team of RheinChemie in 2019 covering geography from Middle East, Indian sub-continent, ASEAN, Greater China, Korea and Japan. During Corona Pandemic he came to India and working from Mumbai as Regional Head. Mr. Sriganesh has extensively travelled many countries like US, UK, China, Korea, Japan, Africa, Bangladesh, Sri Lanka, Malaysia, Indonesia, Thailand, France, Germany etc and has come across many cultures. Apart from working as a regional

head in Lanxess, Mr. Sriganesh serves PAWA with a Prestigious post of “President”.

Mr Sriganesh has two children both of them are working after completing their education in engineering. Son is working in USA and Daughter is working in India. During the leisure time, Mr. Sriganesh likes to watch or listen to classical concerts and farming apart from travelling.

Mr. Rajesh N Phadke

Mr. Rajesh N.Phadke, who is an alumni of Karnataka Polytechnic Mangalore had completed his diploma in Polymer Technology in 1991. Starting his career early in Apollo Tyres and moving on to Chem Trend chemicals co Pvt Ltd.- Subsidiary of Chem Trend USA, later in the late 1990s, he has excelled in his field by reaching a very respectable position of CEO of the company.

Starting as National Manager in the year 2000, he had scaled up the ladder as Head of Sales & Marketing to finally reach the present position.

He has overall responsibility of manufacturing, sales and market leadership in Indian Releasing agent business.

Apart from this he is heading multiple verticals, segments such as Die-casting, composites, thermoplastic, polyurethane and wood composites representing India region as executive member of Chem Trend Global team.

He has been able to provide excellent leadership in customer service, technical knowhow and problem-solving techniques all around the industry.

We at PAWA, are proud to introduce him as another of our Star Performers.

We wish him much more success in his career.

Plastic Processing Lab-Dream Project of PAWA at Karnataka Polytechnic Campus, Mangaluru

After servicing and refabricating rubber processing lab in the year 2018, now PAWA has taken up a new project to service plastic processing lab and provide Polymer Department with fully pledged working Plastic lab, which provides practical exposure to the students giving them rich skill oriented learning, as part of the PPT Lab project firstly we need to setup new utility connections to the plastic lab so that the machines are equipped with basic utilities like Electrification, water and pneumatic connections which are most important entities for functioning of any plastic machines. These machines were lifted from neighboring ITI college, as the plastic processing operator course was fully stopped, with full commitment from our PAWA team and full support from our KPT Principal we were able to convince commissioners of ITI and Department of technical education to transfer the machineries to KPT Polymer Department free of cost, after many visits to both the departments finally government approved to transfer the machines from ITI to KPT free of cost.

Later the machines were shifted to KPT college, **Special thanks to Principal Sri Harish Shetty for providing a space in workshop and funding (₹60000) for transporting of machines from ITI to KPT college.**

Also, I would like to mention the name of Mr. Manjunath of 1987 batch who has donated brand new fully automatic plunger type injection molding machine worth of five lakhs of rupees to the new lab

Initially the project was split into two parts such as

- Providing Utility Connection in first phase.
- In second phase to service all the plastic machines available in the lab

Hence PAWA has provided funding of ₹350000, to fulfil the requirement of basic utility connections and as on date we have completed the utility connection part and completed the First phase of the project. Below are some of the pictures of Phase one project work of PPT lab.

The projects are set to be completed by the end of January 2023, and the inaugural of the new Plastic Lab will be held on 25th February 2023 along with DPTCON-2, 2023.

-Santhosh Kumar P

HOD. Department of Polymer Technology.

Karnataka (Govt.) Polytechnic. Mangaluru.

Earthing for Electric connections

Providing water connection for the entire PPT lab.

Main Control Panel Box

Providing Plumbing Connections

Providing individual MCB Switches to each Machine

OVER-ALL VIEW ON NEP 2020 NEW SYLLABUS

The NEP 2020 which was started by the union cabinet of India on 29th July 2020.The new policy replaces the previous national policy on education 1986. The main outcome the NEP is to provide vocational trainings, internships and practical experience to the students so that they develop problem-Solving, decision-making techniques and get better hands-on working experience. Government of Karnataka has developed diploma course more attractive and industry oriented. The technical education department has revamped the entire curriculum with the help of industry leaders. Its aim to Evaluate higher order skills such as creativity, critical thinking, problem solving, visualization, idea generation on multidisciplinary learning. no separations are made between vocational and academic streams. It makes the students to create higher performance standard demonstration. NEP 2020 has given importance to vocational education, it provides each student with knowledge, skills and exposure to the practical training of work and progress in given occupation. Before writing of the article, Education is an essential and indispensable element for the all-round development of any society or a country. This NEP 2020 new syllabus will provide the younger generations, a high-quality education and mould them into very high standard skilled person.

-Dinesh Shenoy

Lecturer – Polymer Technology, Karnataka Polytechnic

(DPT 1986 Batch)

Brief About What is Rubber

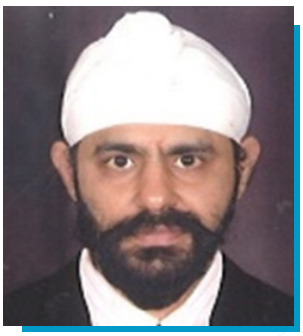
Rubber is a versatile and adaptable material that is found in a variety of products due to its strength, flexibility, durability, and insulation properties. It is made up of long chains of latex molecules that bind together and form elastic structures, which are what give rubber its unique properties. Scientists have been developing new and improved rubbers that provide unique and individualized products for a variety of applications.

The production of rubber begins by harvesting latex from the Hevea brasiliensis rubber tree or by synthesizing rubber molecules from crude oil. The raw rubber is then extracted from the tree's bark and heated in order to remove the latex from the remaining material. This material is then processed into sheets, blocks, or strands and vulcanized, a process that creates cross-linking between the rubber molecules and gives the material its distinctive properties and product strength. Finally, the rubber is cut to specific measurements and molded into the desired shape.

Most people recognize rubber from its common everyday uses, such as tires and rubber bands. However, what many don't know is that rubber has a wide range of other uses as well. For example, rubberized materials are commonly used in shock absorbers, automotive engine mounts, and fuel hoses due to its vibration calming and heat resistance abilities. Other rubber parts, such as gaskets, o-rings, and seals, are commonly found in plumbing systems, vacuum systems, and industrial machineries because they can resist the effects of strong air pressure, water pressure, and chemicals. Rubber is also a popular material used in protectors, floor mats, and other everyday items due to its vibration, compression, and heat resistance capabilities.

Natural rubber produced from the Hevea brasiliensis rubber tree is considered an environmentally friendly material. This rubber is biodegradable and does not pose any threat to the environment or its inhabitants. Additionally, rubber has a low surface energy level, meaning that it absorbs minimal amounts of moisture and oil, which increases its durability over time.

Rubber has revolutionized the modern world with its various uses. Its unique properties of strength, flexibility, and durability have allowed it to be used in a myriad of applications, becoming essential in the production of a number of everyday items. Without rubber, automobiles, plumbing systems, and industrial machineries would not function as effectively, if at all. Its environmentally friendly nature and durability also make it a very cost-effective material, providing an overall cost-efficient option for all types of products.



- Rajpal Singh

DPT (2004 Batch), B.E.

Proprietor

The Rubber House

Peenya, Benaluru.

Take away points of PAWA AGM

The 5th AGM of PAWA was held on virtual mode over Google meet link platform on 11th December 2022 between 11.30am to 12.30pm attended by nearly 20 PAWAites. It is pertinent to list out the take away points worth recording with a reviewed status update.

- **MOU to be signed with IRI & DPT, once lab is ready-To be coordinated by Mr. Vasudeva Rao - Sriganesh U P and Vasudeva Rao have met Mr. Mukhopadhyaya and a visit by him to KPT during April for a one day workshop is arranged.**
- **MOU to be signed with RSDC-& DPT -PAWA. To be coordinated by Mr. Vasudeva Rao. - To be pursued**
- **DBEC Students training options to be explored - Resp Mr. Santhoshkumar and Mr. Vasudeva Rao. To be pursued.**
- **Appeal letter to be made available for DPT Con 2023-Resp - Sanjaya, SUP & GKB-Will be ready for circulation on 01.01.2023.**
- **Sub committees to be activated - resp - Rajesh Phadke, Anil, Rajesh Rao, Rajpal. -On target**
- **Alumni apps to be explored -Resp - Dinesh Aithal. - Tried but did not work out for the time being**
- **Receipt for donations to be issued within one week and same to be declared in group - Santosh & Ashwin. To be pursued.**
- **Students' committee names to be shared by Santosh & added to existing committees. - Done**

- PAWA future mission clarified as providing more scholarships/ education support, less of infrastructure. To ensure
- Bringing out PAWA pulse Special edition Souvenir with Ads etc, details (Advt tariff to be decided by team) -to be decided by technical committee headed by SVR. will be done
- Polymer teaching colleges to be identified for sharing Appeal Letter -Rajpal will be done
- For PAWA one secretariat assistant to be hired to be initiated & Santosh to co-ordinate with Mr Yashwanth Katte who will be the Secretary General who will be signing authority of Appeal Letter. will be done
- Efforts to be put to make the lab. a profit centre but safety of operating students to be of prime concern. Need to look into.

