



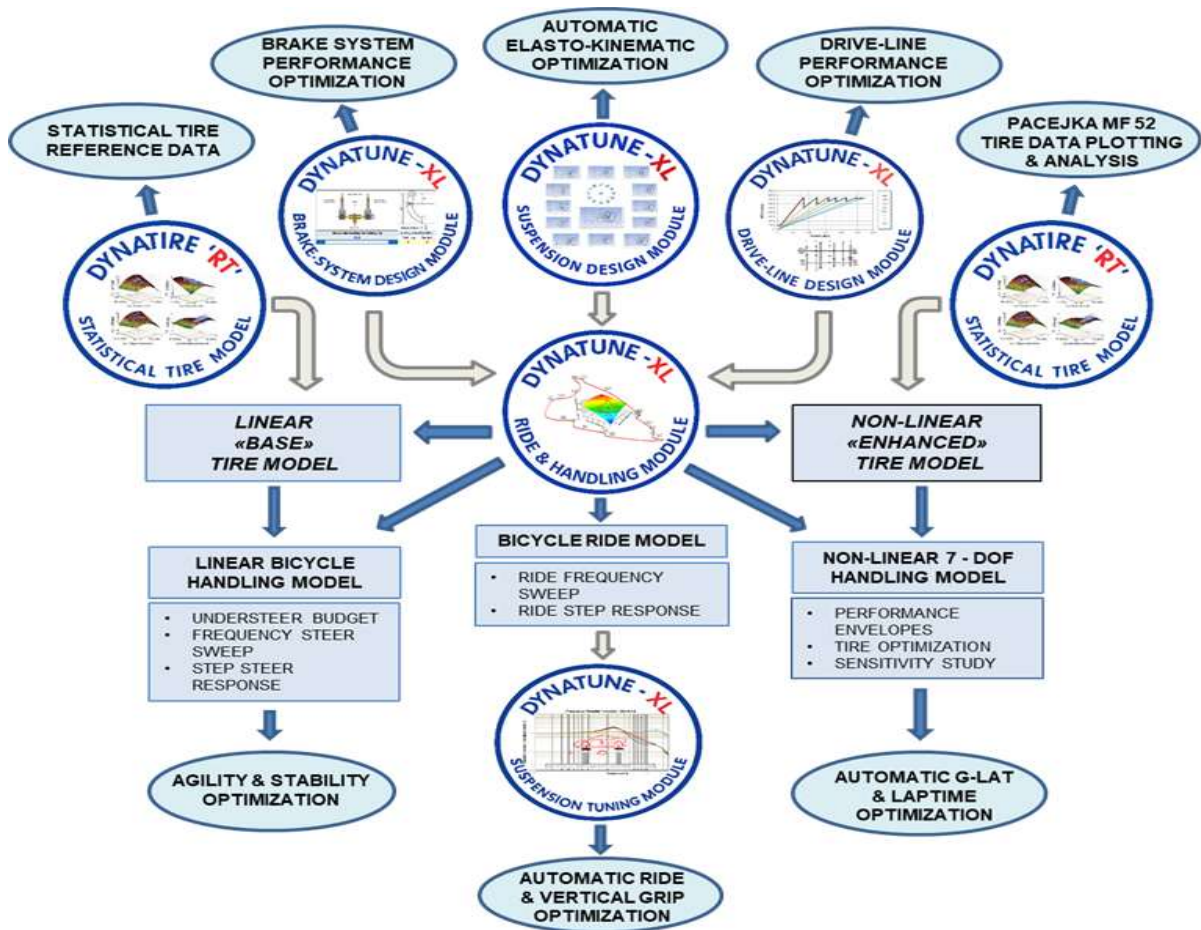
# DYNATUNE-XL SIMULATION TOOL SUITE

**MODULAR SOFTWARE TOOL SUITE FOR RIDE & HANDLING ANALYSIS, SUSPENSION ELASTO-KINEMATIC DESIGN, SPRING-DAMPER TUNING, ACCELERATING & BRAKING PERFORMANCE OPTIMIZATION.**

DYNATUNE-XL is the registered name of a suite of core skill **MS EXCEL**® based Engineering and Simulation Tools which establish a self-supporting Eco-System for Vehicle Performance Optimization.

