powered by 2D

Analyzer program

BMW – specific contents

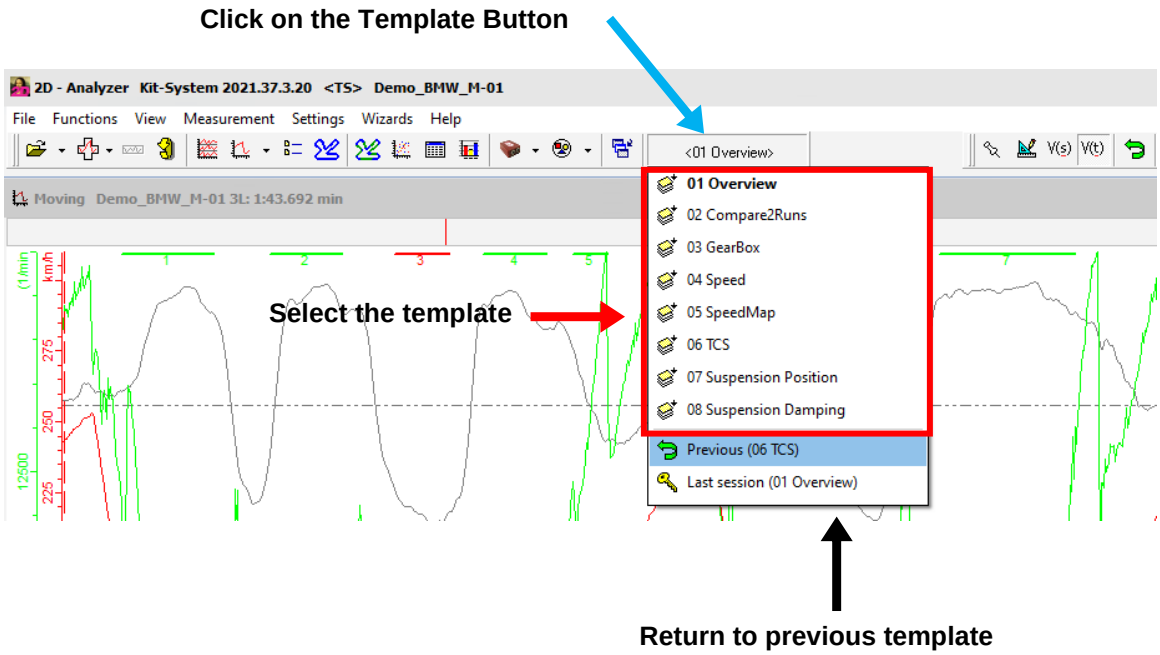
Table of Contents

1 Templates

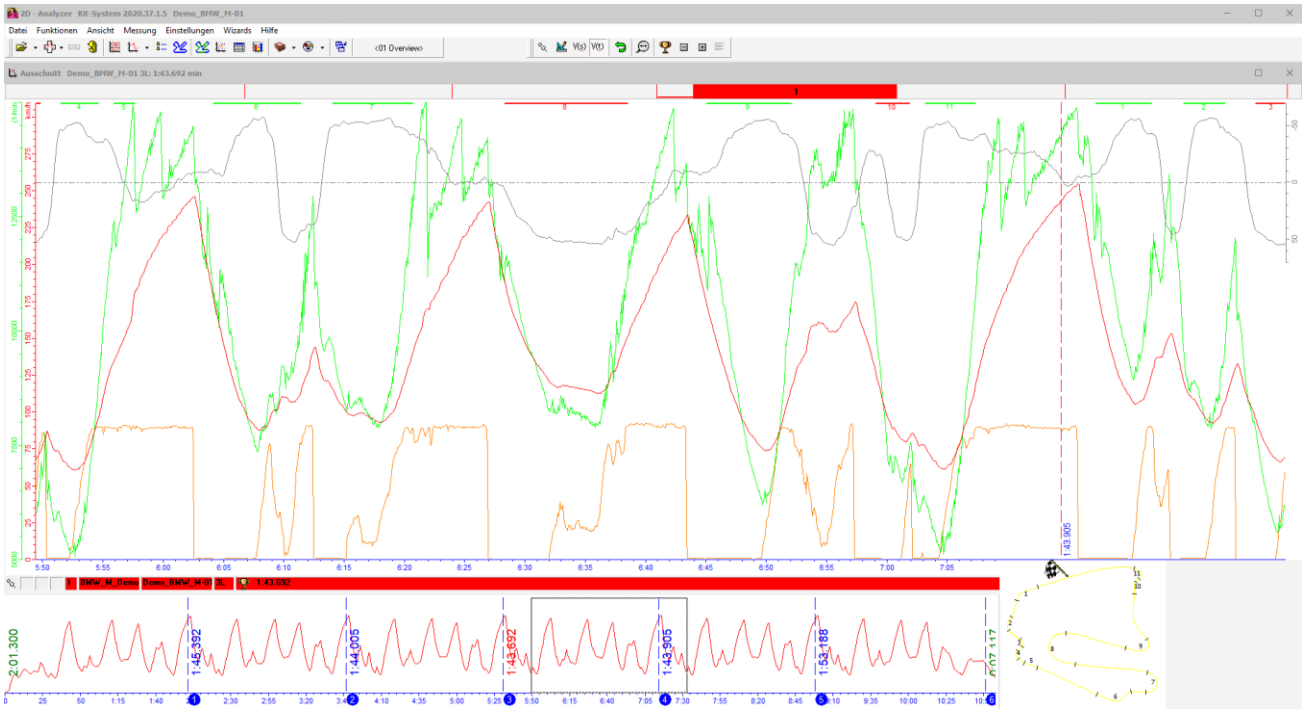
The following predefined templates can be used for analysis of the measured data.

