



**Venue**  
Hotel Ciputra  
Jakarta

[www.rubber-industry.org](http://www.rubber-industry.org)

Understanding of rubber compound formula design, mixing the compound and processing the rubber compound in forming processes like extrusion and injection molding including rubber to metal parts is decisive for a successful manufacturing of rubber parts. Performance of parts manufactured with rubber depends not only on the composition of the rubber compound but also on the fact that all processes are running inside a process window, which must be identified. A precondition is the knowledge, why a process behaves the way it does. It is important to consider rheology, relaxation and other phenomena, which influencing stability and quality of the process and may cause even part failure, specifically in dynamic application. The process of development a rubber part starts with the compound formula design based on customers needs and most likely a specification. State of the art knowledge about formulation design enables the compounder to fulfill his responsibility on material cost, while his responsibility reaches out to process conditions, quality consistency and part performance during service life. The polymer and the ingredients used in the formula have not only a relation to properties and processing performance, but they effect the majority of the total manufacturing costs.

In rubber product manufacturing everything starts with mixing. Failure in mixing process design can hardly be corrected in the next manufacturing steps. Extrusion and Injection Molding of rubber are multi-parameter and multi-factor processes (machine, die or mold interact with the material and affect each other). Even the adhesion in molding process depends not only on the rubber compound but also on the process design. No matter, how efficient the process management, the most important factor is COST. Cost management practices of raw materials and process cost are key aspects to gain competitive advantage on overall operations of the rubber industry.

This course is designed to review and submit a detailed knowledge of the rubber manufacturing process starting with a review of rubber part specification, compound formulation and process design including strategies how to get on top of the number of influencing parameters and not drowned. The participant will learn and practice how to find and use relations between material and process by directed experimentation with the knowledge about materials and their behavior important in manufacturing. Methods and tools are illustrated, which enable the responsible teams to understand the relation between material and process. At the end of the course, the participant should be in a position to gain a detailed understanding with the focus on the most important relationships in rubber manufacturing. This course is aimed for every technical person as well as top management in the rubber processing.



**Instructor:**

**Dr. Hans-Joachim Graf**

Hans-Joachim Graf has over thirty years' experience in the rubber industry. He was first with manufacturing companies for pharmaceutical and technical rubber parts. He then joined DESMA a manufacturer of Rubber Injection molding and polyurethane shoe machines responsible for process development, followed by Rhein Chemie as senior manager of material developments for rubber industry. After Cooperstandard Automotive(CAN), division of profile extrusion, as a director of materials, he joined WOCO (GE), a manufacturer of injection molded parts in charge for material development. Since retirement he act as a consultant in the rubber industry and science adviser for TechnoBiz-group. Mr. Graf has authored over 60 publications and paper presentations and invented more than 15 patents. He has given seminars for graduates at University of Waterloo and German Institute Rubber Technology (DIK). He is a member of the American Chemical Society (ACS), Rubber Division of ACS (RdofACS), Deutsche Chemische Gesellschaft (GDCh) and Deutsche Kautschuk Gesellschaft (DKG). He received his diploma degree from University of Mainz and his doctorate in polymer chemistry from University of Freiburg, both Germany. During DKT'12 (German Rubber Conference 2012) he was awarded with the Erich-Konrad Medal of the DKG.

### Program Outline

- **Rubber Products, Raw Materials & Chemicals:** Specification, Function, Compatibility & Selection
- **Compound Formula Design:** Ingredient-Property relations; Functions of Materials in a Rubber Compound; Polymer, Filler and Process oil as the Basic Building Block; Cross-linking and Accelerator System in relation to Part and Processing Performance.
- **Compound Performance Optimization & Case Studies:** Formula Development Methods and Tools; Usage of Raw Material knowledge; Formulation Case Studies
- **Mixing of Rubber:** Mixing Equipment, Interaction of Mixing Process with Rubber; Review of Mixing Process Design regarding Polymer Changes and Dispersion
- **Extrusion of Rubber:** Influence of Screw, Head and Die Design; Rubber Formulation for Extrusion considering Residence Time and Distribution; Influence of Rheology Behavior and Ingredients on Surface Aspects
- **Injection Molding:** Injection Molding Process: Analysis from a Compounders Perspective; Comments on Injection Mold Design; Compounds for Injection Molding
- **Rubber to Metal Bonding:** The Physics and Chemistry of Adhesion; Rubber to Metal Adhesion an manufacturing; Material and Process Considerations in Molding Rubber to Metal Parts
- **Cost Management & Reduction:** Raw Material Management and Control; Cost Saving Opportunities in Compounding, Extrusion, Injection Molding and aslo General Considerations on Improving Process efficiency.

### Registration Fee

- **1,500 US\$/Person**  
This includes documentation, lunch and refreshments.

### Remarks:

- **Early Bird Registration Discount:** 10% discount, if register before 15 Feb 2018. 5% discount, if register before 15 March 2018.
- **Group Registration Discount:** 10% discount for the group of minimum 3 delegates from the same company.
- VAT 7% applies on above registration fees.

Register before  
15 Feb 2018

Get a Free Book  
"Cost Reduction  
in Rubber Processing"

Price: 250 US\$/Copy



To register, please contact

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