PLASTIC PARTS MASTERCLASS SERIES

Automotive Plastic Parts Design

3-DAY HIGHLY INTENSIVE WORKSHOP

Embrace the Future of the Industry

Detailed discussion and examples of: Safety Systems, Powertrain, Interior Components, In-Mold Assembly, Squeaks & Rattles, Integral Seals

6th (Mon), 7th (Tue) & 8th (Wed) August, 2018
Istana Hotel, Kuala Lumpur

13th (Mon), 14th (Tue) & 15th (Wed) August, 2018
Millennium Hilton, Bangkok

8th Edition of Designing Plastic Parts for Assembly by Paul Tres priced **US$160** **FREE** for the first **25** registered participants

World-Class Workshop Moderator

Paul A. Tres is a best selling author and an international speaker and lecturer on plastic product development and design having over **40 years** of experience in design, marketing, selling and manufacture of plastic components and systems while serving the plastics and automotive industries. A reknown speaker with over **17,400 attendees worldwide**!

EXCLUSIVE PRESENTATION MATERIALS

Each participant will take back a highly informative reference Binder with 1,200 colour slides (320 pages). This resource material is exclusively for the participants and not available in Book stores.

Organised by
FIK INTERNATIONAL
Est. 1998

Registered with
HRDF MALAYSIA

Supported by ETS, USA
ETS
www.ets-corp.com

For details contact:
Tel: (603) - 9200 8500
Fax: (603) - 9281 1176
email: vanan@fikintl.com
matt@fikintl.com
www.fikintl.com

ABOUT OUR WORKSHOP LEADER - PAUL A. TRES

Paul A. Tres is Senior Technical Consultant with ETS, Inc. of Bloomfield Hills, Michigan (www.ets-corp.com) serving the plastics and automotive industries. Author of a variety of seminar manuals, technical and marketing papers, including the best selling textbook **Designing Plastics Parts for Assembly, 8th edition**, published by Carl Hanser Verlag of Munich, Germany (2017) and computer software for automotive plastic part design.

Speaker, educator and lecturer at numerous national and international plastics seminars and conferences, with over **17,400 attendees worldwide**, for: American Plastics Council, ASME, SAE, SME, SPE, Grand Valley State University, Polymers Center of Excellence, Purdue University, University of North Carolina, University of Wisconsin - Milwaukee and Madison, etc.

Paul Tres is a Fellow of the International Society of Plastics Engineers. He is also an active contributor and member in Plastics Academy, International Society of Automotive Engineers and American Society of Mechanical Engineers.

Mr Tres is also a highly sought-after expert witness having assisted such law firms as: Griffin & Szipl P.C.; Kreis, Enderle, Callander & Hudgins, P.C.; Lynn, Jackson, Shultz & Lebrun, P.C.; Morgan, Lewis & Bockius, LLP; Sellars, Marion & Bachi and many others.

In 2007, Mr Tres presenting for FIK International has shared his extensive experience to over 200 delegates in Kuala Lumpur, Bangkok and Mumbai. He received excellent remarks and ratings from the participants.

COURSE DESCRIPTION

This three-day in-depth automotive seminar provides information on material selection, design procedure, processing techniques, and assembly methods required for designing with plastics in the automotive industry. Attendees will focus on what to expect from a polymeric material and discuss methods and methodologies used to simplify the design process and fully **comply with FMVSS.**

In addition, this course will enable the automotive OEM and the supplier to communicate more effectively. The OEMs will learn how to apply these concepts to their work, thus allowing for cost-efficiencies and fewer second thoughts when they understand the scientific basis, and the fine tuning that comes with experience.

A number of case histories, including 12 short videos, will show you step-by-step procedures to successful and robust designs. Plan to come prepared with questions to ask or experiences to share.

WHO SHOULD ATTEND

This course is targeted at Designers, Product Managers, Project Managers, Research Engineers, Quality Engineers, Materials Engineers, Sales and Product Development Engineers and managers, lecturers, undergraduate and graduate students or anyone involved in the development and manufacture of plastic products.

Its content is intended for a variety of industries such as automotive, medical, aerospace, furniture, packaging, computers, electronics, construction, recycling, consumer products, agricultural machinery, toy industry, fast food industry, and other industries which use plastic components in their products.

