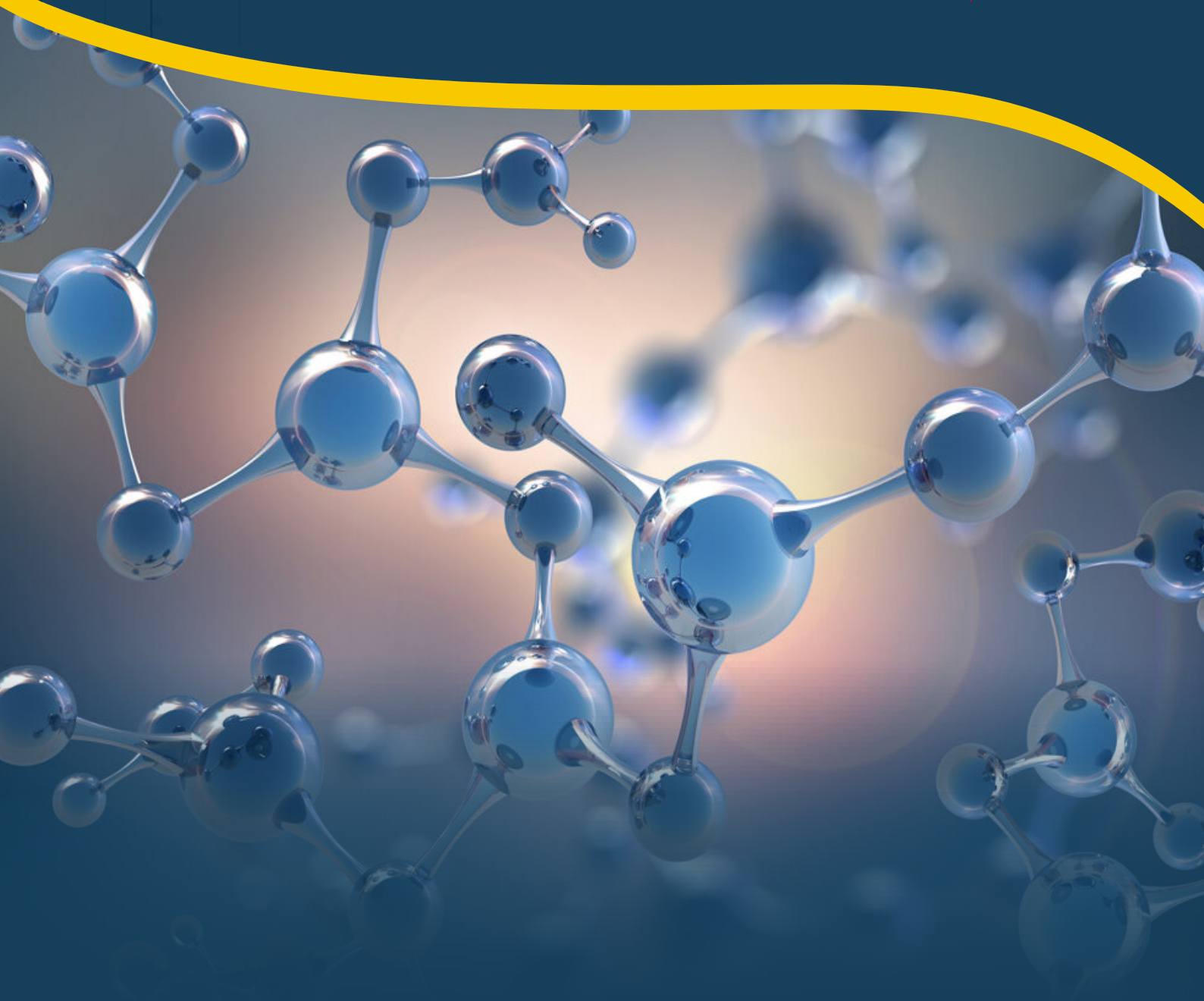
Issue | October 2022

PAWAPULSE



THIRD EDITION

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For feedback on PAWA pulse, please get in touch with

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From the Editor's desk

Dear Reader,

Wow, we are already into third edition now. It has been eight months since war started between Russia and Ukraine and it is unlikely that the war would stop in near future considering the present scenario. The rubber industries who are sourcing specialized elastomers from Russia have suffered very badly as the supply of elastomers have stopped. The Total direct cost of materials in manufacturing have gone up and industries are struggling to reduce the cost of manufacturing. War like situation arose between China and Taiwan after the visit of U.S. House speaker Nancy Pelosi to Taiwan. China started live fire drills around Taiwan. The situation still remains serious countries like Russia, Ukraine, China, Taiwan, Japan, and North Korea. The war like situation would badly impact the Manufacturing industries.

