

KnowHow Webinars MasterClass

# Rubber Compounding for Non-Tyre Products

13-17 September 2021



## KnowHow Webinar Experts

E. Palaninathan; Kalyan Das; MN Aji; P. Roy Choudhury; P. Thavamani;  
Priyabrata Ghosh; R. Lakshminarayanan; Samar Bandyopadhyay; UK Prasad

... **315+** Years' Combined Experience in Rubber Processing ...

International Online Training  
for Rubber Processing Industries

Language: English



KnowHow Webinars MasterClass  
**Rubber Compounding for Non-Tyre Products**

**Program Agenda**

Day	Time, Thai	Module	Topic	Speaker
<b>13 Sept 2021</b> (Mon)	10:30-11:00	1	Introduction to Non-Tyre Products Industry	Dr. Samar Bandyopadhyay
	11:30-12:30	2	General Purpose Rubbers	Dr. Samar Bandyopadhyay
	13:00-14:00	3A	Special Purpose Rubbers – Part 1	Dr. P. Thavamani
	15:00-16:00	3B	Special Purpose Rubbers – Part 2	Dr. P. Thavamani
	16:30-17:30	4	Fillers for Rubber Reinforcement	Dr. Samar Bandyopadhyay
	18:00-19:00	5	Rubber Processing Additives	Dr. Samar Bandyopadhyay
<b>14 Sept 2021</b> (Tue)	10:30-11:00	6	Selection of Textiles/Steel Materials for Non-Tyre Rubber Products	Dr. Samar Bandyopadhyay
	11:15-12:15	7	Rubber Vulcanization & Curing	P. Roy Choudhury
	12:30-13:00	8	Compound Formulation Development	Dr. Samar Bandyopadhyay
	13:15-14:15	9	Rubber Mixing Technology & Selection	Dr. MN Aji
	15:00-15:30	10	Rubber Mixing Procedures & Sequence	Dr. MN Aji
	16:00-17:00	11	Rubber Compounds Testing & Quality Control	Dr. Samar Bandyopadhyay
	17:30-18:00	12	Setting-up Rubber Mixing Line	Dr. MN Aji
18:30-19:30	13	Cost Analysis of Rubber Compound	Priyabrata Ghosh	
<b>15 Sept 2021</b> (Wed)	10:30-11:15	14	Extruded Rubber Products: Compound Development	P Roy Choudhury
	11:45-12:30	15	Molded Rubber Products: Compound Development	E. Palaninathan
	13:00-13:45	16	Conveyor Belts: Rubber Compound Development	Priyabrata Ghosh
	14:15-15:00	17	Transmission Belts: Rubber Compound Development	Dr. P. Thavamani
	15:45-16:30	18	Hydraulic Hoses: Rubber Compound Development	UK Prasad
	17:00-17:45	19	Footwear Soles: Rubber Compound Development	Priyabrata Ghosh
	18:15-19:00	20	Metal to Rubber Bonded Products: Compound Development	E. Palaninathan
	19:30-20:00	21	Industrial Rubber Rollers: Compound Development	Priyabrata Ghosh
<b>16 Sept 2021</b> (Thu)	10:30-11:15	22	Rubber Reclaim Application in Non-Tyre Products	Kalyan Das
	11:45-12:45	23	Troubleshooting of Rubber Mixing and Compounding	Dr. MN Aji
	13:15-14:15	24	Case Study - Cost Optimization of Extruded Hose Rubber Compounds	UK Prasad
	15:15-15:45	25	Storage of Raw Materials & Rubber Compounds	Dr. Samar Bandyopadhyay
	16:15-17:15	26	Regulations & Legislations for Rubber Industry	Dr. Samar Bandyopadhyay
	17:45-18:45	27	Reverse Engineering in Compound Development	Dr. Samar Bandyopadhyay
<b>17 Sept 2021</b> (Fri)	19:00-19:30	28	Best Practices of Rubber Chemists	Dr. Samar Bandyopadhyay
	10:30-11:30	29	Rubber Mixing Plant Management	R. Lakshminarayanan
	12:00-14:00	-	Q & A / Discussion	
	15:30-17:30	-	TechnoBiz Knowledge Test: Rubber Compounding for Non-Tyre Products	

Remark: TechnoBiz reserves the right to adjust program agenda due to unavoidable circumstances without prior notification.