1.1 Switch Templates

To switch between templates, proceed as follow:



1.2 Overview

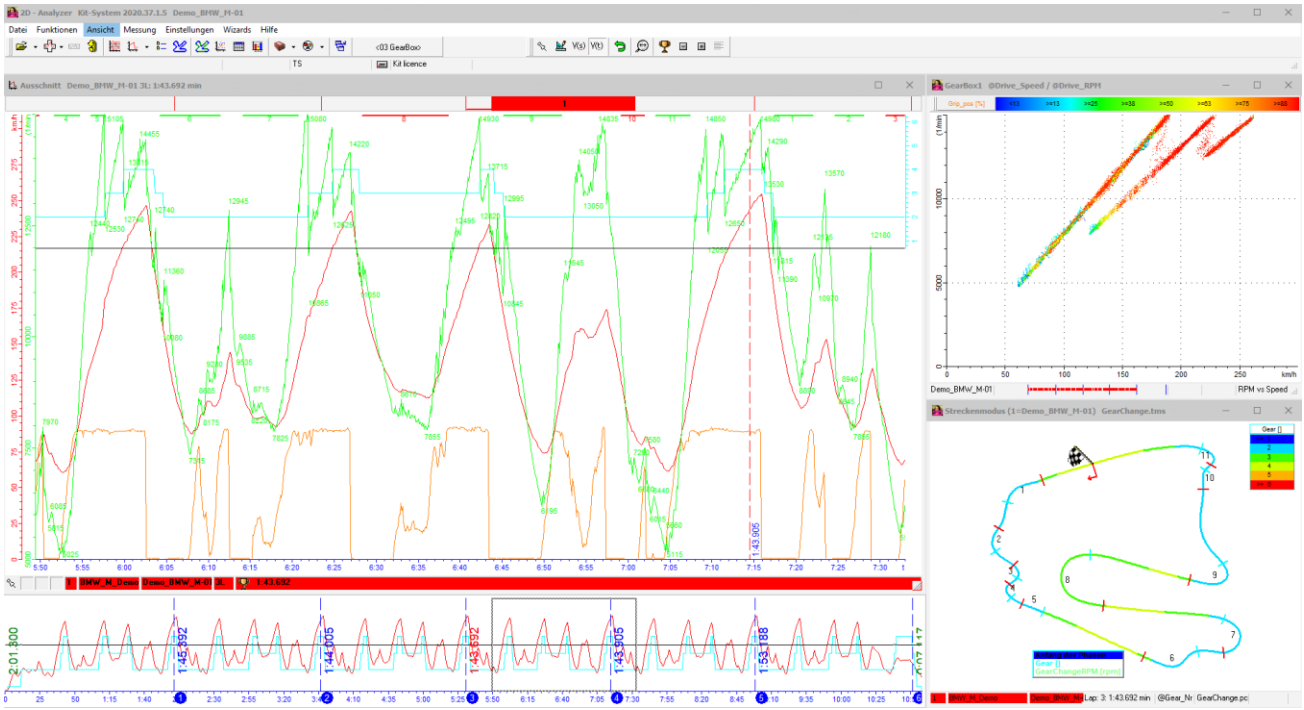


- Analysis and evaluation of lap information
- Contains information on rpm, speed, throttle-valve position, braking and bank angle
- Analysis of riding style and cornering speeds
- The position of the vehicle is shown in the Track window

1.3 Compare2Runs

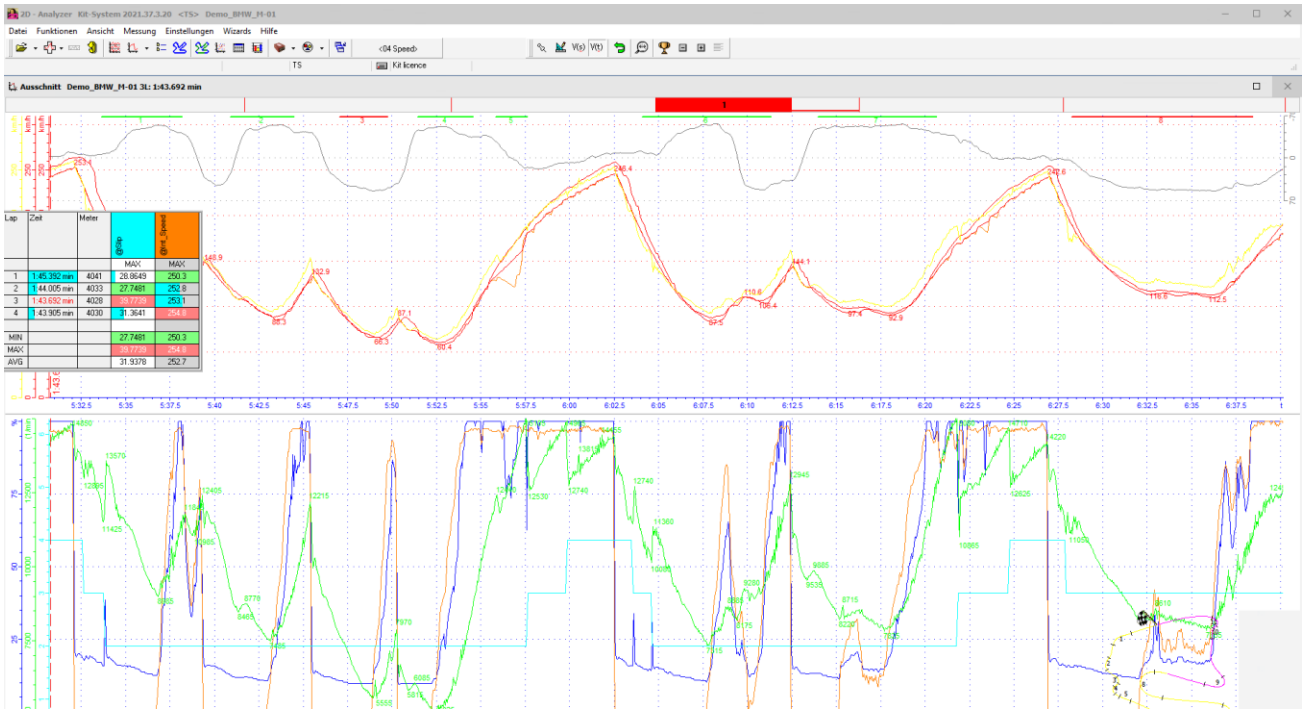
- Comparison between two laps
- Riding-style analysis of two riders
- Time-difference comparison between two laps
- Speed, throttle-valve angle, braking and gear information
- The position of the vehicle is shown in the Track window