In this newsletter, you would see a technical paper on Bladder Manufacturing volume 2 by undersigned, a third edition on Fundamentals of Mixing Process by Mr. SV Rao. Also, an introspective overview about PAWA by our Joint Secretary Mr. GK Bhat. Mr. Bhat has neatly spelled out PAWA's contributions and progress of PAWA. There is one kavana in kannada by our veteran Mr. K P Bhat.
Kudos to all above members for contributing their might in bringing this third edition successfully.

Also, I would like to thank Mr. Aditya Kalluraya and his team of "The Web People LLP" for designing the newsletter in attracting way from the first edition of magazine.

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.

Anil Pais

From the desk of PAWA President

My Dear Pawa'ites,

Season's greetings, Festivals are the time for family re unions, enjoying the vacations etc. Time is running fast and we are already in IV quarter of Year 2022. We are launching III edition of PAWA pulse too at this juncture.

We are all living in the VUCA world with Volatility, Uncertainty, Complexity & Ambiguity.

Survival & Thriving in this type of atmosphere demands a different approach & a new way of seeing the organisation. This is same for businesses and for our PAWA as well. At PAWA, it calls for more co-operation among alumni members with clear inputs from our esteemed polymer department at KPT. While we all are readily available to contribute for DPT students' development, somehow, we are not able to progress much these days against our declared agenda in the beginning of this year. We clearly lacked co-ordination with which PAWA had been able to achieve so many milestones earlier as the fire in belly appears to have slowed down in us. We need more active participation from everyone and wish to finish off the year with the commissioning of our plastics lab and also make a grand plan for Next DPT con in Feb 2023. The preparations should start immediately. All the committees should gear up and meet to work out precise plan of what is required and how to implement. I call upon suggestions on this as we cannot afford to be left behind. We need to collect funds for which earlier we had discussed various options. We need to relook at all those once again.

Now, let us a peek into the business' world:

Auto sales is growing due to higher demand compared to previous year, overall, 8% up vs Previous year.

Global supply chains are believed to have built a certain degree of resilience to shocks. Geo political pressures are contributing large pressures on energy prices, shortages, Demand supply imbalances. The world is heading towards recession & the major impact is at Europe, America & China. India is expected to maintain growth rates of 6.5% as predicted by world bank for 2023.Tyre & Rubber industries are suffering from higher prices of all raw materials & margins have been reduced, but with the availability scenario improving, this will reverse for sure. The global indices indicate fluctuations of all raw materials for next quarter.

With this background, we are proposing to hold our AGM in virtual mode *but with a clear call to gear up and take the situation head-on. All are requested to join the AGM with positive and constructive inputs to achieve our targeted objectives.

I am signing off wishing all of you good health, safe & great year ahead & Enjoy the festival of lights, Happy Deepavali.

Sriganesh U P

Stars of PAWA

Mr. Purushothama Kini

Purushothama Kini is a well-known personality in tyre industry. His Name is not only limited to Indian tyre industry but is known to international tyre and allied industries too. Mr. Kini is very simple, knowledgeable yet dynamic with never give up attitude.

Mr. Kini has twenty-nine years of rich experience in Technology, Production, Quality, Logistics, Marketing and Service in tyres, Bladders, Automotive Tubes, Paint and lubricants, technical textiles, treated textile cords, Specialty food & Chemical Packaging.

Mr. Kini has served various industries in India as well as abroad in middle level and senior level position.

Mr. Kini completed his diploma in Polymer Technology – Rubber Technology in 1993. He was a topper throughout his diploma course. After completing his diploma, he joined CEAT tyres. At present, Mr. Kini is working as Managing Director at M/s Mehler Engineered Products and located in Doddaballapur. Mehler Engineered Products Pvt Ltd, is a German group of companies.

After completing diploma, Mr. Kini pursued higher education and completed his Bachelor in Business Administration and Master in Business Administration.