BENEFITS OF ATTENDING

- Understand advanced concepts for automotive design
- Learn how to define and use safety factors
- Determine the optimum methodology
- Utilize commercially available software
- Learn how to select materials
- Predict the behavior of plastic materials

WORKSHOP TIMING FOR ALL 3 DAYS:

08:00 AM	Registration
08:30 AM	Workshop commences
10:00 AM	Morning Refreshments (15 minutes)
12:45 PM	Networking Luncheon
02:00 PM	Workshop Resumes
03:15 PM	Afternoon Refreshment (15 minutes)
04:30 PM	Workshop Ends

Testimonials by our delegates on Paul Tres presentations

"A very informative course that opens the mind of plastic part designer."
Design Engineer, Panasonic Air-Cond, Malaysia

".....This is a good training course for design engineers and they should not miss it. It links the daily practical work to theory."
- **R&D Manager, Sony, Malaysia**

"Very useful & very clear." - **R&D Engineer, Perodua, Malaysia**

"Excellent Training."**- Mechanical Engineer, Siemen VDO, Malaysia**

"It has been a very informative and straight to the point seminar."
General Manager, Impact Colours, Malaysia

"Excellent presentation and content."
Design Engineer, Powertrain, Petronas

"Very informative & good training course."
- R&D Engineer, Perodua

"Both presentation and content are excellent."
Product Engineer, Union Plastic, Thailand

"Very Good Information."
QC Engineer, Grand Siam Composites Co, Ltd, Thailand

"Excellent programme to upgrade technical skills to meet future technology requirements." - **R&D Engineer, Maruti, India**

"Case studies were very informative and content of the workshop was excellent."
R&D Manager, Eicher Motors, India

"Very good. A straight forward capsule." -
Material Engineer, Ashok Leyland, India

"The presentation skill is very impressive."
Designer, Tata motors, India

"Good training. Improved the knowledge on large extend."
Design Engineer, Force Motors, India

3-Day Course Program

Day 1

PLASTICS MATERIALS AND AUTOMOTIVE TECHNOLOGIES
North American Automotive Plastics Usage by Segment
Interiors: Infotaiment, Instrument Panel
Exterior: Mega Front End Module
Underhood: Upper Engine Module, Brake-by-Wire, Steer-by-Wire, Active Suspension
Powertrain/Chassis: Hybrid, Fuel Cells, Electric Vehicles, Composite Brakes

UNDERSTANDING AND SELECTING PLASTIC MATERIALS
Resins: Thermoplastics & Thermosets; Water Assist Injection Molding
Automotive Case History: Fuel Tank
Mucell, Structures: Crystalline, Amorphous & LCP
Inherently Conductive Polymers (ICP), Plastic Magnet, BioSteel
BioPolymers, Light Emitting Polymers, Nanotubes
Reinforcements: Glass, Aramid, & Carbon + Carbon Nanotubes
Fillers: Talc, Mica, Calcium Carbonate, Wallostonite, Glass spheres
Additives, Effect of Additives, Physical Properties, Elasticity, Toughness, Plasticity, Notch Sensitivities, Moisture Sensitivity, Shrinkage, Creep, Stress Relaxation, Automotive Thermal & Chemical Characteristics

MATERIAL INITIAL SELECTION & SCREENING
Thermal Behavior, Automotive Chemicals
Automotive Case History: Honda Lumbar Support Mechanism
Impact, Specific Gravity & Cost, Engineering Properties
Snap Fits & Hiving Hinges, Assembly Methods

UNDERSTANDING SAFETY FACTORS
What is a Safety Factor?
Using Safety Factors in Automotive Design
Design Safety Factors: Static, Dynamic, Time Related
Material Properties Safety Factors: ISO 9000, Continuous Improvement
Processing Safety Factors, Operating Condition Safety Factors
Reliable Automotive Brands, Legal Aspects of Automotive Business

PROPER AUTOMOTIVE PLASTIC PART DESIGN
Boss Design for Different Type of Polymers
Case History: 1952 De Havilland Comet
Boss Design Layout, Ribbing: Dimensions, Junctions
Automotive Case History: BMW 550i & 750i Transmission Mount
Wall Thickness, Fillets, Part Stiffness, Undercuts
Draft Angles: Core Vs. Cavity, Texturing

STRENGTH OF MATERIALS FOR PLASTICS
Stresses: Tensile, Compressive, Shear, Torsion, Elongations (Strains)
True Stress and Strain Vs. Engineering Stress and Strain
Poisson's Ratio, Elastic Modulus
Young's Modulus, Secant Modulus, Tangent Modulus
Which Modulus to Use, and How to Use It