1.4 Gearbox



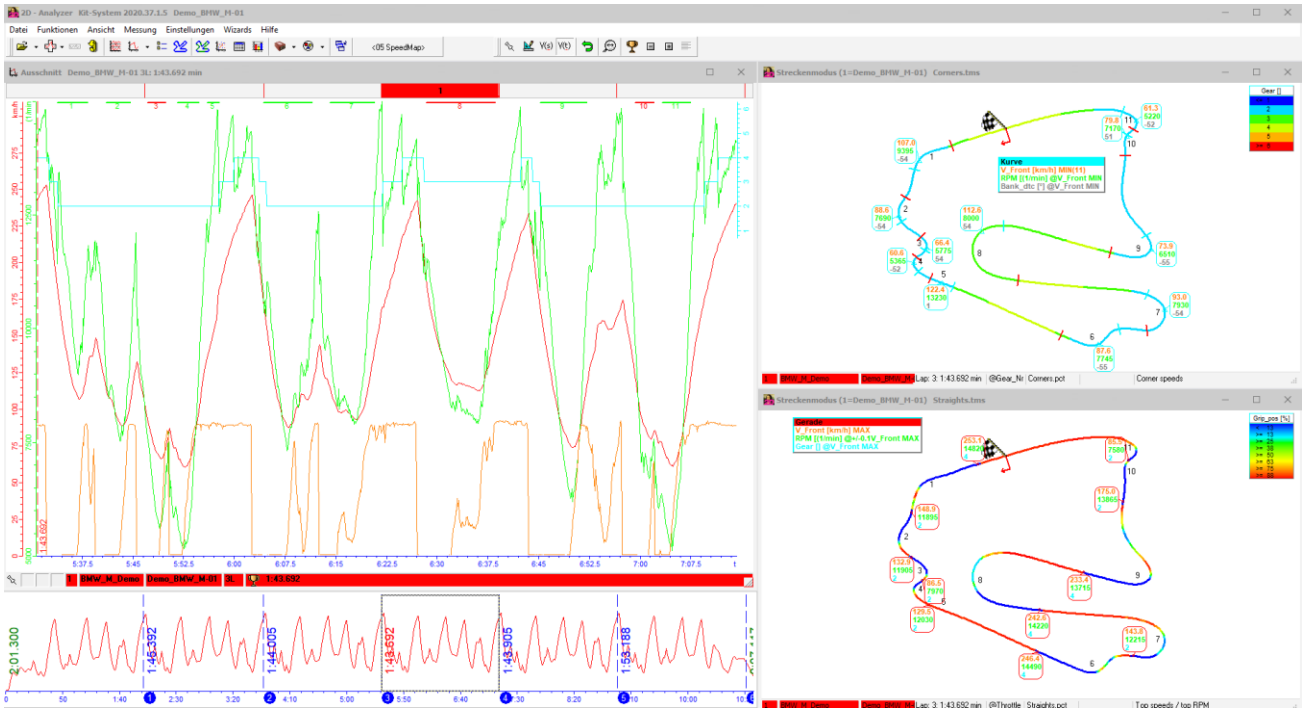
- Gear selection analysis of a measurement
- Analysis of shift rpm and shifting pattern
- Engine rpm, speed, throttle-valve position and gear
- XY plot of gear vs. speed
- Track mode shows gear changing and throttle position

1.5 Speed



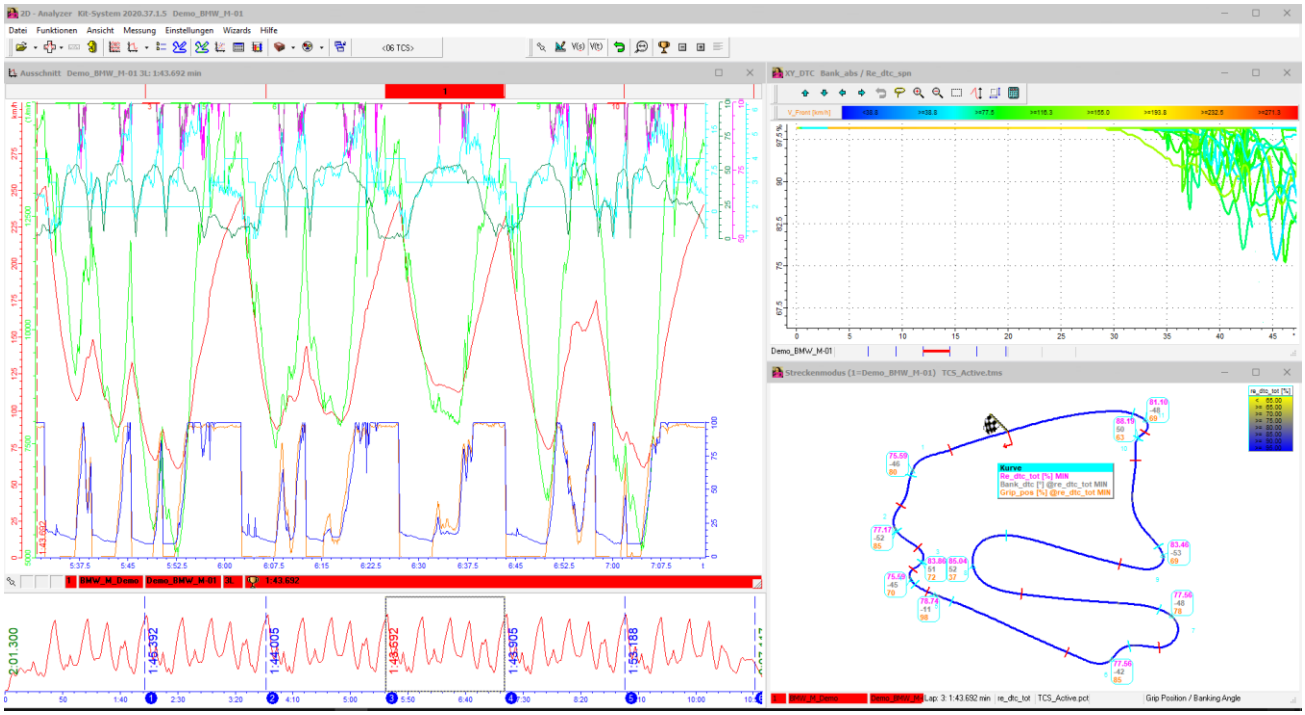
- Detailed analysis of vehicle speeds
- Split-screen view
- The top window contains four speed channels and the bank angles
- The bottom window shows engine rpm, throttle-valve position and gear
- Tabular view of wheel slip and speed

