



Chhotubhai Gopalbhai Patel Institute of Technology

Department of Civil Engineering

A report of GUJCOST sponsored Two-day Webinar
on
‘ Utilization of Polyethylene Terephthalate (PET) in Bituminous Pavement ’

Title	Utilization of Polyethylene Terephthalate (PET) in Bituminous Pavement	
Organizer	Department of Civil Engineering, CGPIT	
Sponsoring Agency	GUJCOST	
Organizing Committee	Mr. Shrinivas Mundkar Dr. Vaibhav Pawar	
Institute	CGPIT, UTU	
Date & Venue	3 rd & 4 th November, 2020	
Speakers	Day 1	Dr. Atul K. Desai, Professor , Civil Engineering Debarment SVNIT , Surat Dr. Satyajit Patel, Asso. Professor , Civil Engineering Debarment SVNIT , Surat
	Day 2	Dr. B.K.Vendhan , Asst. Prof. Civil Engineering Debarment SVNIT , Surat Dr. Y.D.Patil, Asso. Prof. Civil Engineering Debarment SVNIT , Surat

Details of webinar:

The objective behind organizing the webinar was to impart the concepts of Utilization of Polyethylene Terephthalate (PET) in Bituminous Pavement. Durability is a crucial factor when designing a road, as it is necessary to ensure that the layers of pavement maintain desired properties. Durability is based above all on the annual increase in volume and traffic loads. It is important to note that flexible pavement is less susceptible to permanent deformations at high temperatures and cracking at low temperatures. Flexible pavement can be created by modifying asphalt binder, which can be done during the fabrication process by considering the origins and processing of petroleum. Unfortunately, both methods are difficult. A third option focuses on modifying the asphalt binder using additives in the mixture to significantly improve the performance of the pavement. Recycled plastic can be used to increase the durability of the pavement. Plastics are used in almost every productive segment of the economy, and their use tends to increase with development, thus generating an increase in plastic waste. A typical example is PET bottles, which possess a short useful lifetime and become waste soon after use. The high temperature of the fusion of PET hinders mixing with asphalt binder, making its incorporation impractical. However, different studies have promoted its use through another method. Once reaching the temperature of glass transition (70°C), it gradually obtains crystalline properties, contributing to the stiffness of the asphalt mixture. Thus, researchers have incorporated PET as an additive by reducing its size into small particles with a nominal maximum of less than 2.36 mm. There were 26 participants in the webinar and total 4 sessions were conducted.

Day 1

First day of the webinar was started with introduction of speakers to participants and welcome speech session immediately followed by a lecture session on ‘Recent Advanced In Fiber Reinforced Concrete In Field Application’ by Dr. Atul K. Desai, Professor, Civil Engineering Department SVNIT, Surat. He gave an introductory speech on the most famous advantage of concrete is its high compressive strength. However, there are many defects for concrete materials, such as low anticracking performance, bad toughness, low tensile strength, and so on. During the failure of the concrete structure under the action of load, the energy consumed is very limited, and many cracks with different size scale will come into being. The concrete with higher strength has larger brittleness. The existing of a large number of cracks has great adverse influence on the mechanical properties and durability of concrete structures, which will result in shortening of the service life of the structures. The defects of common concrete restrict the application under severe conditions to a large extent.

REC

Manoj Gundalia

Tarsadia Testing Lab

Shrinivas Mundkar

Prof. A.K.Desai SVNIT

Director CGPIT

Manu Samuel

Sapan Parekh

Grishma Salvi

Palak Trivedi

Dr. A. K. Desai Lecture

People (25)

Add people

Host controls

Vaibhav Pawar (You)

Akhilesh Yadav

Bhagyashri Sarde

dhruv patel

Dimple Desai

Director CGPIT

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Manoj Gundalia

Tarsadia Testing Lab

Shrinivas Mundkar

Prof. A.K.Desai SVNIT

Director CGPIT

Manu Samuel

Dr. A. K. Desai Lecture

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Bhagyashri Sarde

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Turn on captions

Present now

REC

Prof. A.K.Desai SVNIT is presenting

Prof. A.K.Desai SVNIT

Director CGPIT

Manoj Gundalia

Tarsadia Testing Lab

Dr. A. K. Desai Lecture

People (30)

12 ↓

Add people

Host controls

Vaibhav Pawar (You)