Inputs compiled by

- Gopalakrishna Bhat

Joint Secretary – PAWA

Senior Manager – Technical BKT, Bhiwadi

ಆನಂದಮಯ ಈ ಜಗಹೃದಯ

ಅದೊಂದು ಜೈತ್ರ ಯಾತ್ರೆ! ಅತ್ಯಂತ ದೀರ್ಘವಾದ ಹಾದಿ! ಎತ್ತರದ ಹಾದಿ! ಬೆಳ್ಳನೆಯ ಹತ್ತಿಯಂತಹ ಮುಗಿಲುಗಳ ನಡುವೆ ಅನಂತವಾಗಿ ಹಬ್ಬಿದ ಆಗಸದಲ್ಲಿ ಜೀವಗೋಲ ವಸುಂಧರೆಯ ಅಯಸ್ಕಾಂತೀಯ ಪ್ರಭಾವಲಯವನ್ನವಲಂಬಿಸಿ ಸಾಗಬೇಕಾದ ಪಯಣವದು! ಹಾಗೆ ಸಾಗಿಬಂದ ಜೋಡಿಗಳವು ಸಿಂಧೂಸಾಗರದ ದಕ್ಷಿಣ ಭಾಗದ ಕಡಲ ತೀರವನ್ನು ತಲುಪಿತ್ತು. ಅದು ವೈಶಾಖ ತಿಂಗಳಿನ ಮಧ್ಯದ ಯಾವುದೋ ಒಂದು ವಾರ. ಸಿಂಧೂಸಾಗರಿ ಎಂದಿನಂತೆ ಅಂದೂ ತನ್ನ ತೆರೆಗಳನ್ನು ಚಾಮರವಾಗಿಸಿ ತಂಗಾಳಿಯನ್ನು ಬೀಸುತ್ತಾ ವಿಶ್ವಗುರು ತಾಯಿ ಭಾರತಿಯ ಸೇವೆಗೈಯುತ್ತಿತ್ತು. ಪಶ್ಚಿಮದ ಗಗನದಂಚಿನಲಿ ಯಾವುದೋ ಒಂದು ನವ್ಯ ಚಿತ್ತಾರವನ್ನು ಬರೆದು ಅರೆಬರೆ ಬಣ್ಣವನ್ನು ಬಳಿದು ತ್ವರಿತಗತಿಯಲ್ಲಿ ಕಡಲಿಗಿಳಿಯಲು ದಿನಪನೂ ಉತ್ಸುಕನಾಗಿದ್ದ. ಹಾದಿಯಲ್ಲಿ ಸಿಕ್ಕಿದ ನೂರಾರು ದ್ವೀಪಗಳಲ್ಲಿ ತಂಗಿದ್ದಾಯಿತು. ಹೊಯ್ದಾಡುವ ಕಡಲಿನ ಕೋಟಿ ಕೋಟಿ ಅಲೆಗಳನ್ನು ಎಣಿಸಿದ್ದೂ ಆಯಿತು! ಹಾಗಾದರೆ ಏನು ಈ ಬದುಕಿನ ಉದ್ದೇಶ? ಈ ಪಯಣ-ಕ್ಕೊಂದು ಅಂತಿಮ ಗಮ್ಯವಾದರೂ ಎಲ್ಲಿದೆ? ಇಂತಹ ಪ್ರಶ್ನೆಗಳು ತಮ್ಮದೇ ಆದ ಸೀಮಿತ ರೂಪದಲ್ಲಿ ಆ ಜೋಡಿಗಳ ಸೀಮಿತ ಪ್ರಜ್ಞೆಯನ್ನು ನಿರಂತರ ತಾಕುತ್ತಿದ್ದವು!

ಹೌದು ಮುಖ್ಯವಾಗಿ ಆಗಬೇಕಿರುವುದೇ ಅದು ಅಲ್ಲವೆ! ಪ್ರಶ್ನೆಗಳು ಉದ್ಭವಿಸಬೇಕು! ಉತ್ತರಕ್ಕಾಗಿ ಹುಡುಕುವ ತುಡಿತ ರೂಪುಗೊಳ್ಳಬೇಕು! ಉತ್ತರಗಳಂತೂ ಇದ್ದೇ ಇರುತ್ತವೆ ಈ ಪ್ರಕೃತಿಯಲ್ಲಿ! ಪ್ರಶ್ನೆಗಳಾಗಲೀ ಉತ್ತರಗಳಾಗಲೀ ಅಪರೂಪವಲ್ಲ ಈ ಪ್ರಕೃತಿಯಲ್ಲಿ!!! ನಿರಂತರವಾಗಿ ಪ್ರವಹಿಸುವ ಈ ಬೆರಗು ಕೋಟಿ ಕೋಟಿ ಮನಸ್ಸು ಬುದ್ಧಿಗಳ ವಿಜ್ಞಾನಮಯ ಕೋಶದಲ್ಲಿ ವ್ಯಕ್ತಗೊಳ್ಳುತ್ತಾ ಹೋಗುತ್ತಿರುತ್ತವೆಯಷ್ಟೆ!

ರೆಕ್ಕೆ ಬಡಿಯಲು, ಕೊಕ್ಕಿನಿಂದ ಕುಕ್ಕಿ ಹೆಕ್ಕಿ ಕಾಳುಗಳನ್ನು ಮುಕ್ಕಲು, ಅನಂತವಾದ ಆಗಸದ ಗಾತ್ರವನ್ನು ಹೊಕ್ಕು ಹಾರಾಡಲು ಹೇಳಿಕೊಟ್ಟ ಗುರುವಾದರೂ ಯಾರು ನಮಗೆ ಎಂಬುದೇ ಆ ಜೋಡಿಗಳಿಗೊಂದು ಕೌತುಕದ ವಿಷಯವಾಗಿತ್ತು! ಅವೆಲ್ಲವನ್ನೂ ಕಲಿತಿದ್ದಾಗಿದೆ! ಈಗ ಮೂಡಿದ ಈ ಪ್ರಶ್ನೆಗೂ ಆ ಮೂಲದಿಂದಲೇ ಉತ್ತರಗಳು ಸಿಗಬಹುದೆನೋ ಎಂಬಂತೆ ತಮ್ಮದೇ ಭಾಷೆಯಲ್ಲಿ ಪರಸ್ಪರ ಸಂಭಾಷಿಸುತ್ತಾ ಸಮೀಪದ ತೆಂಗಿನ ಮರದ ಹಸಿರು ಮಡಲಿನ ಮೇಲೆ ಕುಳಿತುಕೊಂಡವು. ಇನ್ನೇನು ಸೂರ್ಯಾಸ್ತವಾಗುತ್ತದೆ, ಕತ್ತಲು ಸುತ್ತ ಮುತ್ತ ಮುತ್ತಿ ಆಗಸರಾಣಿಯು ಅಸಂಖ್ಯ ನತ್ತುಗಳನ್ನು ಹೊತ್ತು ಒಂದಷ್ಟು ಹೊತ್ತು ಮೆರೆಯುವ ಸಮಯ. ಇದನ್ನೇ ಇರುಳೆನ್ನುತ್ತದೆ ಈ ಜಗತ್ತು!

ಹಗಲಿನಷ್ಟೇ ಅಂದ ಮತ್ತು ಆನಂದ ಇರುಳಿಗೂ ಇದೆ! ಆದರದನ್ನು ಗುರುತಿಸುವ ಕಣ್ಣುಗಳು ಬೇಕಷ್ಟೆ! ಹಿರಿಯರಿದಕ್ಕೇ ಅಂದಿದ್ದಲ್ಲವೆ "ಆನಂದಮಯ ಈ ಜಗ ಹೃದಯ ಏತಕೆ ಭಯ ಮಾಣೋ..." ಭಯ ಎಂಬುದು ಮಾಯೆ ಅಥವಾ ಮುಖವಾಡ... ಆನಂದ ಎಂಬುದೇ ನಿಜವಾದ ಮುಖ ಅಥವಾ ಸತ್ಯ... ಹೀಗೆಯೇ ಸಾಗುತ್ತಿತ್ತು ಆ ಜೋಡಿ ಪ್ರಜ್ಞೆಗಳ ಚಿಂತನಾ ಲಹರಿ!