The **DYNATUNE-XL** Tool Suite does provide Professional Engineering Tools covering the most Important Aspects of Vehicle Dynamics. All Tools aim to achieve a Maximum of Results with a Minimum of Input Data allowing quick Setup Checks or - if wanted - more complex Generic Parameter Studies. Being a fully **MS EXCEL**® based Tool does significantly help reducing the application threshold for many engineers and technicians. Furthermore **MS EXCEL**® is available on most computers as part of **MS OFFICE**® and widely supported in engineering business applications.

The **DYNATUNE-XL** Eco-System of Tools does exist out of the following (standalone) Modules, each providing specific areas of performance optimization or specific input data for any of the other Modules:



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**NOTE: DYNATIRE “RT” is a standalone Module. More info available in the DYNATIRE “RT” Prospectus**





## DYNATUNE-XL – RIDE & HANDLING MODULE



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The **DYNATUNE-XL “EXPERT” RIDE & HANDLING MODULE** has been specifically developed & validated over the last 35 years around the equations of a Bicycle Model and a 7-DOF Vehicle Model. It is entirely focused on providing an efficient tool for optimizing the **RIDE & HANDLING** behaviour of a vehicle. The Analytical Features have been developed to cover all disciplines of Vehicle Dynamics and are perfectly suited to cover all aspects from an Upfront Benchmarking / Concept Design Trade-Off Tool – with OEM Style Objective Test Simulations - up to a typical (Race-) Engineers Approach focused on achieving maximum Lateral Acceleration / Laptime Performance.

Many features – as indicated in the table below - can only be found in hugely complex expensive multi-body vehicle dynamics simulation tools.

<u>Vehicle Input Characteristics:</u>	<u>Simulation Features:</u>
Vehicle Mass, Passenger & Pay-Loads (incl. Inertia)	Vehicle Balance Calculations – Weight Distribution & Inertia Roll Couple & Lateral Load Transfer Distribution
Vehicle Aerodynamics – Linear Coefficients Ride Height Dependant Aero Maps. Open Wheel Features.	Max. G-Lat Constant Velocity Lateral Sweep – Non-Linear Max. G-Lat Constant Radius Lateral Sweep – Non-Linear
Suspension Kinematic & Steering System Data Suspension Compliance Data Kinematic & Compliance Data Base Available for Solid Axles, Semi-Independent & Independent Suspensions	Linear Frequency Steer Response Test w/o Load Transfer Non-Linear Freq. Steer Response Test w/ Load Transfer Linear Step Steer Test w/o Load Transfer Non-Linear Step Steer Test w/ Load Transfer
Linear Spring, Anti-Rollbar & Non-Linear Damper Setting Non-Linear Bump-Stops, Gaps and Rebound Stops Coupled/De-Coupled Suspension Heave & Roll Setup	Body & Wheel Natural Frequencies, Damping Ratio Analysis Ride Bounce & Pitch Centre Analysis Linear Ride Step & Frequency Response Test
Custom Linear or Non-Linear Tire Model Tire Cornering Stiffness, Aligning Torque Stiffness, Grip Value & Vertical Load Dependency, Relaxation Length Generic Tire Data Base	Tire Data Map Plotting Tire Operating Points on All 4 Corners Bundorf Understeer Budget Analysis 3.5D Understeer Behaviour Visualization (Gx-Gy-V)
Brake Distribution Axle Drive Concept (FWD, RWD & AWD) Limited Slip Differentials with Locking Features & Preload	Full Torque Vectoring Analysis & Yaw Moment Calculation Regenerative Powertrain Braking Full Performance Envelope Calculation & Laptime Simulation

Also, a Unique **AUTOMATIC SETUP & LAPTIME ANALYSIS with MULTI-OBJECTIVE PARAMETER OPTIMIZATION** is included, setting a new Industry Benchmark in Chassis Performance Engineering.