Akhilesh Yadav

Bhagyashri Sarde

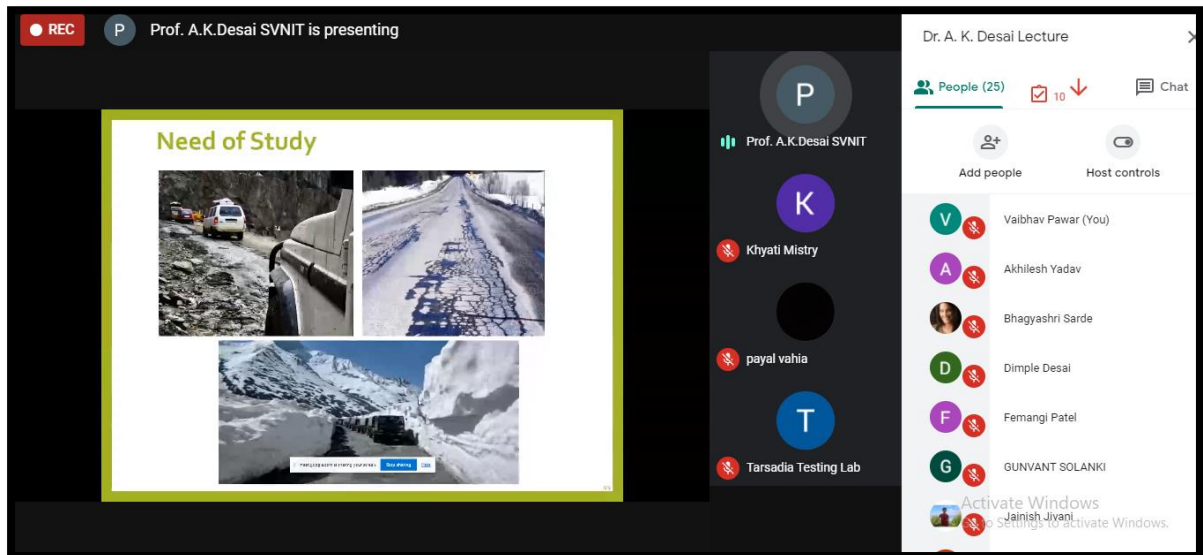
dhruv patel

Dimple Desai

Director CGPIT

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Low Impact & Abrasion Resistance





The Afternoon session, Geotechnical Aspect of Pavement design and Construction, by Dr. Satyajit Patel Associate professor , Civil Engineering Department SVNIT , Surat. He gave the course covers the latest methods and procedures to address the geotechnical issues in pavement design, construction, and performance. These methods can be applied to new construction, reconstruction and pavement rehabilitation projects. The content includes geotechnical assessment, testing and characterization of in-place and constructed sub-grades, as well as designing and constructing pavement subgrades and unbounded materials for paved roads. The course is designed to cover the elements of the empirical and mechanistic-empirical design approaches. It will cover asphalt pavements including granular layers and HMA mixes, specifications, and main aspects of construction.

In second presentation on stabilization of clayey sub grade with fly ash, Emerging trend of using waste material in soil stabilizing or soil strengthening is being operational all over the world in present days. The main reason behind this trend is the excessive production of waste like fly ash, plastics, rice husk ash which is not only hazards but also creating deposition problems. Using some of these waste materials in construction practice will reduce the problem in a great extent. Pavement engineers have long recognized long term benefits of increasing the strength and durability of pavement sub-grade soil by mixing in a cementitious binder during reconstruction or new construction. Millions of dollars can be saved by soil sub-grade stabilization in comparison to cutting out and replacing the unstable sub-grade soil. When included in pavement design, stabilizing the sub-grade can result in reducing the thickness of other pavement layers.

REC Dr. Satyajit Patel is presenting

Geotechnical problems associated with pavements

a) Excessive rutting b) Aggregate contamination or displacement






Figure 2. A) Failures in Pavement

Image Source : FBWA-NHI-05-037

Meeting details

People (22) Chat

Add people Host controls

- V Valbhav Pawar (You)
- A Akhilesh Yadav
- A Amit Jain
- Bhagyashri Sarde
- d dhruv patel
- D Dimple Desai

REC Dr. Satyajit Patel is presenting

References for determination of various properties

Property	Reference		
	IS	AASHTO	ASTM
Soil Classification	IS : 2720 (Part 4) - 1985	T88	D422
Water Content	IS : 2720 (Part 2) - 1973	TO T265	D2216
In situ density of soil	IS : 2720 (Part 28) & (Part 29)	-	D2922, D1556
Consistency limits of soil	IS : 2720 (Part 5) – 1985 & (Part 6) – 1972 (Reaffirmed 1978)	T90, T92	D4318, D427
Compaction characteristics	IS:2720 (Part 7)- 1980	T99, T180	D698, D1557
Modulus of subgrade reaction	IS : 9214 : 1979	I993	-
Resilient Modulus	-	T307	-
California Bearing ratio	IS : 2720 (Part 16) – 1979	T193	D1883
permeability	IS : 2720 (Part 17)-1986	T215	D5084