Time Zone: The above mentioned time zone Thailand

## Program Content

### Module 1: Introduction to Non-Tyre Products Industry

- Different Non-Tyre Products
- Compound Ingredients used
- Different Process Involved
- Application of Non-Tyre Products
- Different Tests Conducted

### Module 2: General Purpose Rubbers

- Different General Purpose Rubbers
- Structure of NR, BR, SBR and IR
- Structure Property Relationship
- Applications of General-Purpose Rubbers
- Compounding Considerations

### Module 3A: Special Purpose Rubbers – Part 1

- NBR, HNBR, XNBR, PVC-NBR, EPDM, and CR
- Why are They Special?
- Chemical Structure & Influence on Properties
- Manufacturing Methods
- Characteristics of Different Grades
- Curing Systems and their Effects on Properties
- Typical Applications

### Module 3B: Special Purpose Rubbers – Part 2

- ACM, AEM, and FKM Rubbers
- Why are They Special?
- Chemical Structure & Influence on Properties
- Manufacturing Methods
- Characteristics of Different Grades
- Curing Systems and their Effects on Properties
- Typical Applications

### Module 4: Fillers for Rubber Reinforcement

- Different Black and Non-Black Fillers
- Characterization of Black
- Compounding with Black
- Characterization of Silica
- Compounding with Silica

### Module 5: Rubber Processing Additives

- Different Processing Additives available
- Softeners
- Tackifiers
- Peptisers
- Dispersing Agent
- Homogenisers
- Flow Promoters

### Module 6: Textiles / Steel Cord for Non-Tyre Products

- Different Textile Materials
- Properties of Textiles
- Bonding Textiles with Rubber
- Steel Cord Bonding with Rubber

### Module 7: Rubber Vulcanization & Curing

- Vulcanization & Cross-Linking Principles
- Sulfur Vulcanization
- Non-Sulfur Vulcanization
- Accelerator & Curing Characteristics
- Curing Techniques

### Module 8: Compound Formulation Development

- Saturation, Unsaturation, Polar, Non-Polar Materials
- Heat, Oil and Ozone Resistance of Polymers
- Compound Formulation with Ingredients
- Function of Ingredients
- Compound Hardness Concept

### Module 9: Rubber Mixing Technology & Selection

- Rubber Processing Mixers (Banbury & Intermix)
- Functional Parts of Mixers
- New Development in Mixers
- Selection of Mixers based on Applications

### Module 10: Rubber Mixing Procedures & Sequence

- Polymer Preparations & Mixer
- Types of Mixing Procedures
- Mixing Cycle Controls
- Factors affecting Mixing Procedures
- Importance of Sequence in Mixing Steps

### Module 11: Compounds Testing and Quality Control

- Specification and Standards
- Repeatability and Reproducibility
- Different Types of Tests for Rubber Compounds
- Significance of Different Tests
- Quality Control and Quality Assurance

### Module 12: Setting-up Rubber Mixing Line

- Definition Mixing Room/Mill Room Lay-out
- Accessories for Mixing Room/Mill Room

### Module 13: Cost Analysis of Rubber Compounds

- Specific Gravity/Density of Rubber Compound
- Rubber Compound Cost Calculation (Weight / Volume)
- Selecting Correct Materials (Quality vs Cheap Materials)
- Cost Reduction of Rubber Compounds

### Module 14: Extruded Rubber Products: Compound Development

- Extrusion Technique
- Extruded Products for Automotive, Engineering & Medical Applications
- Compounding for Extrusion Product and Mixing Technique
- Selection of Rubber and other Ingredients for Extruded Products
- Curing of Extrusion Products
- Joining of Extrusion Profiles with Adhesive

## Module 15: Molded Rubber Products: Compound Development

- Understanding OEM Material Specification
- Compound Design Criteria Process and Machines
- Impacting Process Parameters
- Compound Validation to Product Performance
- Compatibility of OE Spec and Product Performance
- Defects and Resolution: PDCA
- Typical Formulation for O Ring & Moulded Rubber Product
- Compounding to Improve Productivity
- Best floor Practice to Zero Defect

## Module 16: Conveyor Belts: Rubber Compounds Development

- Function of Rubber Compounds in Conveyor Belts
- Types of Conveyor Belts
- Selection of Rubbers for Different Grades of Conveyor Belts
- Typical Compound Formulations of Different Application

## Module 17: Transmission Belts: Rubber Compound Development

- Types of Transmission Belts
- Key Characteristics of Rubber Compounds used
- Compound Design for Process & Functional Requirements
- How to Create Anisotropic Properties within Rubber Matrix?
- What is Short Fiber Rubber Composites (SFRC)?
- How to process SFRC?
- Curing systems and their Effects on Belt Performance
- Typical Compounds for Particular Applications

## Module 18: Hydraulic Hoses: Rubber Compound Development

- How Hydraulic Hose is defined.
- Constituents of Hydraulic Hose & Functions Defined
- Technical requirements/spec of Wire-Braided Hose
- Compound Features/Parameters for Compound Development
- Compound Development Steps.