NON-LINEAR CONSIDERATIONS
Material: Linear and Non-Linear Polymer Models
Geometry: Linear and Non-Linear Models
Finite Element Analysis (FEA) and How to Use It
Non-Linear Considerations
Behavior Modeling (BMX), ISight - Design of Experiments
DFMPro Injection Molding Pro/E Assistance Module
TRIZ: Theory of Solving Problems Inventively

ULTRASONIC WELDING
Equipment, Vibration Types, Ultrasonic Cycle
Design: Shear Joint & Energy Director Joint
Heat Stake Joint Design: Flash, Hollow, Spherical
Spot Welding, Swaging, Stud, Heat Staking
Post Design: Round Solid, Round Hollow, Cross

HOT PLATE WELDING
Equipment , Process
Joint Area Strength Capability, Joint Design;
Automotive Case History: Mercedes-Benz Windshield Washer Bottle

Day 2

VIBRATION WELDING
Equipment, Process
Phases, Cross-thickness
Joint Design, Welding Glass Reinforced Polymer, Fixture Design
Automotive Case History: PSA Peugeot Citroën - Diesel Engine AIM & VW Sharan

ELECTROMAGNETIC WELDING
Equipment
Induction Coil Materials
Bonding Agent
Joint Design
Automotive Case History:
Mitsubishi Motors - Power Steering Fluid Reservoir

LASER WELDING
Surface Heating & Through Transmission
Joint Designs, Examples
Automotive Case History: Mercedes Ignition Key

BONDING
Failure Theories: Adhesive, Cohesive
Substrate Wettability Tests, Drafting Symbols
What is Surface Energy and How to Improve It
Surface Treatments: Corona, Plasma, Flame
Bonding Stresses: Tensile, Shear, Peel, Cleavage, Compression
Joint Designs
Automotive Case History: Chrysler CCV Car Program
Stress Cracking, Adhesives, Solvents

AUTOMOTIVE PAINTING
Adhesive Promoters, Primers, Base Coat, Top Coat
Painting Considerations, Painting Work Flow
Power Wash Parameters
Automotive Case History: Mercedes-Benz Wheel Hub Cover

PRESS-FITS
Material Properties, Geometric Definitions, Safety Factors, Creep, Loads
Press-Fit Theory
Design Algorithm Methodology
Case History: Cassette Deck
Automotive Case History: Upper Intake Manifold
Fusible Core Injection Molding
Upper Intake Manifold Design Requirements
CAMPUS (Computer Aided Material Preselection by Uniform Standards)
Design Algorithm
Case History: Successful Press-Fit Designs

LIVING HINGES
Design for Polyolefins
Common Living Hinge Design
Design for Engineering Plastics
Design Analysis
Elastic, Elastic/Plastic, Plastic Hinge Designs
Automotive Case History: Delphi World-Class Connector
Step-by-Step Design Analysis
Automotive Case History: V-6 Ignition Cable Bracket
Molding Hinges, Processing Issues
Coined Hinges
Class Exercise #1: Design, Material Selection & Tooling
Oil-Can Terminology & Concepts, Oil-Can Designs
Software Demo for Designing Living Hinges

TOOLING CONSIDERATIONS
Gate Design: Direct, Edge, Film, Fan, Tunnel, Pin
Sprue, Spoke, Disk, Diaphragm, Valve, Hot Runner
Reverse, Z, & Ring Sprue Puller, Design Formula
Runner Design: Runner Cross-Section
Runner Layout: Herring Bone, H-Type, Star

3-Day Course Program

Day 3

SNAP FITS
Material & Design Considerations
Assembly Positioning, Assembly Motions, Yield Criteria
Safety Factors & Cantilever Snap-Fits
Snap-Fits: Angle of Deflection, Self-Locking Angle
Automotive Case History:
One-Way Continuous Beam with Rectangular Cross Section
Finite Element Analysis Example
Case History: Hewlett-Packard Omnibook
Class Exercise #2: Cantilever Beam Calculation
Annular Snap-Fits:Shallow Groove, Deep Groove
Case History: Pen & Cap
Torsional Snap-Fits
Automotive Case History: GM World Class Connector
Case History: Snap-fits Which Kill
Deformable Rib Design, Springiness Rate, Automotive Recyclability
Symbols for Plastics - - Class Exercise - Cantilever SNAP-FIT
Assembly-Disassembly Assists, Preventing over-deflection
Automotive Case History: Lumbar Support Actuator
Tooling for Snap-Fits, Issues with Snap Fitting
Case History: Injection Blow Molded Bottle Assembly
Serviceability, Conclusions, Software Demos