1.6 SpeedMap



- Track mode window for quick analysis of riding style and speed of a lap
- Plots of engine rpm, speed, throttle-valve position and gear
- Track mode 1 shows **cornering speed**, rpm, bank angle and gear
- Track mode 2 shows **top speed**, rpm, gear and throttle-valve position

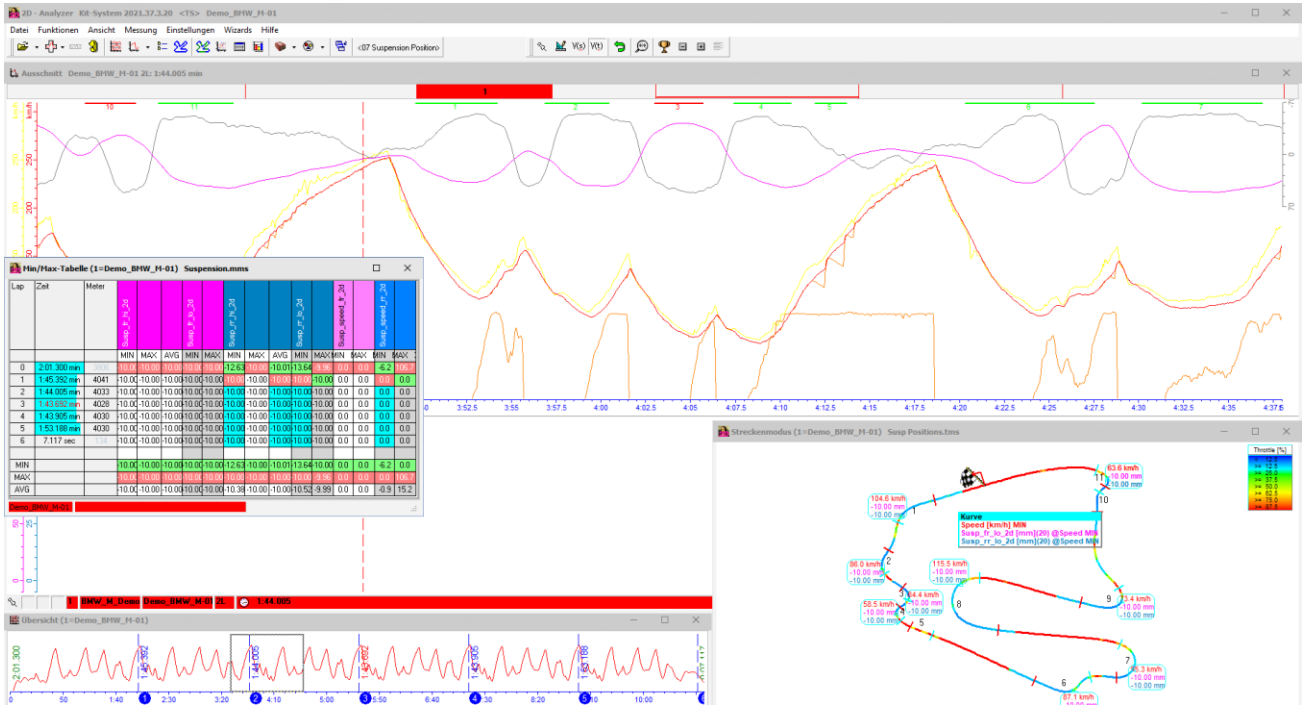
1.7 TCS



- Detailed analysis of traction control
- Analysis of where traction control cuts in
- Engine rpm, speed, throttle valves
- XY plot showing traction control in relation to banking
- Track mode shows where DTC intervenes

