Name of the department :- Rubber Technology

Event Description

Due to covid 19 these time kaizen event was organized online on the zoom application. The kaizen 2k20 event was organized by Rubber Technology Department of the institute with great enthusiasm and support by all faculty members and students . The event was scheduled for two days 6th and 7th April 2020. Total 6 UG group projects of 29 students were presented their projects on zoom application. On the 6th April 3 teams have presented their projects and poster on the zoom application and the rest of the team have presented their projects and poster on the next day. Projects prepared by all the students are well prepared, innovative and technically sound. Some of them are quite helpful to the society and industry. The students were happy to show case their work to all the facilities and judges. The environment had been very vibrant on both the days. The facilities and judges were delighted to see the overwhelming response of the students. Special appreciation is due to the faculty members who whole heartedly guided the projects and participating the events.

1. **Project Title:** Anti static transparent silicone rubber

IDP-. Industry defined Project

Prepared by :

160280126001	Ambaliya Hardik Kishorbhai
160280126009	Ghori Vishal Satishbhai
160280126027	Varsani Jagadish Jayantibhai
160280126028	Vasani Kamlesh Pravinbhai
150280126014	Kachhadiya Darshakkumar Arvindbhai

Abstract:- In pharmaceutical company, they are using silicone rubber hose to pass a drugs through it. Due to flow of powder drugs the static charge is generated on the surface of hose or tube. It may be cause of explosion or product failure and results into accident.Transparency is required to see clearly flow of drugs through the tube or hose and it will help in avoidance of blockages in tubes or hose.

Not funded project

Guided by: Prof. P.N. Chavda

2. **Project Title**: Replacement Of Silicone rubber By FKM rubber In FDA Tubing Application

IDP-. Industry defined Project

Prepared by :

160280126013	Kachhadiya Vivek Rameshbhai
160280126014	Kasodariya Rohit Ghanshyambhai

160280126015	Kasvala Satyam
150280126025	Sabhaya Ravi Maheshbhai
170283126005	Shah Md Sadat Ali Najibuddin

Abstract :- Silicone rubber gives poor resistance towards the solvents like dichloromethane , isopropyl alcohol , toluene , n-heptane , benzene which are used in silicone tubing for medical & food grade application. Objective of this project work is to replace silicone tubing by FKM which gives good solvent resistance than silicone along with superior thermal stability and physical properties.

Not funded project

Guided by: Prof. A.D.Bhatt

3. **Project Title:** Aerospace Solar Silicon Sheet

IDP-. Industry defined Project

Prepared by :

130280126020	Patel Harsh Dineshkumar
160280126023	Patel Tarangkumar Hasmukhbhai
170283126001	Mhamane Shrikant Ashok
170283126004	Patil Akshay Uttam
170283126006	Yadav Ajay Laxman

Abstract:- Aerospace solar sheet is made up of Silicone rubber and used in many aerospace and spacecraft applications because Silicone rubber has its extreme heat resistance characteristics with low temperature flexibility and low modulus.With outstanding ability to endure incredible stresses and temperature extremes, Silicone rubber has versatile applications. Existing product still needs to modify to sustain the extreme weather. The objective of this project is to prepare the solar sheet to give heat resistance up to 400^{o}C and withstand without serious degradation. To achieve this goal and for better performance of the product in such harsh atmosphere, a unique formulation has been prepared by blending of specialty rubbers and chemicals, which can still increase heat resistance and endurance of product.

Not funded project

Guided by: Prof. B.D.Patel

4. **Project Title:** Magnetorheological Rubber

IDP-. Industry defined Project

Prepared by :

160280126004	**Boricha Piyush Popatbhai**
160280126007	Dhrangdhariya Parth
160280126019	Nakum Nileshkumar Pithabhai
160280126021	Parmar Divyesh Mansukhbhai
170283126002	Mishra Princekumar Santoshkumar

Abstract:- Magnetorheological rubber belong to the class of 'smart material' whose mechanical properties can be altered continuously and reversibly by an applied magnetic field. MRE's are composites that consists of magnetically polarisable particles in rubber matrix. With suitable controlled algorithms, they respond to changes in their environment. Purpose of this work is to know more about magnetorheological rubber for active stiffness, vibration control and dampening applications. Although few applications of these materials have been reported in the literature, the possibilities are numerous. They can be used for various applications such as vibration absorber, vibration isolator, variable stiffness bush, spring, force sensors, actuators etc.