AUTOMOTIVE INTEGRAL SEAL DESIGN
Design Issues: Integral Seal - Design A & Design B
Structural Analysis: Step 1 through 7, Material Model
Engineering Stress-Strain Curve
True Stress-Strain Curve - Plastic Region
Analysis Results: Total Displacement, Von Mises Stresses
Simulating Leak Through Seal 1 & Through Seal 2
Processing Issues, Drying, Melt Temperature
Injection Rate, Screw Forward Time, Mold Temperature
Tool Design: Mold Closed - Part Filling

OVER-MOLDING AND IN-MOLD ASSEMBLY
Reasons for Multi-Material, Materials Compatibility, Pulsafe FitLogic
Part Design & Material Selection, Materials Incompatibility For IMA
Indexing (Rotating Platen) Tool, Mold with Core Retraction
Automotive Case History: TRW Louver Assembly

TROUBLESHOOTING
Air Traps, Black Specks, Burn Marks, Dark Stripes
Flashing, Flow Marks, Hesitation, Jetting
Peeling, Sink Marks, Shrinkage, Splay, Sprue Sticking, Unfilled Parts
(Short Shots), Unmelt, Warpage, Waves, Weld lines
Class Exercise #3: Rim

FASTENERS
Self-Threading,Tread Forming, Recessed Driving Heads
Clamp Load Vs. Time
Torque Vs. Penetration Depth
Type AB, Type B, Type C, Hi-Lo, PT,
Free Body Diagram, Pullout Load Vs. Engagement Area
Assembly Stress, Plastic Boss Design for PT Fasteners
RS Plast, Delta PT , Polyfast, and Plastite Thread Designs
Automotive Case History: Threaded Assembly Calculation
Weld and Meld Lines
Thread Cutting: BF, T, Hi-Lo, RS Duroplast, & Duro PT
Pilot Hole Design Detail
PLASTIC PART DESIGN ON THE WORLD WIDE WEB

Testimonials - US delegates

"Overall one of the best courses for automotive plastics I've attended in 20 years."
Stephen T. Green, Principal Engineer - Consolidated Metco

"This is likely the most informative class I've ever taken"
Jeffrey Lubbers, Development Engineer - Mercedes-Benz

"What a value to be with such an expert!"
Michael Blicher, CGM Director - Magna International

"Mr. Tres is very experienced, knowledgeable and an excellent speaker - a rare combination."
Scott Jarman, Sr. Manufacturing Engineer - Tyco Electronics

"The book and binder are awesome."
Simon Anderson, Design Intern - Kostal of America

"Very helpful in troubleshooting problems with current suppliers. Paul very knowledgeable - would highly recommend him."
Sean Rountree, Parts Quality Engineer - Mercedes-Benz US International

"Best course at Daimler Trucks North America, very detailed, yet very practical."
Michael Health, Senior Engineer - Daimler Trucks North America

"I liked the vast array of topics covered, very diverse and helpful."
Michael Rice, Product Development Engineer - Hella Electronics

"Injection molding and snap-fits were most helpful for what I do day to day, as well as supplier visits, to understand processing defects."
Antonio M. Johns III, Parts Quality Engineer - Mercedes-Benz US International

"I liked the broad coverage of material. Gave me a good idea of what I would like to expand on."
Kevin Gluski, Design Engineer - Toyota Boshoku America

"This was one of the best courses I have ever taken because it relates to directly what I do. I now have more confidence with my designs!"
Erik Oberg, Engineer - Toyota Motor Engineering & Manufacturing

"Having no previous background - my general knowledge of plastics was greatly improved. I can use this information and apply it to many different applications at the plant."
Christie Makrickas, Associate Technical Specialist - Honda Manufacturing of Alabama

"Real case studies are great."
Adam Gofton, Product Engineer - Yanfeng Automotive Interiors

"Great job!"
Fumiaki Tago, Mechanical Engineer - Panasonic Automotive Systems Company of America