Meeting details

People (22) Chat

Let everyone send messages

Activate Windows
Tomorrow lecture link will send at 9:30 AM (Tomorrow Morning)

REC Dr. Satyajit Patel is presenting



Construction and Quality control

Construction of **subgrade** (native soil mixed with fly-ash at 50% up to 300 mm from top) is over. Following are some photographs and clips of the construction activities and tests for quality control.

a. **Box cutting** of the proposed section has been already done.

b. **Dumping** of the Fly-Ash on the native soil is shown here.

*It is very important to dump the fly ash before it starts drying otherwise its very difficult to make it slide down due to suction developed.

Meeting details

People (22) Chat

Activate Windows
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Day 2


Second day of the webinar was started with a lecture session on ‘utilization of plastic waste in bituminous pavements’ by Dr. B.K.Vendhan, Assistant Professor of Civil Engineering Department, S.V.N.I.T. He started with the major threat to the environment is the disposal of waste plastic. In a highway, the potholes and corrugation is the major problem. Plastic pavement will be a better solution to the above stated problems. A material that contain one or more organic polymer of large molecular weight, solid in its finished state, can be shaped by its flow is called as “plastic”. The durability of plastic is high and it degrades very slowly. And also plastic has high resistant to degradation. Plastic can be divided into two major categories- thermoses & thermoplastics. Thermosets have high durability and strength because it solidifies irreversibly when heated, henceforth can be used primarily in construction application. Plastic is a non-degradable waste, causes greenhouse effect and global warming. The various experiments have been carried out whether the waste plastic can be reused productively. The various literature indicated that the waste plastic when added to hot aggregates will form a fine coat of plastic over the aggregate and such aggregates when mixed with binder is found to have higher strength, higher resistance and better performance over a period of time. Along with bitumen, use waste plastic increases its life and smoothness. It is economical and eco-friendly. Addition of plastic waste in construction of pavements reduces the plastic shrinkage and drying shrinkage.

The screenshot displays a Zoom webinar interface. At the top, a status bar shows 'REC', 'Dr. B. Kondraivendhan SVNIT is presenting', and 'Kinjal Mistri and 4 more'. The main content area features a Venn diagram with three overlapping circles: 'Metal' (blue), 'Ceramic' (orange), and 'Polymer' (green). The central intersection of all three circles is labeled 'Composite'. The right sidebar lists participants: Swapnil Adsul, Dr. B. Kondraivendhan SV..., and Bhagyashri Sarde. A Windows watermark is visible at the bottom right.

REC D Dr. B. Kondraivendhan SVNIT is presenting R Rutvi Patel and 8 more You 13

What are waste plastic roads?

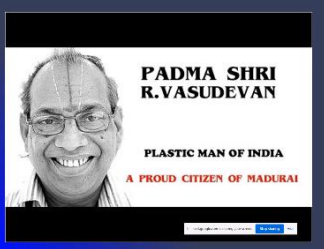
- > The roads constructed using waste plastic, are known as **Plastic Roads**
- > Are found to perform better compared to those constructed with conventional bitumen.



Dr. B. Kondraivendhan SV...
Swapnil Adsul

Activate Windows More options

REC D Dr. B. Kondraivendhan SVNIT is presenting K Kinjal Mistri and 9 more 11:19 AM You 13



Dr. B. Kondraivendhan SV...

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REC D Dr. B. Kondraivendhan SVNIT is presenting Dr. B.K.Vendhan Lecture X