Not funded project

Guided by: Prof. S.J.Padhiyar

5. **Project Title:** " PIEZOELECTRIC RUBBER PAVER"

IDP-. Industry defined Project

Prepared by :

160280126003	Babariya Vishal Dineshbhai
160280126005	Chovatiya Parag Himmatbhai
160280126006	Dantreliya Satyam Bhagirathbhai
160280126018	Murav Himanshu Rajeshbhai
160280126026	Songra Jaydip

Abstract:- In the present days, there is boom on harvesting the renewable energy sources by any means due to day-by-day shortage of non-renewable source of energy. There are many natural energy that can be used to provide a source of clean and renewable electricity or even used for other purposes such as providing heating for your home or business. Especially for wireless data transmission technique in electric devices requires the power source with help of batteries or direct

supply. So, alternative method needs to develop as solution. Mechanical energy of foot traffic is not being utilized so if we could utilized it would provide energy without harming the environment. By piezoelectric effect, mechanical energy is convert into electrical energy using piezoelectric components. Using this piezoelectric effect we design a rubber paver generating electricity. The main motto is to obtain a pollution-free energy source and to utilize and optimize the energy being wasted.

Not funded project

Guided by: Prof.G.G.Bhatt

6. **Project Title:** Replacement of standard rubber oils by low PCA content hydrocarbon TDAE oil in rubber compounds

IDP-. Industry defined Project

Prepared by :

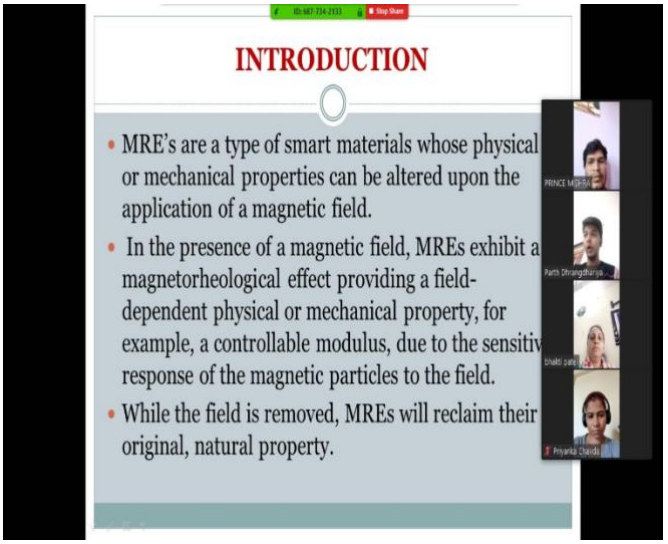
160280126010	Gohil Ravi Rameshbhai
160280126011	Hadiya Umeshbhai Najabhai
160280126012	Jan Prince Mansukhbhai
160280126016	Khunt Arpitkumar Pareshbhai
170283126003	Panigrahi Rakesh Nilanchal

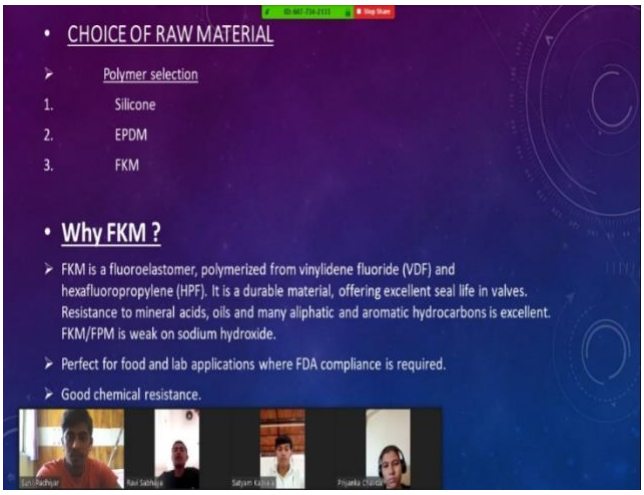
Abstract: - This Invention relates to a process for producing process oil by means of re-extraction of distillate aromatic extract (DAE) at lubricant oil processing. More specifically, the present invention relates to liquid-liquid extraction process from DAE feed which resulted treated distillate aromatic extract (TDAE) that have low content of polyaromatic hydrocarbon (PAHs) and content of polycyclic aromatic (PCA) less than 3%.We use TDAE oil which has low PCA content (less than 3%) so this oil is non carcinogenic and eco friend oil. Accordingly, an object of the present invention is to provide a rubber composition containing Silica Surface treated carbon black which gives a rubber composition having the Superior tan Δ temperature dependency of Silica even it gives excellent wear resistance and also free from the problems derived from low electro conductivity. Another object of the present invention is to provide a rubber composition for a tire which gives a rubber Superior in wet grip and rolling resistance compared with use of carbon black. The chemical modification of NR via epoxidation of natural rubber latex yield a specialty rubber called epoxidised natural rubber (ENR). Epoxidation increases the polarity of natural rubber. The strong interaction between ENR-Silica gives unique properties. Silica-filled ENR-25 compound provides low rolling resistance together with high wet grip and offers the best balance required in green tire application.