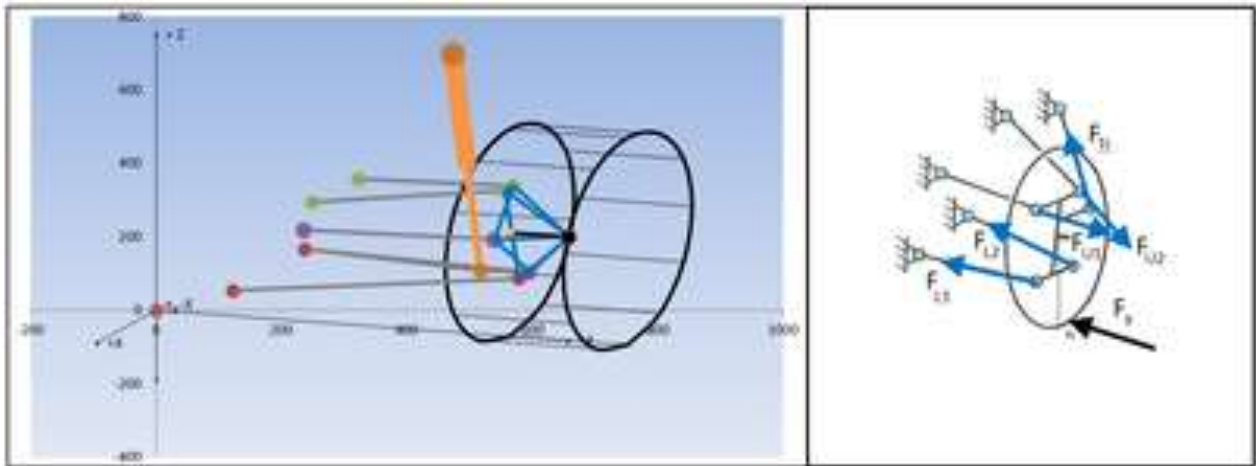


The **DYNATUNE-XL “EXPERT” R&H MODULE** has been used at the "cradle" of many important & iconic (race-) cars, is well established both in the Automotive OEM World as in Racing, and is used by many Professional Vehicle Dynamics Experts & Enthusiasts all over the world.





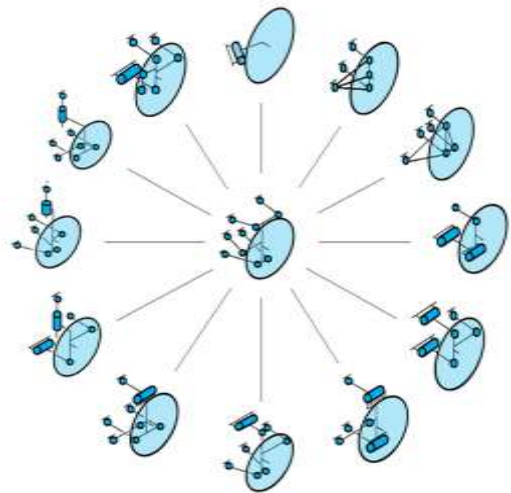
## DYNATUNE-XL – SUSPENSION DESIGN MODULE



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The **DYNATUNE-XL SUSPENSION DESIGN MODULE** does provide with its unique vector algebraic approach the possibility to model and analyse the geometry and (steering) kinematics of almost any kind of Independent Front & Rear Suspension Type, including even the most complex Multi - Link Suspension architectures.

**DYNATUNE-XL SDM** provides in the Expert Version also - quite uniquely and not offered by any of its peer competitor tools - the ability to analyse elementary compliant suspension behaviour, either by providing a reference metrics table or by displaying the results of (combined) contact patch force induced suspension Link Loads & Deflections.



In it's latest **RELEASE 8.1** the Expert Version of **DYNATUNE-XL SDM** does come with a truly **Unique Elasto-Kinematic Optimizer** allowing the User to generate quasi in Full Automatic Mode the best matching Suspension Geometry and Compliant Requirements to match the imposed Targets and Constraints