Mr. Kini has published paper in tire technology international magazine in 2012 and published an interview in Polymers and Tyres Asia Magazine in 2012. Apart from this Mr. Kini holds four global Patents related to textile usage in tyre and rubber industry.

Mr. Kini is also associated with Mean Metal Motors which is young start up as an investor, mentor and advisor. MMM is working on designing EV in automotives.
Mr. Kini is loving and passionate DAD for his only one daughter.

We, from PAWA wish all the best to Mr. Kini in his future endeavours.

Mr. Raghavendra Prabu

Mr. Prabhu is an experienced Plastic Technologist having completed his diploma in Polymer technology - specialization in Plastic Technology in 1988. After completing his diploma, he joined M/s Konkan speciality poly products Pvt ltd, (KONSPEC) Mangalore in 1989 as a trainee. When Mr. Prabhu had joined M/s KONSPEC was in its initial stage which was established in 1987. The Main product of KONSPEC was speciality plastic compound and colour master batches particularly used in plastic industries. After joining KONSPEC, there was no looking back for Raghavendra Prabhu and he played a pivotal role in developing and improving process operations, minimising the waste and improving productivity and quality of products.

Mr. Prabhu is a dedicated, committed workaholic yet very simple person having completed his thirty-three years of work experience in KONSPEC and because of his commitment and contribution to KONSPEC, Mr. Prabhu rose to the level of Senior Vice President – Operations after working almost in every department of manufacturing. Mr. Prabhu has been an integral part of KONSPEC to grow to the revenue of 250 crores from 15 lakhs in 1988. Now, as a Senior Vice President, Mr. Prabhu handles and guides team of more than three hundred people.

Mr. Prabhu is a happily married and his wife Bharathi Prabhu works as a Hindi Teacher in Sharada Vidyalaya, Mangaluru. Ms. Shwetha Prabhu, daughter of Mr. Raghavendra Prabhu is pursuing her Engineering degree in Information Science at Canara Engineering College, Mangaluru.

We, from PAWA wish all the best to Mr. Prabhu to his professional and personal life.

ಗೀತೆಗೆ ಮುನ್ನುಡಿ

ಕಾರಿರುಳಿನ ಕಗ್ಗತ್ತಲ ಮರೆಸುತಲವತರಿಸಲು ಹೊಂಗದಿರ ಸೆಲೆ!
ಕಾನನದೊಳಗಾಚಣ ಚಿಗುರೊಡೆಯಿತು ಹಸಿರೆಲೆ ಮುಡಿಯುತಲಾ ಕಣಿಲೆ!

ಬಂಧನಗಳ ಕದವೊಂದೊಂದನೆ ಕಿತ್ತೆಸೆಯುತ ಶಿಶುವಿಟ್ಟನು ಪದವ!
ಒಂದೆಲೆ ನೂರೊಂದುಗಳನು ದಾಟುತ ಹುಲ್ಲಿನ ಶಿರ ಮುಟ್ಟಿತು ನಭವ!

ಪದವೊಂದೊಂದಕೆ ನೂಪುರ ತಾಳದ ಮೇಳದ ಸಡಗರ ಗೋಕುಲದಿ!
ಬಿದಿರಿನ ಮುಕುಟಕೆ ಸೋಕುತ ಸೊಬಗೆಂದೆನಿಸಿತು ಮುಗಿಲಿನ ಹೂಬಳ್ಳಿ!

ಕಾಲವು ಕೂಡಲು ಮೂಡಿತು ಯೋಗವು ಕೃಷ್ಣನ ಕರ ಸೇರಿತು ತೃಣವು!
ಲೀಲೆಯ ತೋರುವ ಕರದೊಳು ಕೊಳಲೆನಿಸಲು ನಕ್ಕಿತು ಗಣಿತದ ಫನವು!

ಮಾಧವನುಸಿರಿನ ಸಂಸ್ಪರ್ಶದಿ ಹೊರಹೊಮ್ಮಿರಲೀ ಮುರಳಿಯ ನಾದ!
ವೇದದ ಸಾರದ ಗೀತೆಗೆ ಮುನ್ನುಡಿಯಾಯಿತು ಜಗದೊಳಗೀ ಯೋಗ!

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

Bladder Manufacturing – Part 2

Continued from Previous edition...