ಜೋಡಿಹಕ್ಕಿಗಳ ಈ ಚಿಂತನೆಗೆ ತಡೆಬಿದ್ದುದು ಅನತಿ ದೂರದ ಮಾವಿನ ಮರದ ರೆಂಬೆಯೊಂದರಲ್ಲಿ ತಲೆಕೆಳಗಾಗಿ ಕಾಲಲ್ಲಿ ನೇತಾಡುತ್ತಿರುವ ಬಾವಲಿ ಹಕ್ಕಿಯ ಕೂಗು! ಬೆಚ್ಚಿಬಿದ್ದು ಅತ್ತ ನೋಡಿದರೆ, ಆ ಮಾವಿನ ಮರದ ಪಕ್ಕದಿಂದ ಆರಂಭವಾದ, ಹಸಿರು ಸೋಗೆಗಳನ್ನು ಹೊತ್ತು ಎತ್ತರಕ್ಕೆ ತಲೆಚಾಚಿ ನಿಂತ ಸಾಲು ಸಾಲು ಅಡಿಕೆಮರಗಳು! ಕೆಂಪು ಅಡಿಕೆಗಳ ಗೊಂಚಲನ್ನು ಹೊತ್ತ ಗೊನೆಗಳು! ಅಚ್ಚರಿಯ ಕಂಗಳಿಂದ ಇದೇ ಮೊದಲಬಾರಿಗೆಂಬಂತೆ ಆ ಜೋಡಿಹಕ್ಕಿಗಳು ಇದನ್ನೇ ನೋಡತೊಡಗಿದವು! ಬಾವಲಿಯಂತೂ ತಲೆಕೆಳಗಾಗಿ ಜೋತಾಡುತ್ತಲೇ ಕಿರ್ ಕಿರ್ ಎಂದು ಕಿರುಚುತ್ತಲೇ ಇತ್ತು. ಆಯಾಸದಿಂದ ಬಳಲಿದ್ದ ಈ ಜೋಡಿಗಳಿಗೆ ಏನೋ ಒಂದು ಭಯದ ಕಂಪನ ಸುತ್ತಲೂ ವ್ಯಾಪಿಸಿದಂತೆ ಅನಿಸತೊಡಗಿತು! ಭಯವೆಂದರೆ ಅದೇ ಅಲ್ಲವೆ! ಒಂದಷ್ಟು ಶಬ್ದ, ಒಂದಷ್ಟು ವಿಚಿತ್ರ ನೋಟ, ಮನಸ್ಸಿನ ಮೇಲೆ ಆಗುವ ಇವೆರಡರ ಒಟ್ಟು ಭಾವಕಂಪನಗಳ ಸ್ವರೂಪವೇ ಭಯ! ನೋಡುನೋಡುತ್ತಿದ್ದಂತೆಯೇ ಆ ಬಾವಲಿ ಪಟಪಟನೆ ರೆಕ್ಕೆ ಬಡಿಯುತ್ತಾ ಪಕ್ಕದ ಅಡಿಕೆ ಮರದ ಸೋಗೆಯೊಂದಕ್ಕೆ ತನ್ನ ಜೋಕಾಲಿಯನ್ನು ಬದಲಿಸಿತು! ಅದರ ಮೇಲೆ ಒಂದು ಗೊನೆ! ಗೊನೆಯಿಂದಲೂ ಮೇಲೆ... ಅದೇನೋ ಒಂದು ಅಸ್ಪಷ್ಟ ಚಿತ್ರಣ ಕಾಣ್ತಾ ಇದೆ! ಕೇವಲ ನಕ್ಷತ್ರಗಳ ಬೆಳಕಿನಲ್ಲಿಯೂ ಕಾಣುತ್ತಿತ್ತು ಅದು! ಏನಿರಬಹುದು ಅದು? ಆ ರೀತಿ ತಲೆಕೆಳಗಾಗಿ ನೇತಾಡುವ ದೆವ್ವದ ಮನೆಯಿರಬಹುದೆ? ಆ ಮನೆಯೊಳಗೆ ಇಲ್ಲಿ ಹೊರಗೆ ನೇತಾಡುತ್ತಿರುವ ದೆವ್ವದ ಸಂಗಾತಿ ಅಥವಾ ಮರಿದೆವ್ವಗಳು ಇನ್ನಷ್ಟು ಇರಬಹುದೆ? ಮೊದಲೇ ಭಯಗೊಂಡ ಜೋಡಿಗಳ ಮನಸ್ಸು ಇಂತಹ ಯೋಚನೆಗಳಿಂದ ಇನ್ನಷ್ಟು ಮತ್ತಷ್ಟು ಭಯಗೊಂಡವು!!!

ಅಂತೂ ಇರುಳೆನ್ನುವುದು ತಪ್ಪಿಸಿಕೊಳ್ಳಲಾರದ ಅನಿವಾರ್ಯವೆ ಸರಿ! ಇದರಿಂದ ಬಿಡುಗಡೆಯನ್ನು ನಿರ್ಧರಿಸಲು ಸಾಧ್ಯವಿರುವುದು ಕಾಲಕ್ಕೆ ಮಾತ್ರ! ಈ ಸತ್ಯವನ್ನು ಮತ್ತೆ ಎತ್ತಿಹಿಡಿಯುವಂತೆ ಅಡಿಕೆಯ ತೋಟದಾಚೆಯ ಮೂಡಣದ ಗಗನ ರಂಗೇರಿತು! ದಿನಪನ ಬರುವಿಕೆಯನ್ನು ಮುಂಗಡವಾಗಿ ಸಾರುತ್ತಾ ಅರುಣನೂ ಮೂಡಿದನು! ಹಿಂದಿನ ರಾತ್ರಿಯ ಭಯವನ್ನು ಮರೆಸಿದ ನಿದ್ರೆ ಆ

ಬಿಟ್ಟು ಎತ್ತಲೋ ಹೊರಟುಹೋಯಿತು! ನಿಧಾನಕ್ಕೆ ಕಣ್ಣು ತೆರೆದಾಗ ಮೂಡಣದಲ್ಲಿ ಏನೋ ಸಂಭ್ರಮ ಸಡಗರ... ತಮ್ಮ ತೆರೆದ ಕಣ್ಣಿಗೆ ವ್ಯಕ್ತವಾಗತೊಡಗಿತು. ತಲೆಕೆಳಗಾಗಿ ನೇತಾಡುತ್ತಿದ್ದ ದೆವ್ವ ಎಲ್ಲಿಗೋ ಹೊರಟು ಹೋದಂತಿತ್ತು! ದೆವ್ವ ನೇತಾಡುತ್ತಿದ್ದ ಸೋಗೆಯ ಮೇಲಿನ ದೆವ್ವದ ಮನೆಯ ಬಾಗಿಲು ಕೊಂಚವೇ ತೆರೆದಂತಿತ್ತು! ನೋಡು ನೋಡುತ್ತಲೇ ಮೂಡಣದಿಂದ ಮೂಡಿದ ಮೊದಲ ಹೊನ್ನ ಕಿರಣ ಆ ದೆವ್ವದ ಮನೆಯ ಬಾಗಿಲನ್ನು ಸ್ಪರ್ಷಿಸತೊಡಗಿತ್ತು! ಆಹಾ ಎಷ್ಟೊಂದು ಚೆಂದ ಆ ದೃಶ್ಯ! ಬಾನಿನಿಂದ ಸೂರ್ಯನೆಸೆದ ಕಿರಣದ ಕಣಕಣವೂ ಪೋಣಿಸಲ್ಪಟ್ಟಂತೆ ಸಾಲುಸಾಲಾದ ಮುತ್ತುಗಳನ್ನು ಜೋಡಿಸಿದ ಅಡಿಕೆಯ ಸಿಂಗಾರ ಹೊರಗಿಣುಕಿತ್ತು! ಭಯದ, ಮಾಯೆಯ ಮುಖವಾಡ ಕಳಚಿಬಿದ್ದಿತ್ತು! ಸತ್ಯದ ಆನಂದದ ನೈಜ ಮುಖ ಗೋಚರವಾಗಿತ್ತು! ಮತ್ತೆ ಮತ್ತೆ ಪ್ರಕೃತಿ ಹಾಡುತ್ತಿತ್ತು "ಆನಂದಮಯ ಈ ಜಗಹೃದಯಾ ಏತಕೆ ಭಯ ಮಾಣೋ... ಸೂರ್ಯೋದಯ ಚಂದ್ರೋದಯ ದೇವರ ಕೃಪೆ ಕಾಣೋ..."

-ಕೃಷ್ಣಪ್ರಸಾದ್

Lead Auditor for ISO 9001:2015
Technical Consultant – Rubber Industries

Top 5 Communication Skills and How to Improve Them

Er. Ashwin L Shetty

5 skills are absolutely necessary for successful communication in the workplace or private life

▸ Listening

Listening is one of the most important aspects of communication. Successful listening is not just about understanding spoken or written information but also an understanding of how the speaker feels during communication.

If a speaker can see and feel that someone is listening and understanding, that can help build a stronger, deeper relationship between interlocutors.

Careful listening can also create an environment in which everyone feels safe to express ideas, opinions, and feelings or plan and solve problems in a creative way.

▸ Straight Talking

Conversation is the basis of communication, and one must not neglect its importance. Even a simple, friendly conversation with colleagues can build mutual trust and even detect problems before they become serious.

A healthy dose of chatting with an unknown person can lead to a business opportunity. Be accessible and friendly because then you will be able to talk to almost anyone.

▸ Non-verbal communication

When we talk about things that matter to us, then we send a lot of nonverbal messages. Non-verbal signals are wordless communication, body position, facial expression, hand movements, gestures, eye contact, attitude and tone of your voice, muscle tension, and the way you/we breathe.

The way you look, listen, create, react, gesture speaks far more about feelings than words will ever be able to.

Why non-verbal communication skills are important?

Because, according to Salesforce's research on interpersonal communication, 93 percent of communication is non-verbal.

Developing the ability to understand others and use nonverbal signals will help you connect with others, express what you think, meet challenging situations, and build better relationships at home and at work.