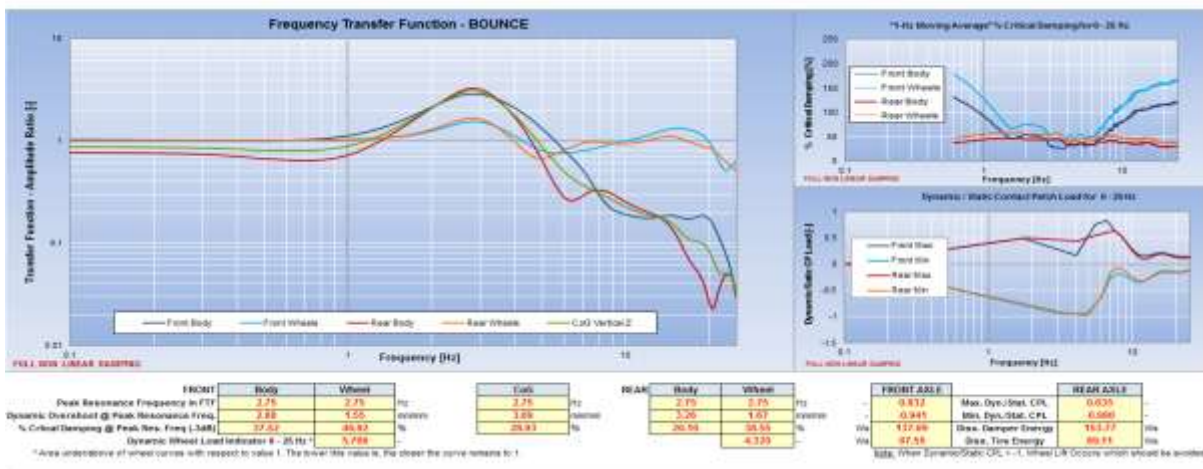
STEP 1 MANDATORY	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	
PREPARE OPTIMIZATION EVENT & LOAD SUSPENSION DATA FROM MASTER DASHBOARD	RUN SENSITIVITY ANALYSIS	START / RESET OPTIMIZATION	CONTINUE / RUN OPTIMIZATION	SET OPTIMIZED DATA AS NEW STARTING POINT	COPY NEW / OPTIMIZED DATA TO MASTER DASHBOARD	RESET ALL SUSPENSION DATA BACK TO ORIGINAL "STEP 1" LOADING CONDITION
EXECUTE FULL AUTOMATIC SENSITIVITY ANALYSIS & OPTIMIZATION LOOP (n) WITH FINAL VERIFICATION RUN						
RUN FULLY AUTOMATIC STEP 3, STEP 4 & STEP 5 OPTIMIZATION LOOP						
						Number of Full Optimization Loops <b>6</b>

**DYNATUNE-XL SDM** is considered by many customers in the professional automotive world to be the Best-In-Class Suspension Kinematic Analysis Tool. Due to its unique versatility the tool is also highly appreciated by the many (club-) racers who design & build their own cars.





## DYNATUNE-XL – SUSPENSION TUNING MODULE



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The **DYNATUNE-XL SUSPENSION TUNING MODULE** has been specially developed for those, who want to dive deep into the many complex vibrational aspects of suspension tuning. It is the perfect tool to analyse the often-complex interactions between springs and dampers.

Next to the classical Damping Ratio and Bounce & Pitch Centre analysis the tool does offer to simulate dynamic events both in the Time Domain as in the Frequency Domain.

Typical Fully Dynamic Simulation Events are:

- Fully Dynamic Ride Step – Time Domain, Fully Non-Linear Damper
- Fully Dynamic Ride HavSin – Time Domain, Fully Non-Linear Damper
- Fully Dynamic Ride Frequency Response Test - Linear Decaying Amplitude
- Fully Dynamic Ride Frequency Response Test - Exponential Decaying Amplitude

All of the above events can be fully parametrized to specific test requirements. A full range of Key Performance Indicators will be calculated allowing objective comparisons of various setups.

On top of that **DYNATUNE STM** does also offer the truly **Unique Feature to Optimize Damper Settings Automatically** towards a range of customer defined Targets and/or Cost Functions.

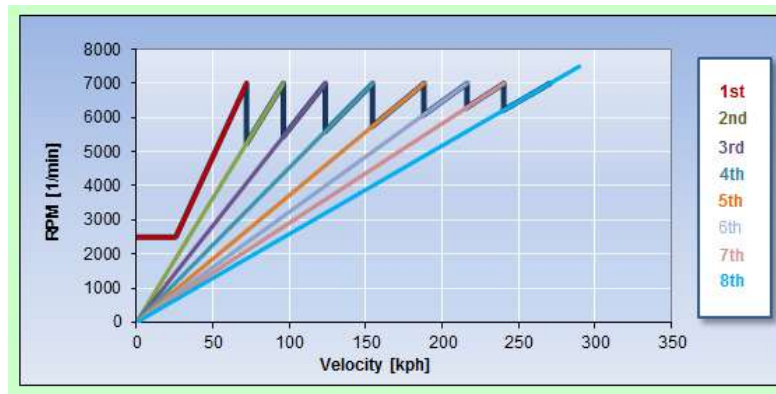


**DYNATUNE-XL STM** is a truly powerful standalone tool, which enables one to get the best out of one's ride setup by executing and analysing advanced 4-Poster Ride Setup Procedures combined with various Time Domain Ride Obstacles Event Simulations.