Compounding of tyre curing bladder

Butyl rubber must be compounded and vulcanized to yield useful, durable end use products. Grades of butyl have been developed to meet specific processing and property needs and a range of molecular weights, unsaturation and cure rates are commercially available. The selection and ratios of the proper fillers, processing aids, stabilizers and curatives also play critical roles in both how the compound will process and how the end product will behave.

Tyre curing bladders undergo and withstand several heat conditions like exposure to high temperatures from high pressure steam, hot water, or inert gas. This condition is fulfilled by butyl rubber specially compounded with reactive alkyl phenol formaldehyde resin. The selection of compounding materials plays important role in bladder life. The primary materials which are used in bladder compounding are butyl polymer, cure activator, reinforcing agent like carbon black, processing aids, plasticizers, Zinc oxide and curing resin.

Base polymer

Butyl Rubber (IIR, isobutylene isoprene copolymer) is the preferred elastomer for tyre curing bladders due to following properties.

- Excellent heat aging resistance
- Good flex and tear resistance
- Low tension and compression set properties
- Low permeability to air, inert gases and water vapours.

The unique properties and difficult manufacturing conditions place butyl rubber in the special purpose elastomers category, distinct from general purpose rubbers. Butyl rubber is a copolymer of isobutylene and approximately 2 mol% isoprene. The length of the isobutylene structural unit (0.270 nm) is 67% of that of the 1-4-isoprene structural unit (0.405 nm)3. The stereochemistry of the isobutylene unit results in close packing along the polymer chain, low free volume fraction, and consequently low permeability. Isoprene is incorporated in a trans-1,4 enchained head-to-tail arrangement to produce a random, linear copolymer.

Commercial butyl rubber is produced by cationic polymerization of isobutylene with little amount of isoprene, catalysed by aluminium chloride dissolved in methyl chloride. The extremely rapid reaction is unique proceeding via cationic polymerization at -100°C to completion in less than a second. Monomer purity is important to achieve the desired polymer molecular weights.

The feed which is a 25% solution of isobutylene (97-98%) and isoprene (2-3%) in methyl chloride, which is the diluent is cooled to -100°C in a feed tank. At the same time aluminium chloride is also being dissolved in methyl chloride. Both of these steams are continuously injected into the reactor. Since the reaction is exothermic and instantaneous, cooling is very important which is done by boiling liquid ethylene continuously through the reactor cooling coils, keeping the reaction at -100°C. As the polymerization proceeds, a slurry of very small particles is formed in the reactor. This slurry overflows into a flash drum that contains copious quantities of hot water. The mixture is vigorously agitated and the diluent and unreacted hydrocarbons are flashed off overhead. Antioxidant and zinc stearate are

introduced into the polymer. The antioxidant is added to prevent breakdown of the polymer in the subsequent finishing section. Zinc stearate is added to prevent the agglomeration or sticking together of the wet crumb. The slurry is then vacuum stripped of residual hydrocarbons. The butyl rubber slurry is dewatered in a series of extruders to bring the water content to 5-10% in the rubber during finishing operation. Final drying is completed in third extruder by allowing the compressed polymer melt to expand through a die to form an exploded crumb. The crumb is air conveyed to an enclosed fluidized bed conveyor where water vapour is removed and the crumb is cooled and baled.

Butyl rubber grades are distinguished by molecular weight (Mooney viscosity) and mole % unsaturation. The mole % unsaturation is the number of moles of isoprene per 100 moles of isobutylene.

Activators

Vulcanization of rubber compound or crosslinking of rubber molecular chains enhanced by accelerators. Organic or inorganic activators are used to achieve the full potential of vulcanization accelerators. Inorganic activators are metallic oxides such as Zinc Oxide along with long chain fatty acid such as stearic acid that act as co-activator is generally used as activators in rubbers. Generally, it can be stated that increasing the pH leads to activation of the vulcanization. The basic activators mentioned lead to improved strength properties of the vulcanizates and come to shortening of the vulcanization time. Better processing and improvement in dispersion of fillers and other chemicals can also be achieved by the used of fatty acids and fatty acid salts as co-activators. 5 phr zinc oxide with 1-3 phr stearic acid is the commonly accepted combination.