Stress management

- In small quantities, stress can be very useful and encouraging for work. However, when the stress becomes constant and completely begins to take effect, it can affect communication, clarity of opinion, and appropriate behaviour and action.

When you are under stress you may misunderstand other people, send confusing nonverbal signals, and use funny patterns of behaviour.

How often did you feel stressed during a discussion with your friends or colleagues and then say or did something you regretted later?

If you improve stress management skills, not only will you avoid these subsequent regrets, but you will also be able to influence the other person you are entering into a conflict.

Emotion control

- In communication, feelings play an important role. Making decisions more often affects the way you feel than the way you think.

Guided by emotions, your nonverbal behaviour affects the understanding of other people and how others understand and perceive you.

If you are not aware of your feelings you are guided, you will not be able to express

your needs and experiences. This can result in frustration, misunderstanding, and conflict.

Control of emotions provides you with tools to understand others, yourself, and the messages you send.

Though recognizing feelings makes it simple, many people have a strong feeling like anger, sorrow, or fear of being pushed under the carpet.

4 Smart Ways to Improve your Communication Skills

Communication experts have many advices on how to improve communication skills.

Simon Lancaster shares his best practices for developing great communication skills

Or watch what Linda Reynier has to say when it comes to building great communication skills for your personal and professional life:

As you can see, there is no single way to develop great communication skills or become a great leader.

The methodology you're going to pick will depend on you the objectives you want to achieve and your personality as well (we don't need to develop the same communication skills).

To help you get started with thought leadership, following are 4 of the most productive ways to quickly and efficiently improve your communication skills:

Listen with empathy

Empathy is the ability to understand the feelings, thoughts, and beliefs of another person. Exactly this is the reason why organizations have started developing empathy in the workplace.

Emotional acceptance, closely related to empathy, means that, after empathizing and understanding how other person feels, we can accept the reasons why somebody feels or thinks the way they do, regardless of whether we agree with it or not.

Try to see things from others' perspectives by accepting what you hear instead of trying to „fix things and solve the problem".

Speak up

Communication begins with you. Take responsibility and start communication, do not wait and expect another person to do so, and don't hide behind various forms of online communication.

Good communication, especially on important topics, requires far more than what we can express in a written message.

We often misunderstand this kind of communication because we do not see the person's face, its nonverbal communication, and in what circumstances communication starts.

Prepare what you're going to say

Think before you speak. Most of us work best when we have time to process our own thoughts before we share them.

If the conversation or meeting is worth your precious time, take a few minutes to prepare the speech draft.

For a very important conversation, try a mock-up conversation with a trusted person so you can get rid of any potential mistakes.

► Be ready for different answers

As you formulate a speech strategy, put yourself in the position of a person who will listen to you.

This will ensure a balanced approach and you will be prepared to learn and defend potential disagreements and it will be easier for you to defend your standpoint.

No one can predict with certainty how other people will react.

Improve chances of a successful conversation by expecting negative answers and queries. So it is harder for your listeners to catch you unprepared.

International Rubber Conference – 2022 Bengaluru- An insight from a PAWAite

Indian Rubber Institute (IRI) had organized IRC2022, an International Rubber Conference with the theme "SUSTAINABLE TECHNOLOGY, INNOVATION AND MOBILITY" & Expo during 24th to 26th November 2022 at Sheraton Grand Bengaluru Whitefield Hotel & Convention Centre, Bengaluru, Karnataka, India.

This International Rubber Conference was mainly focussed on Rubber Materials, Reinforcement and compounding ingredients, Processing technology and innovation, Innovation in rubber products and design, Thermoplastic elastomers, Miscellaneous (energy, environment etc.), India specific topics like New Technologies and Markets, Smart, Nano and Functional materials, Advances in the testing and testing equipment, Sustainability & Circular Economy.

This conference was mainly attended by professionals across global reach from the field of Rubber and Allied Industries, R&D Organizations, Technical Executives, Quality Control Executives, Educational Institutions, Testing Laboratories, Product Testing Centres, Raw Material Manufacturers, Automobile Industries, Polymer/ Rubber/ Chemicals Industries, Students / Research scholars.

While I was involved as one of the organizing member representing M/s. Beratex, our Alma Matar, Karnataka Polytechnic, Mangalore was represented by Mr. Santhosh Kumar (HOD Polymer Tech) and Mr. Balakrishna (final year student). We take this opportunity to thank Chennai Branch of IRI for sponsoring our two men team. We have managed to allot a space for us there which was used successfully as a launching pad for our fledgling Alumni Association PAWA. These two along with about 10 of us, PAWAites who have established ourselves in industry as fairly well-known professionals, managed not only to attend many workshops conducted by IRI at the venue but also made the occasion count distinctly by spreading the wings of PAWA to most of those attendees.

The Exhibition Platform at the venue gave PAWA an opportunity to express themselves and to hand out our leaflets about us and also to campaign about the forthcoming DPTCon' 2023. A table and a chair provided at the exhibition centre helped us in distributing the appeal letter around and interactingg with industry experts. Mr. Sriganesh U.P.,our industrious President, accompanied by past President Mr. Vasudeva Rao (well-known erstwhile Secretary General of IRI), Mr. Santhosh Kumar, Mr. Krishna Marakala and self-shared appeal letters with many exhibitors and visitors while discussing about upcoming DPTCon'2023.Two of our stalwarts, Mr. Rajesh Phadke, Vice President and Mr. Sanjaya Rao, General Secretary too had made good use of the opportunity by spending quality time with dignitaries of different industries and spreading the wings of PAWA.

We at PAWA believe, this event gave us a grand platform to showcase PAWA & DPT of Karnataka Polytechnic, Mangalore.

About International Rubber Conference Organization (IRCO)

The International Rubber Conference Organization (IRCO) is an association of rubber societies around the world which plans the calendar for the main international rubber conferences. By careful selection of conference proposals and monitoring of events, the IRCO ensures that all conferences run by its member societies meet the very demanding requirements dictated by the IRCO and thus provide delegates with first-class conferences.

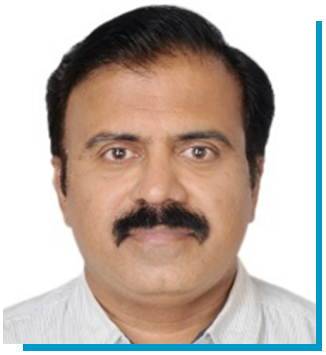
About Indian Rubber Institute (IRI)

Indian Rubber Institute (IRI) is a professional body of Technologists, Engineers, Scientists, Academicians and Professionals associated with Indian Rubber industry. It was registered on 25th May 1987 under West Bengal Societies Act XXVI of 1961, and is the successor in India of Plastics and Rubber Institute (PRI), London, UK. IRI is a non-profit organization engaged in the development of diverse areas of

technological education, training and skill development in Rubber sector. IRI offers Diploma (DIRI) and Post Graduate Diploma (PGD-IRI) in Rubber Technology. IRI is affiliated with American Chemical Society (ACS)-Rubber Division, Member of I nternational Rubber Conference Organization (IRCO), UK and Training Provider of Rubber, Chemical, Petro-chemical Skill Development Council (RCPSDC), under the National Skill Development Corporation, Govt. of India.

This IRC 2022 has really turned out to be a God-sent opportunity for us at PAWA. We are quite confident that we will be able to see it giving fruit during our forthcoming DPT-con 2023 to be held on 25th February next year KPT premises, Mangalore

Compiled By



-Rajesh Rao

Country Head

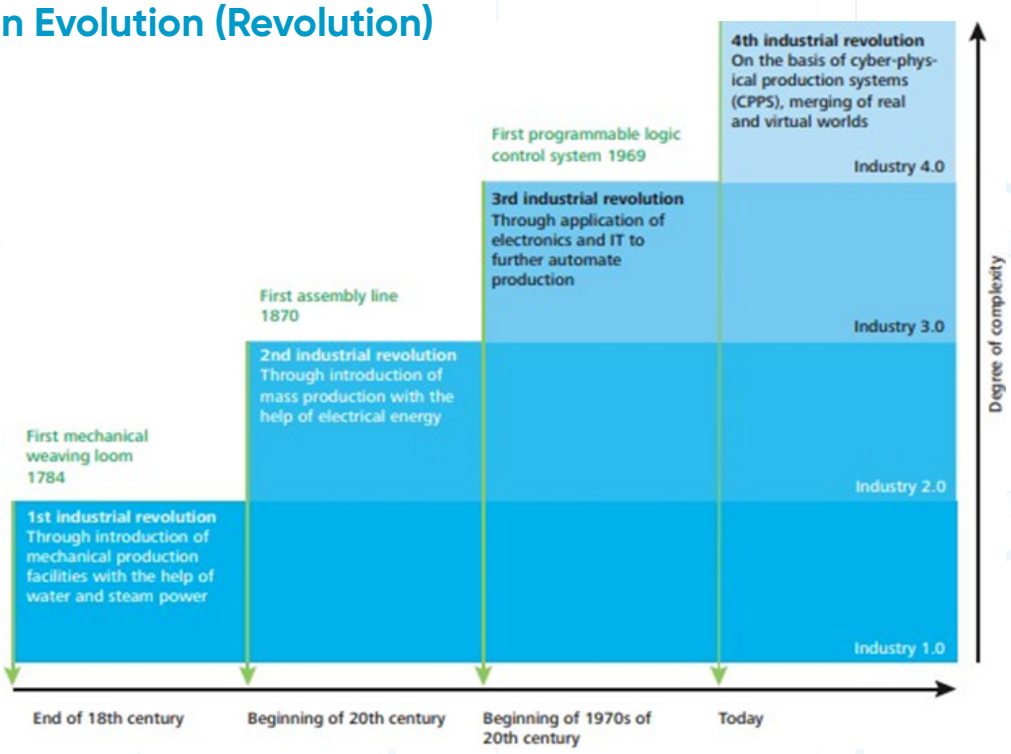
Beratex, Bengaluru

Next Generation Industrial Automation Merging human lives with disruptive Technology