People (21) Chat

Add people Host controls

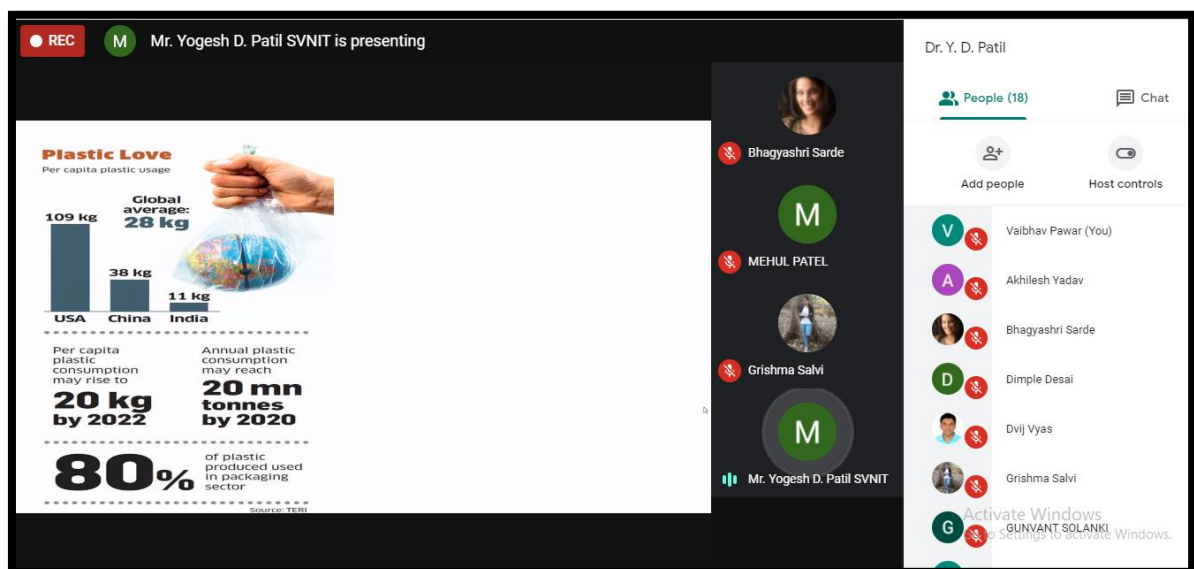
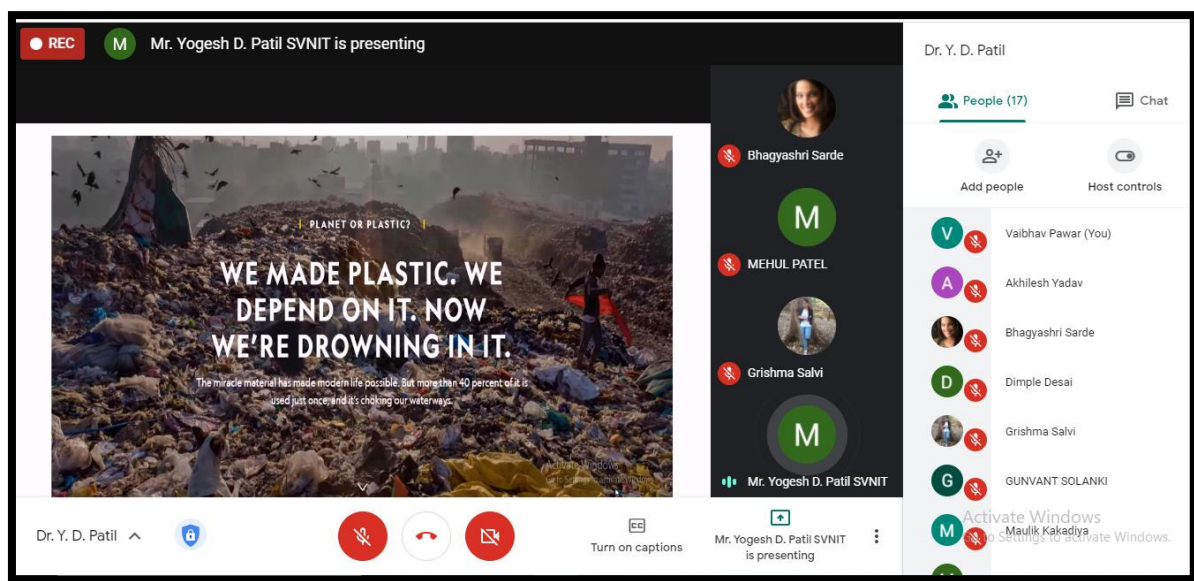
- V Vaibhav Pawar (You)
- Bhagyashri Sarde
- d dhruv patel
- D Dr. B. Kondraivendhan SVNIT
- D Dr. B. Kondraivendhan SVNIT (Present...)
- D Dvij Vyas
- F Activate Windows Go to Settings to activate Windows. (Femangi Patel)

Waste Plastics - As Binder

- > The most used plastics/polymer materials are polyethylene, polypropylene, polystyrene
- > Around 130-140deg.C they get softened without releasing any gaseous products.
- > Various analysis has shown that there is no gas evolution in the temperature range of 130-180°C.

Dr. B. Kondraivendhan SV...