## Module 19: Footwear Soles: Rubber Compound Development

- Introduction of Microcellular (MC) Soles
- Types of MC Soles and Compounding Ingredients Requirement
- Typical Compound Formulations for MC Soles and Straps
- Mixing Procedures and Vulcanization
- Application of Safety Shoe Soles
- Typical Compound Formulations for Safety Shoe Soles

## Module 20: Metal-Rubber Bonded Products: Compound Development

- Metal Type & Preparation
- Understanding the Chemistry of Bonding
- Selection of Bonding Agents & Application
- Compounding influence on Bonding
- Testing of Bonding
- Performance Evaluation of Bonding.
- Best Practice for Bonded Product Manufacture
- Product Bond Failure Analysis

## Module 21: Industrial Rubber Rollers: Compound Development

- Introduction to Industrial Rubber Rollers
- Properties of Rubber Rollers
- Types of Rubber and their Characteristics
- Production Processes and Process Flow-chart
- Typical Compound Formulations for Rubber Rollers

## Module 22: Rubber Reclaim Application in Non-Tyre Products

- Introduction to Sustainability & Reclaimed Rubber
- Advantages of Reclaimed Rubber
- Different Types of Reclaimed Rubber
- Unique Properties of Each Reclaimed Rubber grades
- Applications of Different Reclaimed Rubber grades
- Effect of Reclaimed Rubber on Compound Properties

## Module 23: Troubleshooting of Rubber Mixing and Compounding

- Common Problems Experienced in Rubber Mixing
- Data Sheet for Troubleshooting Analysis
- Approach towards Troubleshooting
- Importance of “Genbutsu-Genba” in Troubleshooting

## Module 24: Case Study - Cost Optimization of Extruded Hose Rubber Compounds

- Basic Rubber Compound Frame.
- Constituents of Hydraulic Hose & functions defined.
- Technical Requirements/Specification of Compound.
- Cost Contributing Factors/Materials.
- Analyze the Factors.
- Make the Framework for Cost Optimization.

## Module 25: Storage of Raw Materials & Rubber Compound

- Storage Facilities and Importance
- Good Practices of Raw Rubbers Storage
- Good Practices of Rubber Chemicals Storage
- Good Practices of Rubber Compound Storage

## Module 26: Regulations and Legislations in Rubber Industry

- New Regulations for Rubber Industry
- Categorization of Rubber Materials
- Toxicity Data of Different Rubber Chemicals
- Use of Non Petro-based materials
- Benefits of use of Natural Rubber
- Safe Oils
- Reduction of use of Zinc Oxide

## Module 27: Reverse Engineering in Compound Development

- Steps Involved in Reverse Engineering
- Basic Needs for Analysis of Elastomer Products
- Tools Required for analysis
- Different Analysis Steps
- Flow Diagram
- Formula Reconstruction
- Points to be remembered during Reverse Engineering

## Module 28: Best Practices for Rubber Chemists

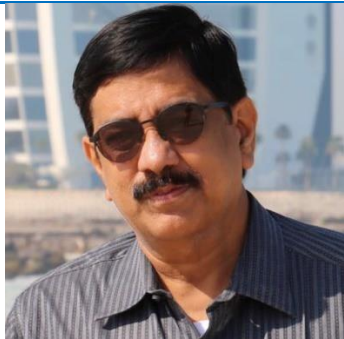
- Best Practices for Chemical Test Laboratory
- Best Practices for Mechanical Test Laboratory
- Laboratory Quality Management Systems

## Module 29: Rubber Mixing Plant Management

- Arrival & Storage of Raw Materials
- Plant Layout & Activities
- Mixing in Kneader
- Quality Control & Troubleshooting
- Safety & Housekeeping

- Energy Management

## Experts / Presenters



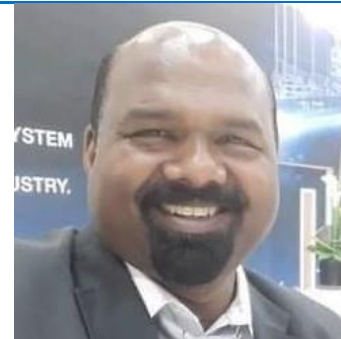
**E. Palaninathan**

34+ Years of Experience in Rubber Products Industry with specialization in Process Control, Compounding, Raw Material Specification, Alternate Material, Product Development, Process improvement & Trouble shooting.