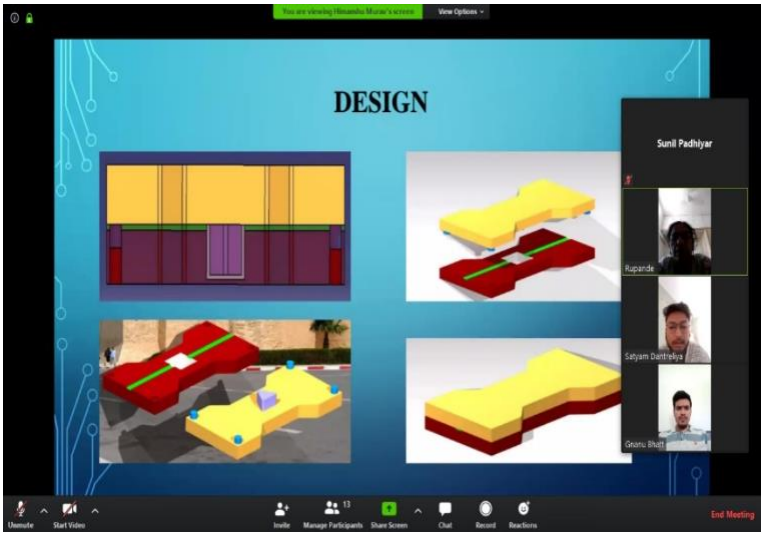
Not funded project

Guided by: Prof.R.Y.Modan.

Evaluation Screenshot







Details of Innovative and Industry useful projects

Title of project: - "Replacement of Standard rubber oils by low PCA content hydrocarbon TDAE oil in rubber compounds.

Name of Team Members: - RAVI GOHIL, UMESH HADIYA, PRINCE JAN, ARPIT KHUNT, RAKESH PANIGRAHI

Name of Guide: - Prof. Riyaz Y Modan

Outcome of Project: - Different kinds of rubber blends filled with surface treated carbon black and silanized silica were prepared on two roll mixing mill & their various physico- mechanical properties were studied for the suitability for tread application. From the study it was observed that TDAE oils improve the abrasion resistance in addition of oil content is more compatible with the ENR and SSBR. ENR rubber improves the rubber filler interaction and it's highly compatible with the surface treated carbon black as well as silica. On the other hand ENR- surface treated carbon black has higher DIN abrasion index as compared with NR/BR– carbon black compound. The overall mixing time of the ENR and SSBR blends takes lower time compare than NR - ESBR blends. So the mixing time is reduced by using the ENR + SSBR + silica based dispersion takes longer time than that of conventional carbon black. The use of ENR and SSBR reduce the overall curing time of the compound with increasing the Mooney viscosity and maximum torque which improve the physico- mechanical properties of the compound. So the blends of ENR and SSBR with BR mixing with surface treated carbon black and silica (silane) system with TDAE process oil is highly suitable for the tyre tread compound & Its applicable to PC Tyre , LCV Tyre , and high speed Tyre.

Name of Industries for project Support: - Parth Rubber Tech. Pvt.Ltd, Innovative Tyres and Tubes Limited, Yokohama Tire Corporation

Title of project: - “Magnetorheological Elastomer”

Name of Guide: - Prof. S.J. Padhiyar

Name of Team Members: - Boricha Piyush Popatbhai, Dhrangdhariya Parth , Nakum Nileshkumar Pithabhai, Parmar Divyesh Mansukhbhai , Mishra Princekumar Santoshkumar

Objective of Project:

Magnetorheological rubber belongs to the class of 'smart material' whose mechanical properties can be altered continuously and reversibly by an applied magnetic field. MRE's are composites that consist of magnetically polarisable particles in rubber matrix. With suitable controlled algorithms, they respond to changes in their environment. The proposed MRE-based vibration absorber can absorb the vibration energy and thus reduce vibration.Various applications are Based on their field-sensitive properties, MREs have been developed for: Force sensors, Magneto resistive sensor, Magneto sensitive strain sensor, Flexible tri-axis tactile sensor, Soft actuator and Moreover, the microwave response and 3D printing properties of MREs have also been recently reported. It is worth being pointed out that the application of MREs is explosively developing.