## DYNATUNE-XL – DRIVE-LINE DESIGN MODULE

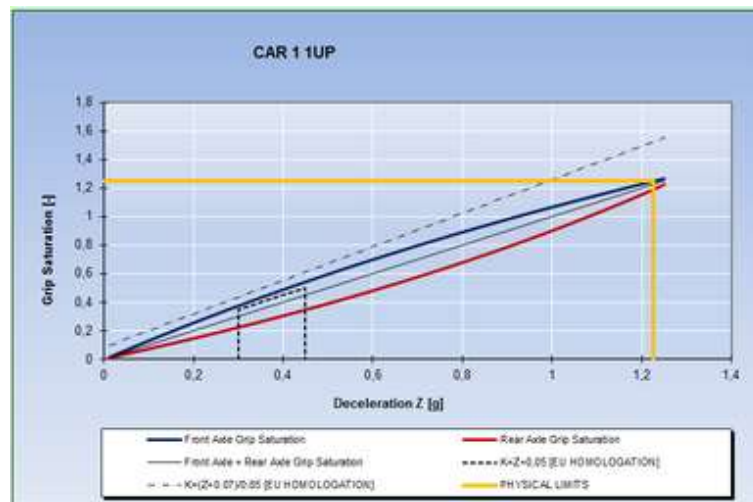


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The **DYNATUNE-XL DRIVE-LINE DESIGN MODULE** does permit to optimize gearbox (up to 8 gears) and differential ratios and match the Drive-Line perfectly to the Engine Torque & Power Characteristics. It is a must have tool for straight forward straight-line performance analysis and is essential for any custom build gearbox gear ratio specifications.

Next to ICE Power Trains also Electrical Propulsion can be simulated and optimized. Powertrain and Rotational Inertia's of the 4 Wheels are fully considered.

## DYNATUNE-XL – BRAKE- SYSTEM DESIGN MODULE



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The **DYNATUNE-XL BRAKE DESIGN MODULE** is indispensable if you are a club racer or you build/modify your own car. Our **DYNATUNE BDM** does allow one to design (or mix & match) brake hydraulic systems components, considering all parameters which do ultimately affect braking performance. One can define Piston & Rotor Diameters and select the best matching Brake Master Cylinder for optimal Brake Distribution and Pedal Travel / Pedal Effort.

Classical (OEM) Tandem Master Brake Cylinders or Racing Brake-Bias-Balance-Bars are available as base configurations. Aerodynamic Downforce & Drag Influence are also taken into consideration.





## **SOFTWARE REQUIREMENTS & LICENSE MANAGEMENT**

Software requirements for **RELEASE 8.0** and onward are **Full** Versions (incl. latest updates) of **MS EXCEL ® 2010, 2013, 2016, 2019, 2021 & 2024** or **Office/365** with a **MS Windows ® XP, Windows Vista, Windows 7 Starter, Windows 7, Windows 8, Windows 10 or 11 Operating System**.

All Modules of **DYNATUNE-XL** come as a compiled executable (\*.exe) binary file which will call **MS EXCEL®** as a separate stand-alone instance. Source code is copyright protected and safe data handling is guaranteed through secure binary files.

The Software Lease Program offers Standard **B2C** Licenses which are typically valid for the use of the workbooks (and ALL user-saved variants) on 1 computer , for 1 user only and are typically valid for 1 year. Special offers can be made available to **B2B** Customers on request.

The protection software does offer to the customer next to the security of encoded binary data handling also - by means of a unique License Key Verification Procedure - a state-of-the-art data protection - ensuring that no one else can have an unauthorized access to your valuable data.

License support is available for the latest releases only. Updates and Bugfixes are available to the subscribers of the Software Lease Program.

Recommended minimum hardware configuration for the **DYNATUNE-XL** Tools are Intel Core i7 CPU (or similar) with 8GB Ram.

All Units in **DYNATUNE-XL** are SI.

## **DYNATUNE-XL DEMO VERSIONS**

DEMO Versions of the following DYNATUNE-XL Modules can be downloaded here:

- DYNATUNE Ride & Handling Module: <http://www.dynatune-xl.com/download-demo-rh.html>
- DYNATUNE Suspension Design Module: <http://www.dynatune-xl.com/download-demo-sdm.html>
- DYNATUNE Suspension Tuning Module: <http://www.dynatune-xl.com/download-demo-stm.html>

## **DYNATUNE-XL STORE**

B2C customers can acquire the various **DYNATUNE-XL** Modules online in our webstore:

[http://www.dynatune-xl.com/store/c1/Featured\\_Products.html](http://www.dynatune-xl.com/store/c1/Featured_Products.html)

B2B customers are kindly requested to contact us directly.

## **DYNATUNE-XL CONTACT**

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Email: [info@dynatune-xl.com](mailto:info@dynatune-xl.com)