1.8 Suspension Position

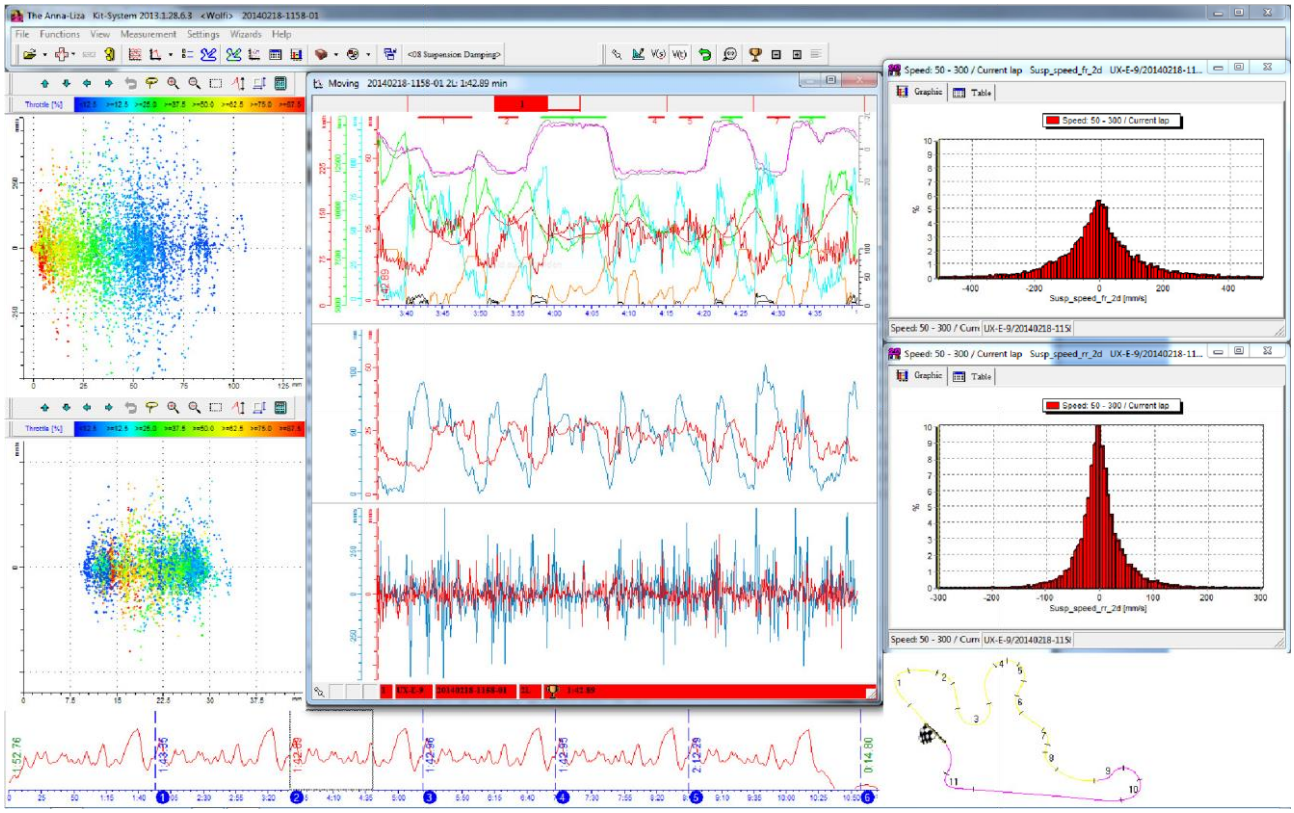
This template is only working with mounted suspension sensors!



- Detailed analysis of suspension
- Speeds, throttle valves, banking/brakes
- Split bottom window shows front and rear bike positions
- Min/max table shows fast/slow suspension movement
- Track mode shows front and rear bike positions at corner speed

1.9 Suspension Damping

This template is only working with mounted suspension sensors!

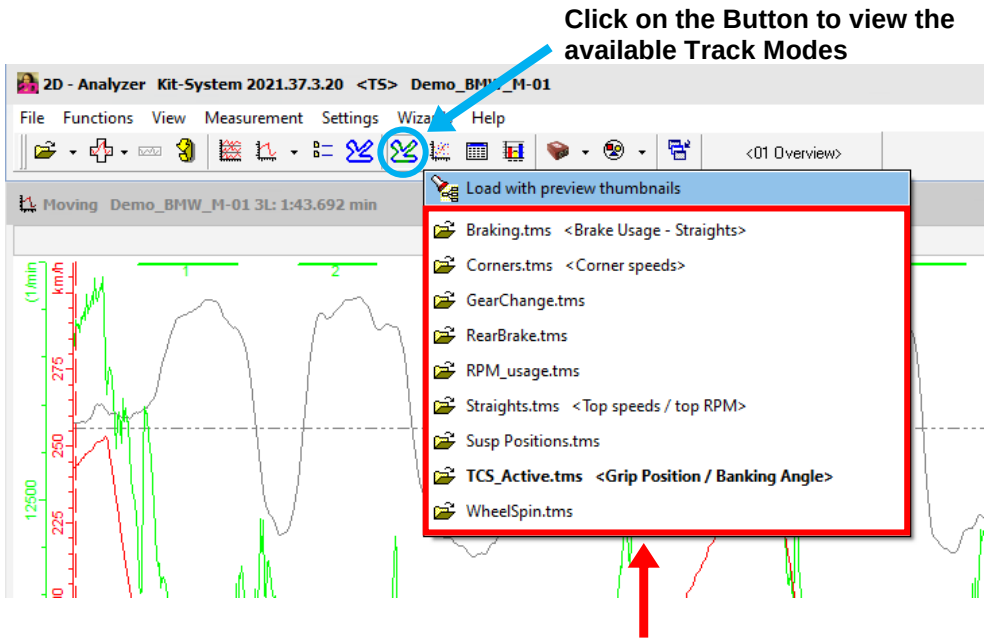


- Detailed analysis of suspension movements
- Speeds, throttle, banking/brakes, suspension
- Split middle window shows front and rear bike positions
- Split bottom window shows front and rear suspension speeds
- XY plots show front and rear bike position vs. suspension speed
- Histograms show statistics of front andrear suspension speed