Definition and development

The term "Next Generation Industrial Automation" refers to a further developmental stage in the organization and management of the entire value chain process involved in manufacturing industry. Another term for this process is the 'fourth industrial revolution'. The concept of industry 4.0 is widely used across Europe, particularly in Germany's manufacturing sector. In the United States and the English-speaking world more generally, some commentators also use the terms the 'internet of things', the 'internet of everything' or the 'industrial internet'. What all these terms and concepts have in common is the recognition that traditional manufacturing and production methods are in the path of a digital transformation. For some time now, industrial processes have increasingly embraced modern information technology (IT), but the most recent trends go beyond simply the automation of production that has, since the early 1970s, been driven by developments in electronics and IT.

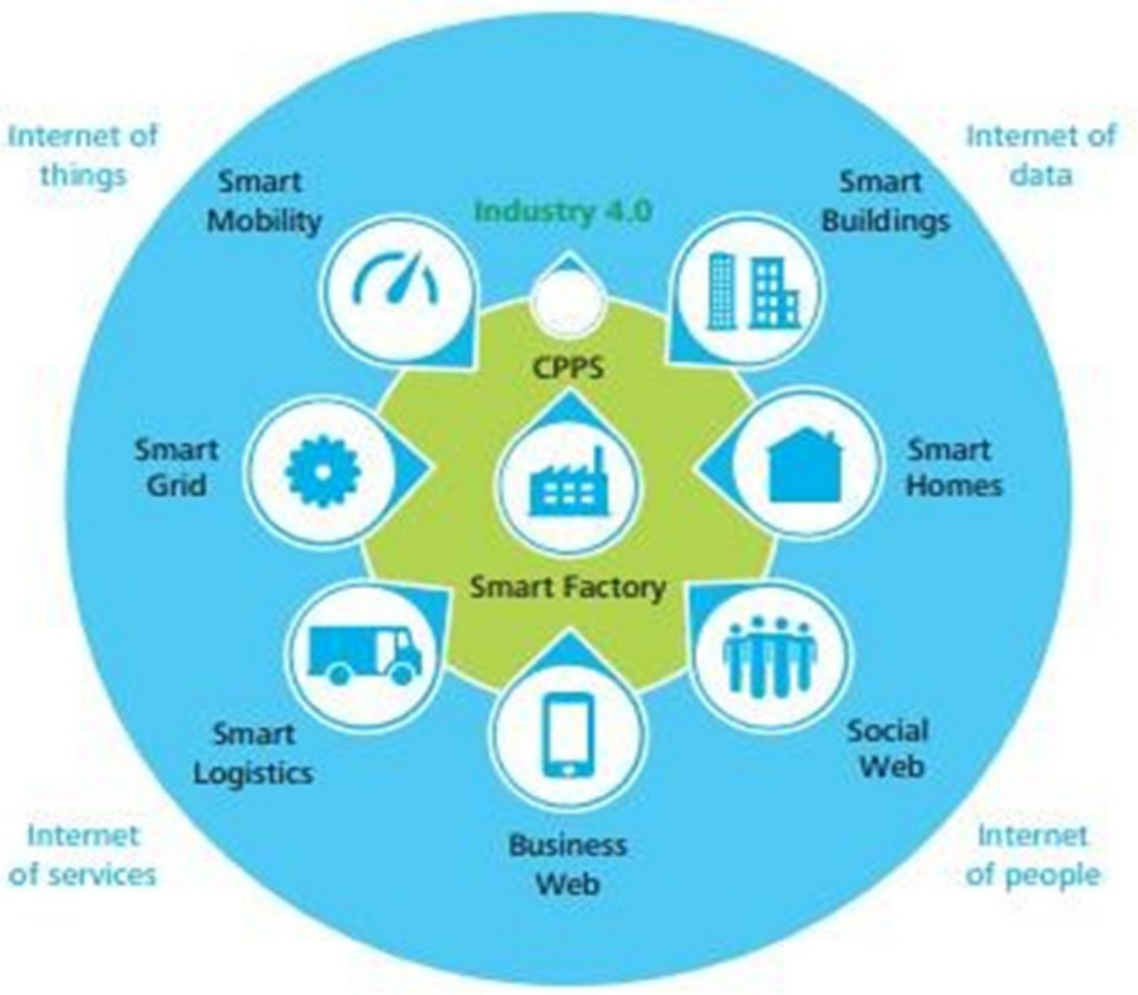
Automation Evolution (Revolution)



The widespread adoption by manufacturing industry and traditional production operations of information and communications technology (ICT) is increasingly blurring the boundaries between the real world and the virtual world in what are known as cyber-physical production systems (CPPSs). CPPSs are online networks of social machines that are organised in a similar way to social networks. Simply put, they link IT with mechanical and electronic components that then communicate with each other via a network. Radio frequency identification (RFID) technology, which has been in use since 1999, was a very early form of this technology.

Smart machines continually share information about current stock levels, problems or faults, and changes in orders or demand levels. Processes and deadlines are coordinated with the aim of boosting efficiency and optimizing throughput times, capacity utilization and quality in development, production, marketing and purchasing. CPPSs not only network machines with each other, they also create a smart network of machines, properties, ICT systems, smart products and individuals across the entire value chain and the full product life cycle. Sensors and control elements enable machines to be linked to plants, fleets, networks and human beings. Smart networks of this kind are the bedrock of smart factories, which themselves underpin industry 4.0

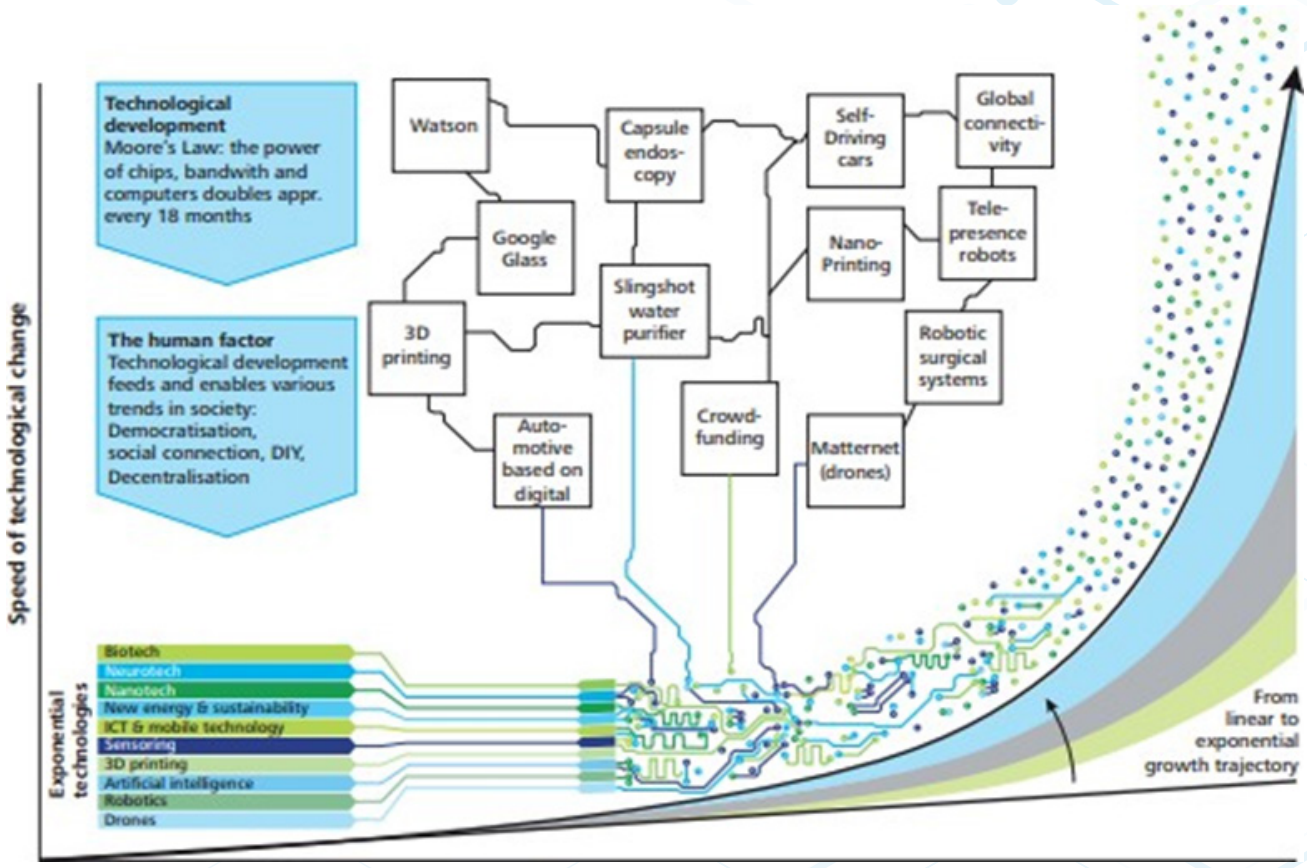
Advanced Automation (Industry 4.0) environment