"He was very knowledgeable and could explain concepts in a way that was easy to understand - had up to date info on newest methods and interesting case histories."
Zoe Carlin, Staff Engineer - Honda R & D Americas

"Interesting speaker. Very knowledgeable."
Peter Boucher, Manufacturing Development Engineer - Hewlett-Packard

"This was well organized and presented - Excellent!"
Greg Perez, Manufacturing Engineer - Ford Motor

REGISTRATION CONTRACT

Please complete this form and email to vanan@fikintl.com or fax it to (603) 9281 1176

A. Delegate's details

1. Name : _____

Position : _____

Email : _____

2. Name : _____

Position : _____

Email : _____

3. Name : _____

Position : _____

Email : _____

4. Name : _____

Position : _____

Email : _____

5. Name : _____

Position : _____

Email : _____

B. Organisation : _____

Address : _____

Town : _____

State : _____ Postcode : _____

Nature of Business : _____

Tel: _____ Fax: _____

C. The Invoice should be directed to Mr/Ms (Dept):

Name : _____

Dept : _____

Tel: _____ Fax: _____

Email: _____

D. Authorising Manager's details

Name : _____

Position : _____

Tel: _____ Fax: _____

Signature : _____

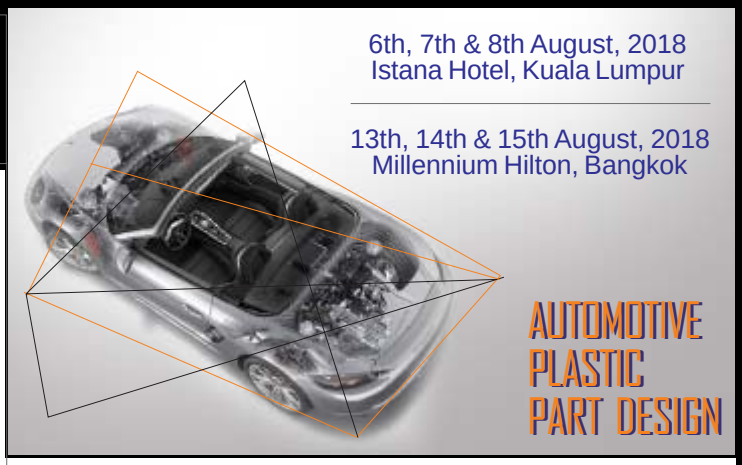
Date : _____

This booking is invalid without a signature

REGISTER NOW

Contact Vanan or Matt
FIK Research Centre Sdn Bhd
23-1, Jalan 2/76C, Desa Pandan,
55100 Kuala Lumpur, MALAYSIA

☎ (603) 9200 8500 / 92811175
🖷 (603) 9281 1176
(603) 9281 1176
vanan@fikintl.com or matt@fikintl.com
www.fikintl.com



3-Day Fee Per Delegate

	Fee
☐ Booked before 20th June, 2018	**US$1590**
☐ Booked after 20th June, 2018	**US$1690**

Fee includes documentation, refreshment & lunch.

METHOD OF PAYMENT :
Payment is required within **10 working days** from the invoice date.

1) Cheque : Made payable to **FIK Research Centre Sdn Bhd**

2) Bank : Maybank, Desa Pandan Branch, Kuala Lumpur
Account Number : **514543136325**

(Quoting your Company Name and **our invoice no** as reference)

CANCELLATIONS & SUBSTITUTIONS : All cancellations of registration must be made in writing. If cancellation is received before 20th June, 2018 you will be entitled to a 50% refund. Regrettably, no refund will be made for cancellation after 20th June, 2018. However, a complete set of documentation will be sent to you. Substitutions are welcomed at anytime.

NOTE : It may be necessary for reasons beyond control, to change the content and timing of the event, speaker(s) or venue. Every effort will be made to inform the participants of the change. FIK International should not be held liable for any costs arising from this change without prejudice.

HOTEL ACCOMMODATION : Accommodation is not included in the workshop fees. To reserve accommodation at the workshop venue, please contact:

- **Kuala Lumpur** - Cik Ezziati, Sales Executive, Istana Hotel, at (603) 2141 9988
- **Bangkok** - Siriwan, Key Account, Director, Millennium Hilton at (662) 4422445 (D/L)

and inform that you are attending FIK International event.

FIK INTERNATIONAL

Singapore Mumbai Shanghai Hong Kong
Jakarta Bangkok Manila Kuala Lumpur