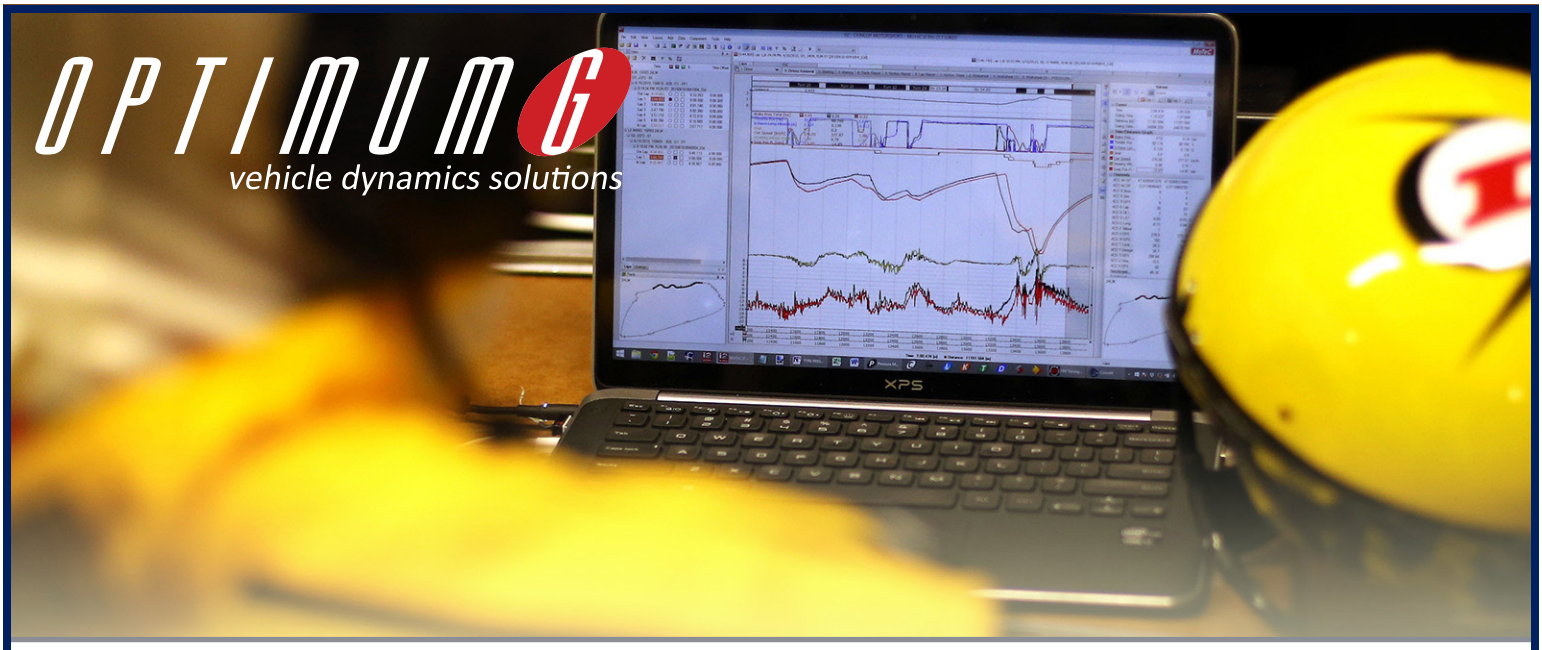
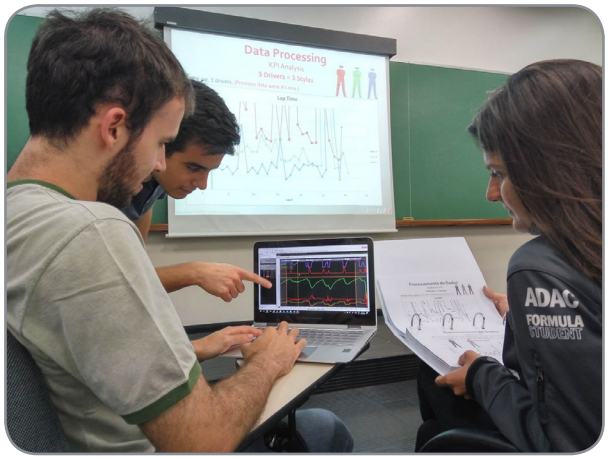
OPTIMUMG
vehicle dynamics solutions



Data Driven Performance Engineering Seminar



The new generation of data and performance engineer needs specific skills to process large amounts of data and make decisions to help the race engineer. They also have to correlate this data against simulation in order to guide their drivers, designers, and race engineers to maximize the performance envelope of the car.

This seminar will give attendees the understanding, techniques, and skills they need to put this into action. Attendees will be exposed to the same practices being successfully applied by OptimumG engineers in categories including: LMP1, 2, and 3; GTE; GTLM; V8 Supercars; Brazilian Stock Car; and Blancpain GT Series. Practical and useful techniques—that can be directly applied to the series you are working in—will be taught.