In case of butyl rubber, the crosslinking is dependent on the reactivity of the phenolmethylol groups of reactive alkyl phenol-formaldehyde resins. The low levels of unsaturation of butyl require resin cure activation by adding halogen containing materials such as SnCl2 or halogen containing elastomers such as polychloroprene. A more reactive resin cure system requiring no external activator is obtained if some of the hydroxyl groups of the methylol group are replaced by bromine. An example of commonly used commercial resin is a brominated alkyl phenol formaldehyde resin. Polychloroprene rubber grade Neoprene™ W grade is commonly used as activator in butyl rubber resin cure.

Fillers - Reinforcing Agents

Carbon black is generally used as reinforcing agent in butyl rubber. High structure carbon black ISAF or HAF which gives a good balance of properties, are used in bladder compounds at levels of 50-60 phr. Other grades of carbon black like GPF which show improved air aging, though ISAF grades have better steam aging properties. Acetylene black compounds in combination with HAF have good thermal conductivity which may reduce tire curing time. However, acetylene black may be difficult to disperse in butyl rubber compound. Generally, a lower loading of carbon black about 35-40 phr gives better air aging and higher loading of carbon black about 60-65 phr gives better steam aging.

Plasticizers – Processing Aids – Softeners

These include a wide variety of oils and synthetic organic materials which do not react chemically with rubbers but serve primarily as processing aid. Main purpose of using processing aids or softener is

- To decrease the viscosity and improve workability of the compound
- To reduce mixing temperature and power consumption
- To reduce hardness
- To reduce low temperature brittle point
- To aid in the dispersion of fillers
- To reduce mill and calender shrinkage
- To provide lubrication to aid in extrusion and molding.

The most important class of softeners are hydrocarbon oils which fall into one of the three primary categories, paraffinic, naphthenic and aromatic. All three classes of oils used at 05-25 phr, contain high levels of cyclic carbon structures, difference is in the number of saturated and unsaturated rings. For all generic all round properties, naphthenic oil is preferred. The proper selection of the oil for inclusion in a formulation is important and must be compatible with the rubber and other compounding ingredients used in the recipe. Incompatibility will result in poor processing characteristics and or bleeding in the final products.

Castor oil 5 phr is the most commonly used as plasticizer in bladder compound due to its low volatility at high temperature. Castor oil reduces the tendency for a marching modulus in resin cured butyl rubber bladder compounds. Also it gives lower unaged modulus and good steam aging.

Plasticizers Castor oil (5 phr) is the most commonly used plasticizer for bladder compounds due to its low volatility at high temperature. Castor oil reduces the tendency for a marching modulus in resin cured butyl rubber bladder compounds. Additionally it gives lower unaged modulus and good steam aging. If castor oil is not available, then oleic acid (5 phr) could be used. Compounds containing either

castor oil or oleic acid have better release properties between the bladder and tire inner liner. These compounds also show better retention in aging properties due to the high boiling point and lower volatility of castor oil.

To be continued in next edition...

-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 3 (PPT)

- Banbury Mixers
- Common Fweatures In Banbury & Intermix Mixers
- Rotor Design
- Internal Mixers
- Difference Between Banbury And Intermix
- Interlocking Or Intermeshing Rotors
- Comparison Of Feeding Efficiency

-Suratkal Vasudeva Rao

Click Here

Way ahead for PAWA

An introspective overview

It has already been a solid 5 years, since our PAWA got officially registered as the body with a vision and a mission. Needless to say, that it is apt time for introspection, for taking stock of our positives and negatives. Also, to chalk out plan to reorient ourselves so as to achieve our objectives. Whereas our initial 4 years have been quite eventful and satisfying, it is bit unnerving that the same cannot be said about the year gone by.

It feels good to count the achievements of the past. From setting up of a physical and virtual library, conducting periodic guest lectures by PAWAites, donation of valuable and desired curricular & extracurricular material for the department, arranging good number of Rubber testing and processing equipment lying idle at Baikampady, refurbishing them and above all organising a memorable DPTCon during November 2018 to raise funds for our activities. Even the cursed era of Covid, 2020-2021 also had gone quite eventful with increasing the membership and organising Hybrid (Online and offline) mode AGMs and organising few online initiatives. We were blessed to have received the willing helping hands of an eager PAWAite during this period in setting up a secretariat of the PAWA and above all launching of our own website kptpawa.org.