Of central importance for industry 4.0 is its interface with other smart infrastructures, such as those for smart mobility, the smart grid, smart logistics and smart homes and buildings. Links to both business and social networks – the business web and the social web – also play an increasingly important role in the digital transformation to industry 4.0. All these new networks and interfaces offered by industry 4.0 within an 'internet of things, services, data and people' mean that manufacturing is set to undergo enormous changes in future. This trend is still in its infancy in some manufacturing companies and industrial sectors, but in others, the transformation to industry 4.0 is already well under way. Traditional industrial economies, such as Germany and the US, expect this fourth industrial revolution to

bring many advantages, ranging from enhanced global competitiveness to a reversal of the trend to relocate production to low-wage countries and the opening of more domestic production locations in Europe and North America. Exponentially growing technologies will be the key to the transformation to industry 4.0

Exponential Technologies for the future



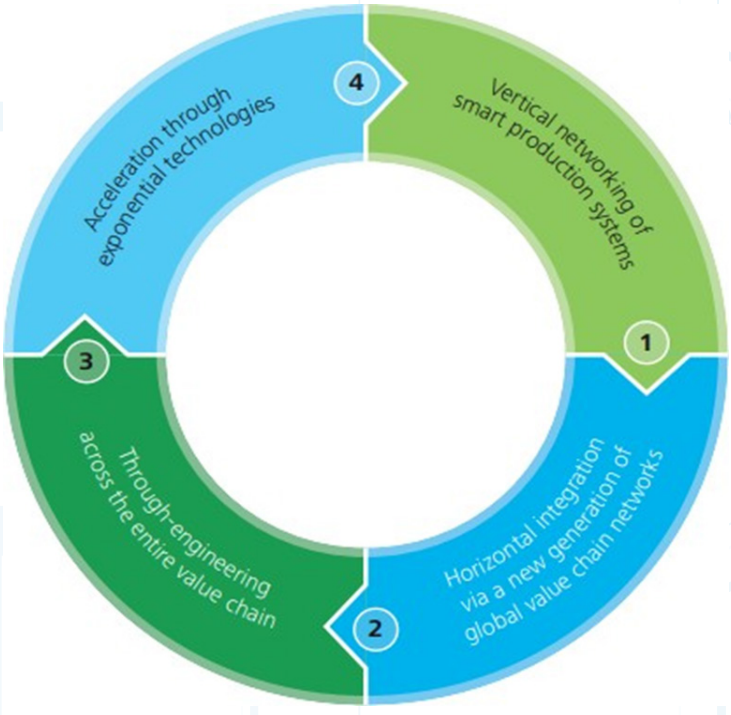
Research has shown that Moore's law – which states that the capacity of microchips, bandwidth and computers doubles every 18 months, representing exponential growth – also applies to other technological developments. 4 3D printing, sensor technology, artificial intelligence, robotics, drones and nanotechnology are just a few examples of exponentially growing technologies that are radically changing industrial processes, accelerating them and making them more flexible. Many of these technologies are not new and were, in fact,

'invented' some 20 or 30 years ago. However, the recent massive boost in computing power (Moore's law) and the reduction in cost, along with miniaturization, now make them suitable for industrial use. New technologies can be overrated and can cause concern, because of the slow development curve in absolute terms at the beginning.

When the exponential development takes off, the influence of such technologies is often underestimated, and disruptive market changes are missed. Several of these exponential technologies will be leaving their linear growth paths in the coming years and we are expecting exponential growth. This exponential growth will fundamentally shape industry 4.0.

The following four main characteristics of industry 4.0 demonstrate the huge capacity that industry and traditional manufacturing have for change: vertical networking of smart production systems, horizontal integration via a new generation of global value chain networks, through - engineering across the entire value chain and the impact of exponential technologies

The four characteristics of industry 4.0



Vertical networking of smart production systems

The first main characteristic of industry 4.0 is the vertical networking of smart production systems in the factories of the future. This vertical networking uses cyber-physical production systems (CPPSs) to enable plants to react rapidly to changes in demand or stock levels and to faults. Smart factories organise themselves and enable production that is customer-specific and individualised. This requires data to be extensively integrated. Smart sensor technology is also needed to help with monitoring and autonomous organisation. CPPSs enable not only autonomous organisation of production management but also maintenance management. Resources and products are networked, and materials and parts can be located anywhere and at any time. All processing stages in the production process are logged, with discrepancies registered automatically. Amendments to orders, fluctuations in quality or machinery breakdowns can be dealt with more rapidly. Such processes also enable wear and tear on materials to be monitored more effectively or pre-empted. All in all, waste is reduced. "The biggest challenge of the digital transformation is going to be guaranteeing that different systems communicate with each other. Significant emphasis is attached to resource efficiency and in particular, the efficient use of materials, energy and human resources. The demands on workers engaged in operational tasks such as production, warehousing, logistics and maintenance are also changing, meaning that new skills in efficient working with CPPSs are required.

Below IT solutions drive the vertical networking of smart production systems

- IT Integration
- Analytics and data management
- Cloud-based applications
- Operational efficiency management

Through-engineering across the entire value chain

The third main characteristic of industry 4.0 is cross - disciplinary through - engineering across the entire value chain and across the full life cycle of both products and customers. This engineering occurs seamlessly during the design, development and manufacture of new products and services. New products need new and/or modified production systems. The development and manufacture of new products and production systems is integrated and coordinated with product life cycles,

enabling new synergies to be created between product development and production systems. Characteristic of this through-engineering is that data and information are also available at all stages of a product's life cycle, enabling new, more flexible processes to be defined from data via modelling to prototypes and the product stage

Below IT solutions drive Through-engineering across the entire value chain

- Integrated and cross-disciplinary engineering
- Efficient management of innovation
- Efficient life cycle

Acceleration through exponential technologies

The fourth main characteristic of industry 4.0 is the impact of exponential technologies as an accelerant or catalyst that allows individualised solutions, flexibility and cost savings in industrial processes. Industry 4.0 already requires automation solutions to be highly cognitive and highly autonomous. Artificial intelligence (AI), advanced robotics and sensor technology have the potential to increase autonomy further still and to speed up individualisation and flexibilisation. AI cannot only help to plan driverless vehicle routes in factories and warehouses more flexibly, save time and cost in Supply Chain Management (SCM), increase

- reliability in production or analyse big data, but can also help to find new construction and design solutions or enhance the cooperation between humans and machines to the point of services. Functional nanomaterials and nano sensors can also be used in production control functions to make quality management more efficient or allow the production of next generation robots that work 'hand in hand' and safely with humans. Flying maintenance robots in production halls and using drones to make inventories of warehouse stock levels and deliver spare parts, at any time of day or night and in any terrain and weather, are further applications that will simply become routines in the autonomous and smart factories of the future. A prime example here of an exponential technology that is accelerating industry 4.0 and making it more flexible is 3D printing (additive manufacturing). 3D printing allows new production solutions (e.g. functionality, higher complexity without additional cost) or new supply chain solutions (e.g. inventory reduction, faster delivery times), or a combination of both that lead to disruptive new business models (e.g. disintermediation of supply chain members, customer integration). More important will be the scanning for quality assurance or changes in SCM and warehousing through on-location printing of spare parts. Significant questions still need to be answered regarding intellectual property, product liability, customs duty and value-added tax. While 3D printing already exists for all materials (metal, plastic, ceramic, living cells etc.), not all materials fulfil industry requirements with regards to porosity and other characteristics. In the cases where the required quality has already been achieved, long lasting material qualification processes are under way, comparable with the processes for any other new material.

Below IT solutions drive Acceleration through exponential technologies

- Corporate venturing
- The learning organisation

Ref: Fourth Industrial Revolution by Klaus Schwab

Compiled by

- Raghavendra Udupa

Mr. Raghavendra Udupa completed his diploma in Polymer Technology (Rubber Technology) in 1983. He has total thirty-six years of experience in tyre and IT industry. During his tenure, he worked with Vikrant tyres, apollo tyres, Bristlecone India, Satyam Computers, HCL technologies and Wipro technologies in Production, QA, SCM, Project Management etc. After completing his diploma, he continued his studies and completed BE in industrial engineering and MBA in SCM.

Mr. Udupa is now a happily retired person continuing to use his experience in SCM consulting.

Technical Papers

Bladder Manufacturing – Part 3

Continued from Previous edition...

Alternatively, if castor oil is not available paraffinic process oils could be used though caution is required.