The Afternoon session was on Plastic Pollution in the Oceans: We made plastic. We depend on it. Now we're drowning in it by Dr. Y.D.Patil, Associate professor, He gives Plastic waste is so ubiquitous in nature that it can be found buried deep inside the arctic ocean and floating atop your local beach. It can be found in the surface of the ocean and at the bottom of the ocean miles deep. An estimated 8 million tonnes of plastic that us, humans, produce ends up being in our Mother Planet's oceans – EACH YEAR. If no action is taken, will double by 2030 and projected again to double at 2050. The physical and chemical properties, plastics have found their way into manufacturing of a lot of items. Production has seen a tremendous growth since the 1950s of 2 metric ton per year to 350 in 2015. It is estimated that a whopping 8 billion tons of plastic has been manufactured since 1950. About 30 % of it is still in use, 10 % has been incinerated.



REC M Mr. Yogesh D. Patil SVNIT is presenting

Plastic Love

Per capita plastic usage

Country	Per capita plastic usage (kg)
USA	109
China	38
India	11
Global average	28

Per capita plastic consumption may rise to **20 kg by 2022**

Annual plastic consumption may reach **20 mn tonnes by 2020**

80% of plastic produced used in packaging sector

Source: TEJEE

Bhagyashri Sarde

MEHUL PATEL

Grishma Salvi

Mr. Yogesh D. Patil SVNIT

Dr. Y. D. Patil

People (20) Chat

Let everyone send messages

You 2:56 PM
lecture will start from 3:10 PM (10 min. Late)

Sachin Bhardwaj 2:57 PM
Ok sir

You 3:00 PM

Morning Session Feedback link:
https://docs.google.com/forms/d/e/1FAIpQLSdxhDkz_g5_egjKAAwyRZsJLqUmUTVnymSTHxdOxiLuu98xvqW/viewform?usp=sf_link

Activate Windows
Go to Settings to activate Windows.
Send a message to everyone

REC M Mr. Yogesh D. Patil SVNIT is presenting

Susmit Ilame

MEHUL PATEL

Grishma Salvi

Mr. Yogesh D. Patil SVNIT

Dr. Y. D. Patil

People (20) Chat

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Sachin Bhardwaj 2:57 PM
Ok sir

You 3:00 PM

Morning Session Feedback link:
https://docs.google.com/forms/d/e/1FAIpQLSdxhDkz_g5_egjKAAwyRZsJLqUmUTVnymSTHxdOxiLuu98xvqW/viewform?usp=sf_link

Activate Windows
Go to Settings to activate Windows.
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REC M Mr. Yogesh D. Patil SVNIT is presenting

S Sachin Bhardwaj and 14 more 3:48 PM You

- We can also use waste plastic in form of resin, aggregate, fiber in concrete which is known as "Polymer Composite".
- There are three types of polymer composite in concrete given by Code ACI 548-08.

Polymer Composite

- Polymer Impregnated Concrete
- Polymer Modified Concrete
- Polymer Concrete

- Fully replace ordinary Portland cement in concrete by resin prepared from water bottles(PET) is a new era of research.

Susmit Ilame

MEHUL PATEL

Grishma Salvi

Mr. Yogesh D. Patil SVNIT

Activate Windows
Go to Settings to activate Windows.

Vote of Thanks

Very good afternoon to one and all

On behalf of Department of Civil Engineering, I, Dr. Vaibhav Pawar would like to express my gratitude for successful conduction of two days webinar on **Utilization of polyethylene terephthalate (PET) in Bituminous Pavement”**

First and foremost, Department is very much grateful to GUJCOST for giving opportunity to conduct and providing funding for this webinar

I would like to thank to Dr. Atul K. Desai, Dr. Satyajit Patel, Dr. B.K.Vendhan and Dr. Y. Patil for **sparing their valuable** time with us and for their expert lectures, guidance and remarks during these two days webinar.

I express my sincere thanks to Respected Director of CGPIT, Dr. Rajkumar Patil Sir and Head of department, Dr. Manoj Gundalia for their continuous support and motivation in preparation and execution. Without their help this kind of success would have not been achieved.

I would also like to thank, Dr. Dinesh R, Shah, Provost, UTU and UTU management for their motivation, unending support and guidance throughout preparation for this webinar,

I would like to express my sincere gratitude to coordinator Dr. Vaibhav R Pawar & Mr. Shrinivas Mundkar, If any and team for their dedicated and committed efforts, without whom, this kind of visit would not have been made possible.

Last but not the least; I congratulate to all the participants for their sincere attendance and maintaining high level of discipline throughout the webinar.

Thank you so much