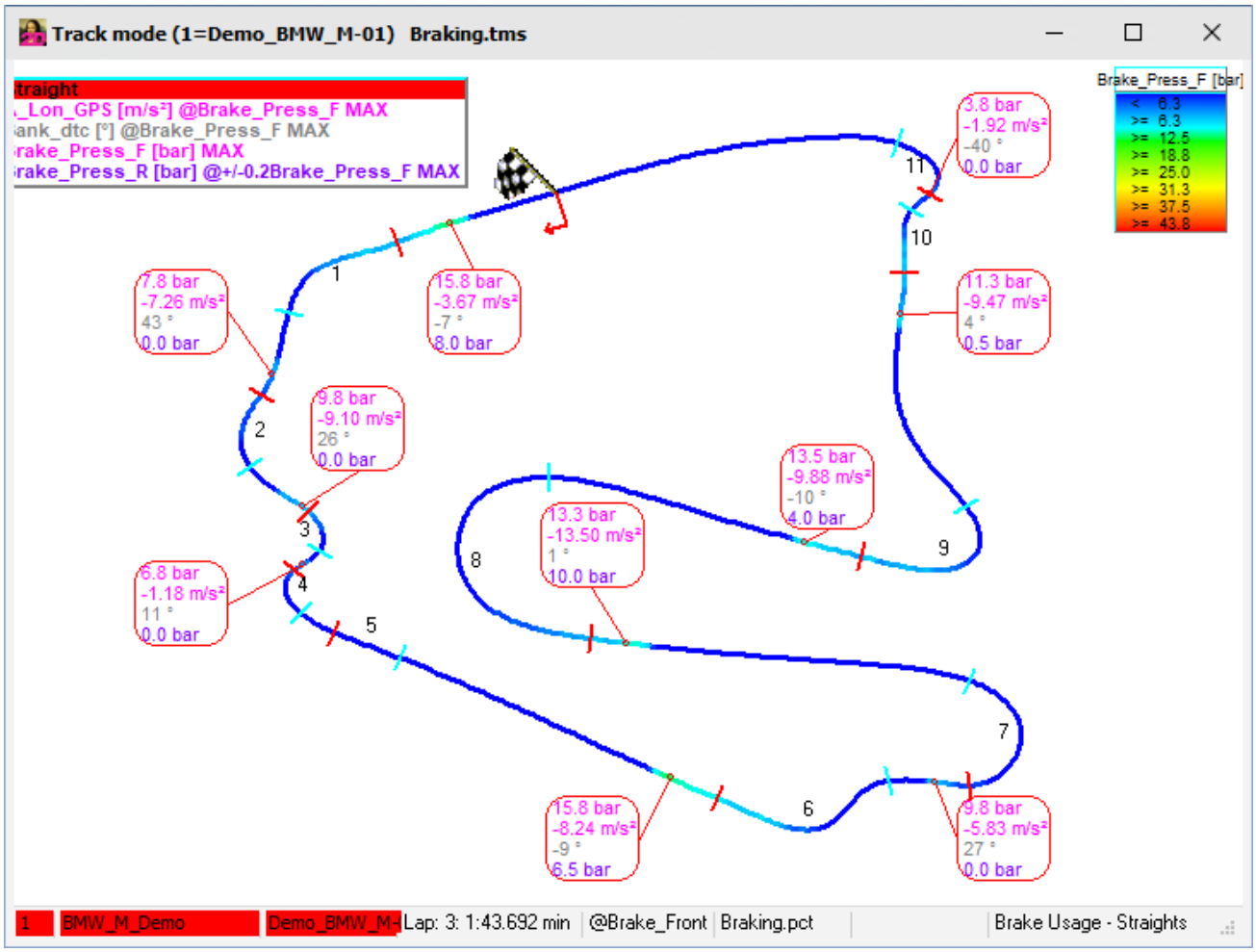
2 Track Mode

The following predefined track modes are available.