Zinc Oxide

Zinc oxide is added to form zinc halide that then acts as the catalyst for the vulcanization of resin cured butyl rubber compounds. Zinc oxide is commonly included in rubber recipe with the dosage of 5 phr. Dispersion of zinc oxide and resin play a critical role in improving the tyre curing bladder life.

Antioxidant

Antioxidants may not be required for resin cured butyl compounds as butyl with resin cure show good resistance to oxidation. Antioxidants like amines may retard the cure rate of butyl compound.

Curing Agent

Phenol formaldehyde resin is preferred curing agent for bladders for having high heat resistance and oxidation resistance. Sulphur cured butyl rubber vulcanizates tend to soften during prolonged exposure to repeated elevated temperature. This may decrease the bladder life drastically compared to resin cured bladders. Resin cure in butyl rubber is based on the reaction of methylol groups in phenol - f ormaldehyde resin with allylic hydrogen in butyl, usually with a Lewis acid catalyst to yield carbon to carbon crosslinks that are thermally stable. The vulcanising resin is a chain of phenolic rings connected by methylene groups. The terminal methylol groups (-CH2OH) are the points at which the resin molecule crosslinks with the butyl polymer molecule. Van der Meer has postulated that the -OH from the methylol group combines with hydrogen on the carbon atom to double bond, establishing a carbon-carbon linking between the resin and butylmolecules. A vulcanizate

crosslink is formed when this takes place at both ends of the resin molecule. It has also been suggested that the cure mechanism involves both the phenolic and methylol hydroxyls in a substitution reaction across the double bond, resulting in a chroman structure.

Processing of Curing Bladder Compounds

The bladder compounds are high viscosity compounds ranging from MV (ML 1+8) 70 to 95. Thus, processing of bladder compound required high attention to control heat build-up (heat history of compound), scorching of compound (scorch safety), Speed of processing machines like Banbury, Intermix, extruders, strainers etc. The control on temperature and pressure of cooling water in internal mixers, mixing mills, extruders and strainers are also necessary in order to prevent bladder compound from possible defects during processing. The required service condition of tyre curing bladder is very unique and undergoes severe conditions of high temperature, pressure and flex. In order to prevent pre-mature failure of bladder due to oxidation cracks, degradation, lamination, pin holes, blisters, unmixed carbon and chemicals, foreign materials, it is necessary to have stringent control on dispersion of carbon black, and other chemicals, polychloroprene, curing resins, ensuring raw material and mixed compound free from foreign material, Straining of mixed bladder compound with adequate mesh size, and storage of bladder compound and processed bladder strips and slugs free from foreign material. Good dispersion of the compound ingredients improves the physical properties and helps to retain the properties during service.

Manufacturing Process

The main processing steps are

- Master batch mixing
- Straining of master batch
- Final batch mixing
- Extrusion of slugs / strips with optional online straining
- Storage of slugs / strips
- Slug cutting and splicing
- Pre – heating of spliced slugs
- Bladder curing – compression moulding or injection moulding.
- Trimming and inspection of cured bladders
- Post curing of bladders
- Packing and storage of bladders.

Mixing Process

This process is very critical in any rubber product manufacturing industry and hence brief explanation is given. As stated above, dispersion of rubber and other ingredients plays very important role in bladder life. During mixing, four stages take place one by one or simultaneously like mastication, incorporation, dispersion and distribution. Mixing of rubber often preceded by kneading the gum rubber to soften it, a process called **mastication.**

it is sometimes suggested that butyl rubber pre-masticate for 45 seconds in an internal mixer or open roll mill. Alternatively preheating for 24 hours at 50 - 60°C will help. An internal bale temperature of 45°C to 50°C, or pre-mastication of butyl rubber, facilitates the easy incorporation of compounding ingredients. Butyl rubber compound mixing is done in two stages in the internal mixer (Banbury or Intermix); the first stage, non-productive, or masterbatch contains all the ingredients except

the curatives. It is also sometimes suggested to separately pre-masticate polychloroprene rubber to improve homogeneity of bladder mix compound. The 2nd stage is the final or productive step where the vulcanization system is added. Masterbatch mixing of tire curing bladder compounds may be carried out in an internal mixer. In order to improve dispersion and to prevent trapped air, it is suggested that the masterbatch weight be increased by 10% to 20% compared to natural rubber or emulsion SBR compounds at an equivalent specific gravity

Incorporation is a process where filler particles become included inside the rubber or polymer.

Dispersion is a process where carbon black pellets and their fragments, agglomerates are broken down to the primary units called aggregates. dispersive mixing, changes the size of particles or agglomerates of particles by fracture or rupture due to the stresses generated during laminar mixing. The distribution depends greatly upon how the compound as a whole move around in the chamber of the internal mixer. Uniform movement without a partial stagnation is the key. One major limitation to the speed of operation of a mixing process, besides the mechanical ruggedness of the equipment, is the temperature rise in the rubber stock because of viscous dissipation. The heat transfer in mixing equipment may be a problem, especially in larger mixers. The efficiency of heat transfer depends upon the geometry of the mixer and the operation conditions, as treated in the analyses. The factors such as fill factor, polymer type, temperature settings, rotor design and speed, power demand, mixing sequence are to be considered in mixing process.

Butyl rubber is a highly saturated rubber with only 1.50 to 2.50 Mol % unsaturation and hence it is important to avoid contamination of unsaturated elastomers such as natural rubber, SBR and polybutadiene rubber with butyl rubber.

The contamination of unsaturated rubber with butyl rubber may lead to loss of compound physical properties and difference in cure.

- Er. Anil Pais

Lead Auditor for ISO9001:2015

Consultant – QMS, (Former QA Head Apollo Tyres, Pune)

Director – St. Joseph International School, Pune

Fundamentals in Rubber Mixing – Part 4 (PPT)

- Suratkal Vasudeva Rao

Click Here

Rubber Testing (PPT)

- Mr. Manoj Kumar

Click Here

Metal to Rubber bonding – Automotive Seals

- Dinesh Aithal U

Click Here

Project Information

Project Name

Warpage Optimization Of Automotive Car Roof Cartridge Part By Reverse Warp Method Using Cae Tool

Executive Summary

Warpage is common and very important factor in Injection molding process. In case of Automotive Plastic part manufacturing due to current need of weight reduction most of the steel parts are getting converted into plastics. And here the main problem we encounter is warpage due to its size and thickness.

In earlier days it was time taking process to get the warpage to its minimum value and need to take more design change, tool & tool design modification, material replacement and also need to alter the process modifications too as per part requirement. But current scenario we have more advanced software, materials and improved processes so that we can cut down time. Currently our process and method of redesigning the part to reduce warpage is based on the reverse deformation technique developed by us. Moldex3D solutions enables us to predict and solve warpage in the earlier stages of product development by exporting the inverse model from Moldex3D the tool makers are able to compensate for unavoidable distortion in the mold. Here Moldex3D advanced module helped us to cut down time and save cost too to build a world class product. Moreover because of Moldex3D reverse warp process is become so easy to adopt even in very tight schedule.

Products - Moldex3D CAE Software

- Designer BLM
- Flow
- Pack
- Cool
- Warp
- Fiber
- Export deformed Model

The Challenge

- Reducing warpage within the gap and flush tolerance for part assembly. This parts fits on roof of car along with glass & motor for front & back action.
- Due to part thickness, geometry feature was getting warp around 15 to 18 mm which was unacceptable in case of fitment.
- To provide the stiffness, the part has added more number of ribs and the thickness is lower side. This will create temperature distribution and cooling problem. Hence this will lead to short shot and may be over heat problem.
- Due to part fitment we can't use direct hot gate on part so need to use cold gate & runner with hot runner manifold.

The Solution

Extreme Tool & Engineering deployed Moldex3D BLM injection molding software to target areas of concern and optimize designs to build tools accordingly so that real problems can be solved with virtual samples before the tool is even built, which saves the time and money that would be required to address these problems after the first sample. Moreover reducing the risk by producing large component ok at first shot.

Due to limitation in part modification we have very limited scope to reduce warpage using current scenario. This is we recently encountered too on actual part too and hence we chose to pre-warp the part with scale1 to reduce warpage at overall.

The Benefits

Please describe what benefits or values are achieved

- Balanced flow to get proper filling to achieve good part and reduced machine tonnage.
- Avoided the fitment issue and hence now its easy to add the assembly components with proper fitment on part and on car's roof assembly location.
- We chose to pre-warp the part which helped to reduce warpage at Centre, corner area of part as well as overall reduction this helps to get ok part at first shot.
- Avoided costly mold reconstructions, rework and improve the overall productivity.
- Reduce cooling time & Overall cycle time reductions.

Competition Declaration and Group Picture!

- **Idea of Smart Molding**

  For me, Smart molding is a new way of molding your same, similar or new developed parts in all brand new way using smart designs, smart materials, smart processing, smart Injection molding machines, smart robots and most important smart people. If you miss one of above then you will miss smart part.

- **Team Spirit declaration**

  "Coming Together is a beginning, staying together is progress and working together is Success".

"When we come together, stay together and work together for a reason and that reason has good cause or pride for self/ all/ community/ country/ world then all positive energy will gather & help us to create success for TEAM". And nobody can defeat us from that success so we are on our way.