The not so productive last year also had its charming moments with 3 telling goals achieved against all odds. First of all, we had managed to get the numerous plastic machinery lying idle at ITI to KPT -DPT through deft and timely but repeated persuasive efforts from our stalwarts at Technical and government level in Bengaluru. Thanks to our ever-helping Principal, we could manage to shift them to

our premises too. Secondly, we are sincerely indebted to another PAWAite, a renowned plastic professional, who has not only provided a working Injection moulding Press to our department but also coordinated diligently in getting it transported from Bengaluru to KPT. Thirdly, launching and publishing this coveted newsletter PAWApulse has also been a feather in our cap. With all round coordination, we have already published 2 quarterly issues and are on verge of coming out with this third issue through our website. Further, PAWA has taken pride in arranging to provide the much needed and sought computers (6 nos.) to DPT for academic purposes.

However, we are found badly wanting in keeping up with the pace desired at ground level during this year especially with our HOD almost becoming handicapped after exit of Secretariat support. All the planning's of all outsiders to set up the plastic machinery to a working condition has come to a stop. So far, ground level work is still almost a non-starter. Had the pace been maintained we would have been busy organising our much awaited second edition of DPTCon by now. Conducting DPTCon is very vital to raise funds for further development activities at KPT DPT. To achieve great tasks, it needs every one's support. Even with the combined support of students together with few Lecturers & our HOD, the speed of refurbishment of our new lab has not picked up yet.

We all need to have more co-ordination of DPT in-house team with Alumni members to succeed. At PAWA, we are all here to support the DPT team which can mobilise and generate good work all along in future also.

We are at a juncture now where hope is what is left in place of confidence as we have found it worthwhile to replace physical AGM with a virtual one this time. Let us take that opportunity to come out with great ideas to make all our dreams come true.

Looking forward to a sea-change in the coming months so that the vigour with which we set out, can be regained and DPTCon-2023 can be a reality soon enough.

Prepared by

- Gopalakrishna Bhat

Joint Secretary – PAWA

Senior Manager – Technical BKT, Bhiwadi

SCHOLARSHIP AWARDED TO MERITORIOUS STUDENTS BY PAWA 2020-21

Amount ₹5000 each

Jnaneshwar
1st Year

Karthik
2nd Year

Nagaraja
3rd Year

Placements of recently passed out students – DPT

Sl. No.	Name	Organization
1	ABHIJITH	PRAPULLA POLYMERS
2	ABHISHEK	HIGHER EDUCATION
3	ASHWIJA	PRAPULLA POLYMERS
4	DEEKSHITH	HIGHER EDUCATION
5	DHANUSH R NAYAK	SELF EMPLOYED
6	DHARMESH M.R	HIGHER EDUCATION
7	HARUSH LINAL CUTINHA	PRAPULLA POLYMERS
8	JHANAVI	YET TO BE PLACED
9	JITHESH	PRAPULLA POLYMERS
10	K HARSHITH KUMAR	YET TO BE PLACED
11	KARTHIK	HIGHER EDUCATION
12	KARTHIK M	SOLARA
13	KOUSHIK K M	MANJUSHREE TECHNO PARK
14	MAYUR	HIGHER EDUCATION
15	NANDEESH M C	HIGHER EDUCATION
16	NAVYA	SELF EMPLOYED
17	PRAJWAL	PRAPULLA POLYMERS
18	PRAJWAL	JK TYRE
19	PRATHAM	HIGHER EDUCATION
20	RAKSHITH	JK TYRE
21	RAKSHITH	HIGHER EDUCATION
22	SAGAR	SOLARA
23	SAJJAN J SHETTY	PRAPULLA POLYMERS

Placements of recently passed out students – DPT

Sl. No.	Name	Organization
24	SHARATH	HIGHER EDUCATION
25	SHARWIN PAUL ALOYSIOUS	SELF EMPLOYED
26	SHASHANK P SHETTY	YET TO BE PLACED
27	SUDHARSHAN	HIGHER EDUCATION
28	SUJAN	PRAPULLA POLYMERS
29	SUKETH	PRAPULLA POLYMERS
30	SUMITHRA	YET TO BE PLACED
31	YASHWIN L KARKERA	YET TO BE PLACED
32	YATHIN K J	HIGHER EDUCATION
33	RANJITH ACHARYA	YET TO BE PLACED
34	KEERTHI KIRAN DSOUZA	MCF
35	MOKSHITH G	MCF

PAWAPULSE