2.1 Selecting a Track Mode

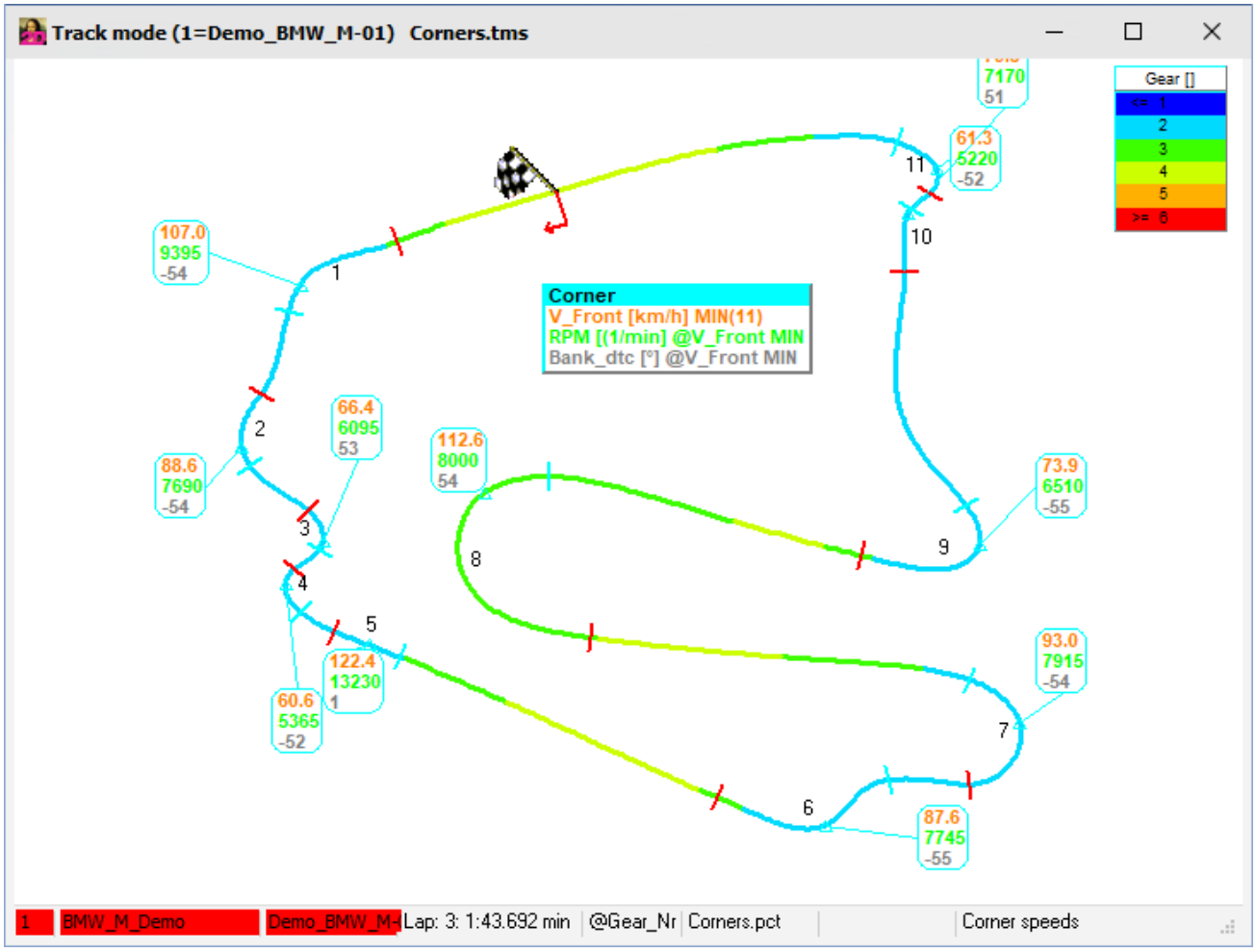


2.2 Braking



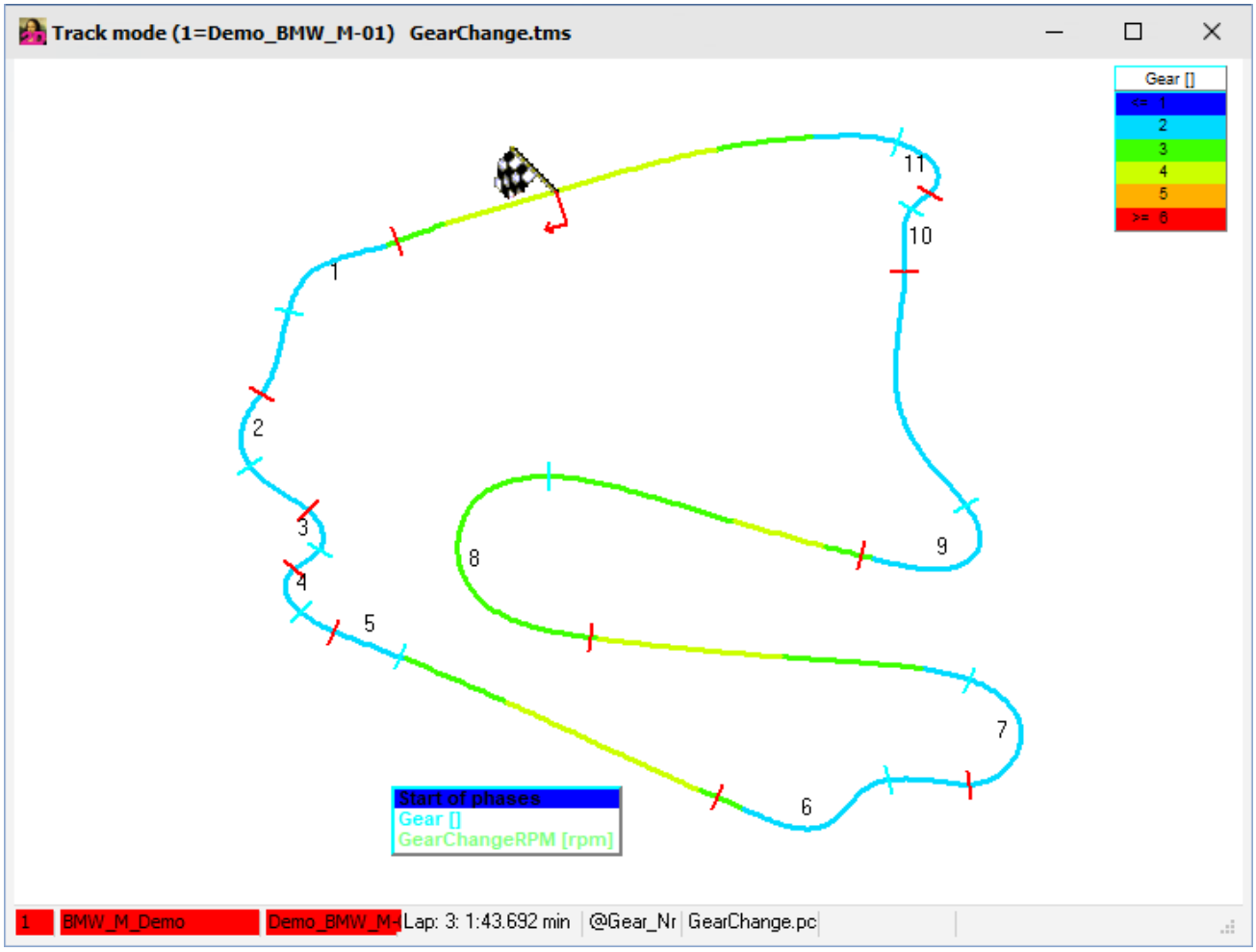
- Overview of brake usage per lap
- Front-brake and rear-brake maxima at significant points on the track
- Bank angle and retardation at maximum braking force
- Color-highlighted map of the track to show retardation achieved