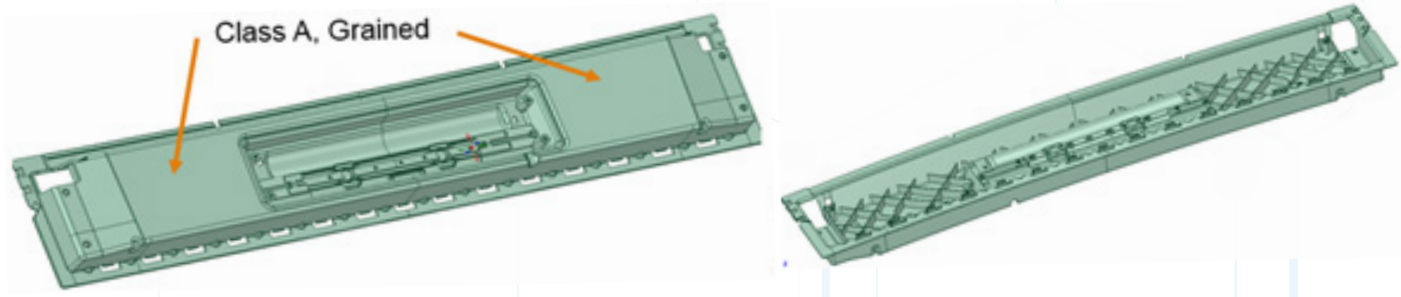
Mr. Kevin Roberts
Team Lead (Process Simulation)
Shape Corp.

Mr. Prasad Gunjikar
CAE Engineer III
Shape Corp.

Mr. Jonathan Wolff
Tooling Engineer
Shape Corp.

Project Descriptions

Provide a high level written description of your project.



Warpage is common and very important factor in Injection molding process. In case of Automotive Plastic part manufacturing most of the parts are big in size and low thicknesses. More over in current situation because of the weight reduction parts are getting low thickness and advanced material with 20% -40% glass filled. In Automotive industry Part should be meet Fit & form functionality along with

appearance too. To fit exactly location and then the parts should function too which is really a challenging task in case of plastic part. And the plastic/ polymer has tendency to warp if the poor design or poor cooling provided to it. So warpage is really important factor need to consider in case of Fit & form functionality.

Now in case of warpage it was present in earlier days too and now also it's present too. In earlier days it was time taking process to get the warpage to its minimum value and need to take more design change, tool & tool design modification, material replacement and also need to alter the process modifications too as per part requirement. But current scenario we have more advanced software, materials and improved processes so that we can cut down time. Here Moldex3D advanced module helped us to reduce the time and saved cost too.

The reverse warp process we followed as mentioned below.

- Took the original part and prepare the mesh & ran analysis as per required material and process settings.
- After analysis we have got X amount of warp which we took from Total displacement.
- Then exported the warped part data by keeping the scale1 in .STL format.
- Used the exported model to see the warp direction after comparing with original part using Rhino. Then took pictures of it and shared with team.
- The exported model ie. STL file format took to convert in STEP file format Special features of software. Here Designers helped to convert the file and they converted file & then changed warp direction to negative direction.
- Receive the part file from Designer to make use in meshing. Used the part and kept all meshing settings as it is like old part and then ran analysis again using same old run details.
- Check the warp in total displacement and again export the model with scale1.

- Again we need to import the exported model, modified model, original model and 1st pre warp model to check the warp direction. While importing e will keep the centre fix so that all parts can fit exactly on same position to show the differences.

In above process we used high dense mesh using level5 BLM in case of part, runner lines, cooling channel (3D) and Moldbase all are in 3D solid mesh to capture the warpage exactly same. Here Moldex3D BLM designer helped us to get the dense mesh and then run analysis using R16. Also advanced module helped us to cut down time and save cost too to build a world class product. Moreover because of Moldex3D reverse warp process is become so easy to adopt even in very tight schedule.

- Prasad Laxman Gunjikar

Mr. Gunjikar is a Polymer Technologist having completed his diploma in polymer technology at Karnataka Polytechnic, Mangaluru and B.E. in SJCE, Mysore. He has also completed PGDIRI from IRI.

Mr. Gunjikar has 16.50 years of rich experience in automotive plastic part product design and development, simulation, manufacturing and business development. Currently Mr. Gunjikar works for Shape Corp (Pune) as Assistant manager (Process simulation) and responsible for all plastic flow simulation and roll form simulation department with design & development

Rubber - Through the prism of Dr. Shetty

Dear PAWA Members,

Among various product which was based on chemistry which was made using chemicals, I feel that Rubber science & technology (RubTech) is more complicated among the products made from organic chemicals such as plastics, petrochemicals, natural and synthetic polymers, pharmaceuticals etc. The above-mentioned chemistry or technology, either one, two, three items are used for a reaction or process. For example, if one has to make the organic ester, then there is an acid, and alcohol along with a catalyst. If 3 materials and one process (estriphication) further for purification by process of distillation is required. In most of polymers used in plastics and fibers there are one monomer (for polythene, polypropylene.) and in some mat be two or three monomers (Nylon 66, Polyester, ABS, APDM etc.) But in case of Rubbers one monomer (having two double bonds e.g., Polybutadiene 2 monomers (SBR), 3 monomers (EPDM)

Now coming to the process to make rubber a thermoplastic is to be converted to an article by Compression Molding, transfer molding, injection molding, extrusion and calendaring. But in case of rubber, apart from above mentioned processors there is a building process is required (Tire, Tank lining), processes are required.

Further, rubber polymer alone cannot be used for making an article or product, it requires a compound containing following materials:

- Polymers
- Activators
- Lubricants
- Fillers (Black/White)
- Antioxidant /Antiozonant
- Retarder
- Sulphur
- Primary Accelerator
- Secondary Accelerator
- Plasticizers

These are the minimum items required in making a rubber part however, there are few other chemicals required such as retarders, peptizers, processing aids, etc.,

Making a rubber product of various process are required:

- Weighing to make a rubber part one has to weigh the above-mentioned chemicals and polymer.
- Mixing in a two roller Mixing mill or Dispersion Kneader or Banbury mixer. Even special types of Extruders are used for mixing
- Blank preparation and applying anti sticking agent (so that the blank pieces do not stick to each other's. (For making Molded parts}.
- For Extruded product, feeding strips are made of particular width and thickness depending on the Extruder output and extruded part size. Also barrel temperature, and die head temperature to be properly decided. For vulcanizing extruded products whether open steam or closed steam (hot air) curing, steam pressure, duration of vulcanization is important. Extruded products are vulcanized continuously by Microwave curing, where Megatron of Microwave system and cure time of rubber compound decides length of hot air curing length.
- For molded products shape and size of the blank, proper size of the platen, gap between the platens, temperature of molding, time required for curing, pressure to be given to the die. For rubber to metal bonded items, preparation of metal surface by sand blasting or chemical cleaning to be done. The metal part to coated with bonding agent. Selection of bonding agent, thickness of coating of bonding agent, time required to mold the coated metal parts to be decided for optimum bond strength.
- Rubber products made by Hand Building (Tank lining, Tire Building etc.). In these products green tack to be sufficient that the rubber to rubber or rubber to metal bonds properly. When building cares to be taken that there is no entrapped air in

between the rubber sheet and substrate. Proper pressure to be applied on the rubber sheet by hand rollers to squeeze out the entrapped air.

Testing of Rubber at various stages are very important to get the desired product as per the requirement of customers.

- Raw materials.
- Compound.
- Physical Properties
  - Tensile Properties such as Tensile Strength, % Elongation at break, Hardness, Modulus% Elongation and 300
  - Properties after aging
  - Special Properties as required by the Customers such as aging properties (in air at different temperatures, in different oils at different temperatures, Cyclic tests, Hysterics test, Bonding strength (Rubber to metal bonded parts), Heat buildup, skid resistance etc. for Tires), Air permeability test, Resistance to acids, alkalis, solvents.

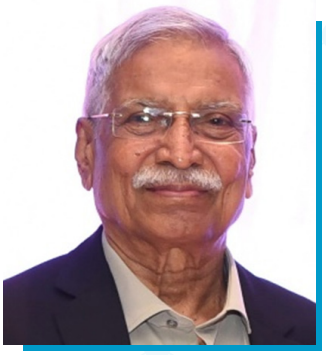
Various tests required on Raw materials

There are at least 10 types of Raw materials are required for making a rubber compound which are mentioned above. These raw materials to be tested to get consistent products.

- **Polymers (Rubbers)** Various rubbers are required to make a product to meet end applications as per the specifications. (Natural Rubber, Styrene-butadiene, Polybutadiene, Nitrile, Hydrogenated nitrile, Polychloroprene etc. Following are the Few important tests:

  - Mooney viscosity.
  - Volatile loss.
  - Heat stability.
  - Ash content.

- **Activator**
  - Solubility
  - Melting point
  - Heat Stability
- **Lubricant**
  - Softing point
  - Solubility
  - Acidity
  - Heat stability.
- **Fillers(Black /White)**
  - Density
  - Oil absorption
  - Surface area
  - Particle size
  - PH (Acidity)



- Dr. S M Shetty

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