**Kalyan Das**

27+ Years of Experience in Rubber & Tyre Industries with specialization in Compounding, Mixing, Tyre Building, Curing, Rubber Chemicals and Rubber Reclaim.



**Dr. MN Aji**

27+ years of experience with specialization in Rubber Mixing Processes and Mixing Technology of Tangential, Intermeshing, Tandem and Kneader and Maintenance of Equipment, Rubber Mixing Troubleshooting etc.



**P. Roy Choudhury**

35+ Years of Experience in different Rubber Industries with specialization in Product Development, Reverse Engineering, Process Troubleshooting, Rubber Testing etc.



**Dr. P. Thavamani**

30+ Years of Experience in Rubber Industry with specialization in Rubber and Plastics Research and Technology and Product Development, Quality Assurance, Six Sigma etc.



**Priyabrata Ghosh**

47 Years of Experience in Rubber Industries with specialization in Rubber Compounding and Processing, Product Design & Development, Troubleshooting and Cost Reduction.



**R. Lakshminarayanan**

50 Years of Experience in the Rubber industry (non-tyre segment) with specialization in Automotive OEM Rubber Parts, Wrapped V Belts, Raw Edge V Belts, Textile Cots and Aprons, Oil Seals, O-rings etc.



**Dr. Samar Bandyopadhyay**

28+ Years of Experience with Specialization in Rubber & Tyre Compounding, Material Selection and Testing, Product Development, Laboratory Assessment and Management.



**UK Prasad**

39 Years of Experience with Specialization in Product, Process & Material Development in Industrial & Automotive Hose & other Industrial Products such as Wire & Cable, Belts & Rubber to Metal-bonded Products.

## Registration Guidelines

<b>Registration Fees</b> <ul style="list-style-type: none"> <li>• Member: 750 US\$</li> <li>• Non-Member: 975 US\$</li> <li>• Group (5-Pax): 2,350 US\$</li> </ul>	<b>Remarks:</b> Registration fee includes Training Documents, Certificate of Participation and TechnoBiz Knowledge Test Report. VAT 7% Taxes and Payment Processing Fees will apply on registration fees. Confirmed participants will receive a separate link for each module two days before schedule time.
<b>Registration Form :</b> <a href="https://webinars.technobiz.org/event-form-18760/">https://webinars.technobiz.org/event-form-18760/</a> Please register online at the above link. Immediate registration confirmation note will be sent along with invoice. Participants have payment methods options of <i>bank transfer</i> or <i>credit card</i> (via Paypal) payments as per their convenience. 100% of Invoice value must be paid.	

### Participant Guidelines

- Confirmed participants, who have paid registration fees will receive a separate link for each module two days before schedule.
- Participants are required to have a stable & high-speed internet to access this online program.
- If registered participant misses any of the modules due to other commitments and prior engagements, participants can view the recorded version of module at an additional fee of 50 US\$++/Module/Person at preferred schedule.
- Participants who join all modules as well as knowledge test will only receive “**MasterClass Certificate**”.
- There will be a short Q&A session after each module. Detailed Q&A session is scheduled on the last day of program. Participants are encouraged to utilize this opportunity to get assistance from all the experts.
- All registered participants will receive copyrighted training document in PDF format.
- Registered participants are required to login 10 minutes before each module starting time on each day.

### TechnoBiz Knowledge Test

- This program has 2-hour long “TechnoBiz Knowledge Test” (online) on the last day of the program with focus on “Rubber Compounding for Non-Tyre Products”. The question format is “true/false” and “Multiple Choice” type questions for the participants to answer. All participants will receive a “**TechnoBiz Knowledge Test Certificate**” with score in PDF format. Interested non-registered participants can also register for this test only at a registration fee of 30 US\$/Person to assess their knowledge on this subject.

### Private Q & A Session

- KnowHow Webinar Experts offer private Q&A Session for individual companies on specific topics based on their expertise. The length of Private Q&A session (Online) is 2 hours long. The registration fee/expert for this session is 650 US\$/company/2hrs. Maximum of 5 participants from the same company can join in this Q&A session. The session schedule will be arranged as per mutual convenience of company and expert. The registered company is required to send background information and list of issues to be discussed in advance (at least 3 days before agreed schedule). Extra fees apply for additional time for the Private Q&A session over 2 hours. For more information and assistance, please send an email to [peram.technobiz@gmail.com](mailto:peram.technobiz@gmail.com).



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