2019 Schedule

January 12-15	Oxford, UK
April 5-8	Magny Cours, France (in French)
November 15-18	Cologne, Germany
December 15-18	Indianapolis, Indiana, USA
December 16-19	São Paulo, Brazil

FS Summer University - Graz, September 2-21
This seminar, open only to students and recent graduates, is a combination of Applied Vehicle Dynamics and Data Driven Performance Engineering. Cost: $2,200.00 US.

Student Pricing Information:

Early Registration
Individual Price: $625.00
Group of 3 or more: $545.00/student

Regular Registration
Individual Price: $745.00
Group of 3 or more: $625.00/student

"Combo" pricing available if you register for this seminar and the Applied Vehicle Dynamics seminar.

For more information, contact susanne.chastain@optimumg.com

"It would be incomplete to speak about this seminar in just a simple word. The very concrete, rigorous, and exhaustive content makes this education opportunity invaluable for those in the racing car business."
- Pascal Vasselon, Toyota F1 Technical Director, Michelin F1 Project Manager

What to expect

Each seminar participant is required to bring their own laptop. OptimumG engineers will train you to use KPIs (Key Performance Indicators) to perform useful simulations and analyze car and driver data. Each participant will also receive a one-month trial version and guided exercises of OptimumLap, OptimumKinematics, OptimumTire, and OptimumDynamics.

What To Measure Before Testing The Car on Track

Chassis straightness • Some basic quality control: measurements of the suspension parts dimensions • Setup pad preparation • The importance of dummy dampers • Car setup methodology • Know-your-car adjustments: ride height, camber, toe, caster, cross weight, setup notches, etc. • Setup, set down, and tear down sheets • Chassis torsion stiffness measurement • Making sure that two cars are the same: the equalization program • Checklist

Test Benches And Lab Testing

Why and how to perform the indispensable spring and anti-roll bars stiffness measurements • Damper dyno types • Methodology of damper test on a dyno • Use of CMM and K&C test rig • 4 and 7 Post Rig Test • Wind tunnel testing • Pros and cons of CFD, wind tunnel, and on-track aerotest • How to conduct cheaper CMM and K&C tests at the workshop • How to conduct track aerodynamics tests

Modeling And Simulation

How to create a relevant tire model • How to compare and choose tires • What if you do not have a tire model • Basic brake calculations • Brake temperature measurement • Differential torque distribution • Kinematics analysis in suspension design and tuning • Use of aeromaps in suspension stiffness determination • "Magic" numbers: weight distribution, anti-roll stiffness distribution, aerobalance, and tire cornering stiffness distribution • Smart use of weight transfer calculation spreadsheet • The criteria of grip, balance, control, and stability using simulations • Damping spreadsheet • Basic lap time simulation • Closing the loop with simulation and on-track objective and subjective data analysis • Race strategy • Tire pressure management • Reading the tires: graining, blistering, camber, and pressure

Race Preparation

Comparing circuits: circuit shape, lateral and longitudinal tire slip energy; and asphalt micro and macro roughness considerations • Statistics on previous races' incidents • Statistics on previous races' weather conditions • Track walk and visual inspection of tracks by drivers and engineers • Briefing and debriefing — paperwork and methodology • Keeping track of test and race setup evolution

Data Acquisition Hardware and Software

Basics of data acquisition hardware • Choice of sensors • Understanding sensor characteristics • Sensors: installation, calibration, and troubleshooting • The classical sensors and loom mistakes and how to avoid them • The classical data acquisition software mistakes and how to avoid them • Loom manufacturing • Loom and connectors troubleshooting and maintenance • The different ways to visualize your data • Channels vs. time and distance • XY graphs, track maps, bar charts, histograms, and FFT • 2D, 2.5D, and 3D graphs • Data acquisition with Excel and Matlab • Run charts • GG diagram • Lap time report • Organizing your recorded data visualization ahead of time • The most important data acquisition engineering skills • Math channels • Driver KPIs • Measure, compare, and improve drivers with steering, throttle, and brake smoothness, speed, integral, and consistency • Coast and crossover factors • Throttle efficiency and brake efficiency • Braking zone comparisons • Analyzing data with your driver(s) • Working with data on a one-car or a multiple-cars team • Using suspension linear potentiometers • Damper speed histograms • Aerobalance data exploitation with data analysis • Weight transfer analysis with data analysis • Track bumpiness quantification • Safety and reliability with data analysis • Engine and transmission data analysis • Brake data analysis • Infra-Red tire temperature data analysis • Push/pull rod strain gauge data exploitation • Slip angle sensor data exploitation • Wheel force transducers data exploitation

Team Work

Who does what, when, and how: organizing and performing tasks as a team • A bit of advice of team members' role and communication • Team owner • Team manager • Driver(s) • Race, performance, data and system engineers, and race strategist • PR, transportation, and logistics personnel • Team presentation • Communication with competitors, technical inspection, and race series management • Team and drivers briefings • Team and drivers debriefings • Driver psychology: left and right brain drivers

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