Name of Industries for project Support: - Bymer Elastomer, Nasik

Title of Project: Aerospace Solar Silicone Sheet

Name of Team members:

Ajay Yadav ,Shrikant Mhamane,Akshay Patil , Tarang Patel, Harsh Patel

Name of Guide :

Prof. Bhakti Patel, Asst.Prof. Rubber Technology Dept.

Objective of Project :

Aerospace solar sheet is made up of Silicone rubber and used in many aerospace and spacecraft applications because Silicone rubber has its extreme heat resistance characteristics with low temperature flexibility and low modulus.With outstanding ability to endure incredible stresses and temperature extremes, Silicone rubber has versatile applications. Existing product still needs to modify to sustain the extreme weather. The objective of this project is to prepare the solar sheet to give heat resistance up to 400^{o}C and withstand without serious degradation. To achieve this goal and for better performance of the product in such harsh atmosphere, a unique formulation has been prepared by blending of specialty rubbers and chemicals, which can still increase heat resistance and endurance of product.

Supporting industry: Subhadra industries , Pune

Title of project:- Piezoelectric Rubber Paver

Name of team members: Vishal Babariya, Parag , Himanshu, satyam , Jaydeep

Name of Guide:- Prof.G.G.Bhatt

Objective of project:- Our objective is to harvest mechanical energy of human footsteps by converting it into electrical energy with the principle of piezoelectricity.

Importance for society:- As the need of Society is increasing day by day for electricity and as well as the non-renewable resources are decreasing thus, our project is important as it provides green and natural energy by utilizing mechanical energy of footsteps which goes unutilized.

Details of feedback from students /faculty members

Department feedback on conduction of the whole process:

As the department got the final guidelines for conducting Kaizen 2K20 on online platform, all faculty members and students started working on the same. All the final year students were being guided by their respective guides. Overall the whole process was conducted with ease by joint efforts of each member. Students were totally satisfied with the whole process. Rubber Technology Department had a great and amazing experience for conducting kiazen 2020 online.

Suggestion /Queries raised by faculty /expert with name:

- **Prof. G.G.Bhatt:** All the team members have presented their projects and poster on the online platform for the first time . That was really nice experience for students as well as for faculties. Some of the projects were really very innovative and useful for the industry and society. The suggestion which I have given to one of the team that they should try to more focus on the raw material selection , processing and do some changes in their compound formulation. So that they can achieve desirable properties and meet the requirements of industry. Though the current situation is really worst they are able to present their work in the given stipulated time. Really their efforts are appreciable.

- **Prof. P.N.Chavda :** The students of each group of Rubber Technology department have performed very well with the limited sources because of current scenario. They utilized their time in productive work from their respective home to make the program of Kaizen 2K20 a successful event. They were feeling good by presenting their work through online platform and they tried to

explain at their best. All off the project topics are very innovative and interesting. Their efforts are appreciable.

Students feedback with details of students like enrollment number /title of project:

- Parth Dhrangdhariya

Enrollment no. : 160280126007

Project name : Magnetorheological Elastomer

"It was a great experience. Through this quarantine it is a great way to be productive. Online presentation was a good experience. Everyone shared their views on the project."

- Himashu Murav

Enrollment no. : 160280126018

Project name : Piezoelectric rubber paver

"Overall it was an exciting experience to see everyone through digital media. Everyone expressed views on project. Faculty praised us."

- Ravi Sabhaya

Enrollment no. : 160280126025

Project name : Replacement of Silicone by FKM in tubing applications

"Nice experience. It was great to give presentation through zoom by connecting with every faculty and college friends."

Department wise best practice to carry projects for students for a specific project case study

- At the beginning of the 7th semester, Different innovative project ideas proposals were being analyzed by the department faculty members and industrial experts.
- Suitable and truly innovative challenges currently possessed by Rubber industries were finalized as project topics.
- After finalizing project topics, the designing of team formation and project topic selection procedure were being carried out.
- For the team member selection and project topic selection, the total freedom was given to the students. But for the better enhancement, the whole procedure was being conducted under guidance of all faculty members.
- In order to fulfill the criteria of continuous evaluation, the registration of all the finalized teams were made on PMMS portal requesting to their respective guide.
- The students were being instructed to follow the PMMS portal regularly and the benefits of following PMMS activities were explained by their respective guides.
- According to the PMMS portal schedule, all the students and their guides followed the given guidelines. Continuous feedback and detailed analysis of students' work was done by all the guides to improve the quality of the projects with the help of PMMS activities.
- Students were made to present their work periodically on regular basis with the help of PowerPoint presentation. Continuous feedback by faculties was given to make sure their quality improvement.
- With the technical feedback, students presentation skills, communication skills and the way of demonstration were also monitored by the guides for their personal growth as well as for the effectiveness of project.