2.3 Corners



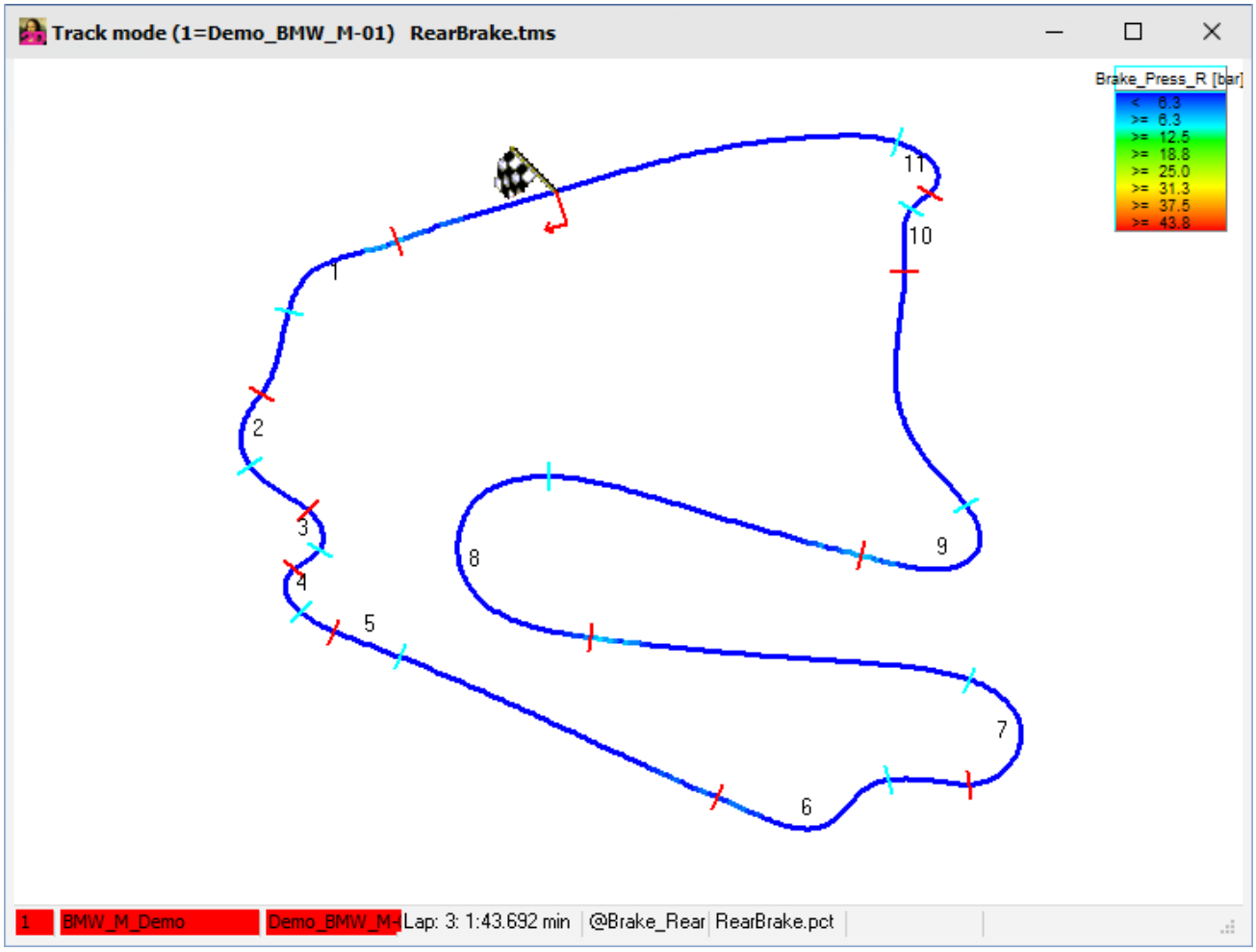
- Quick overview of the cornering speeds per lap
- Minimum cornering speeds
- Bank angles and rpm at significant points on the track
- Color-highlighted map of the track to show selected gear

2.4 GearChange



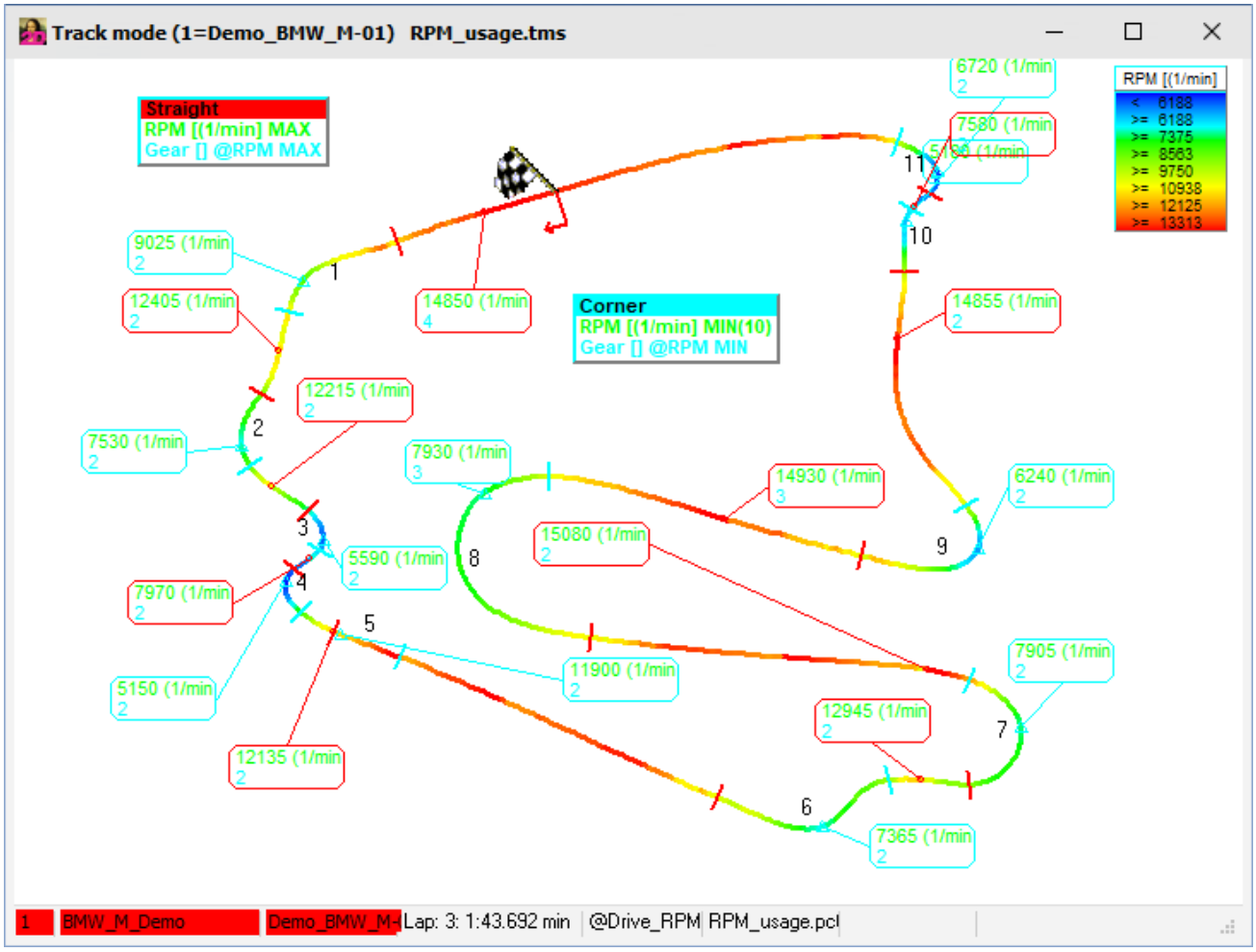
- Quick overview of the gear upshifting points per lap
- Gear and top engine revolution at the points of upshifting
- Color-highlighted map of the track to show gear

2.5 Rear Brake



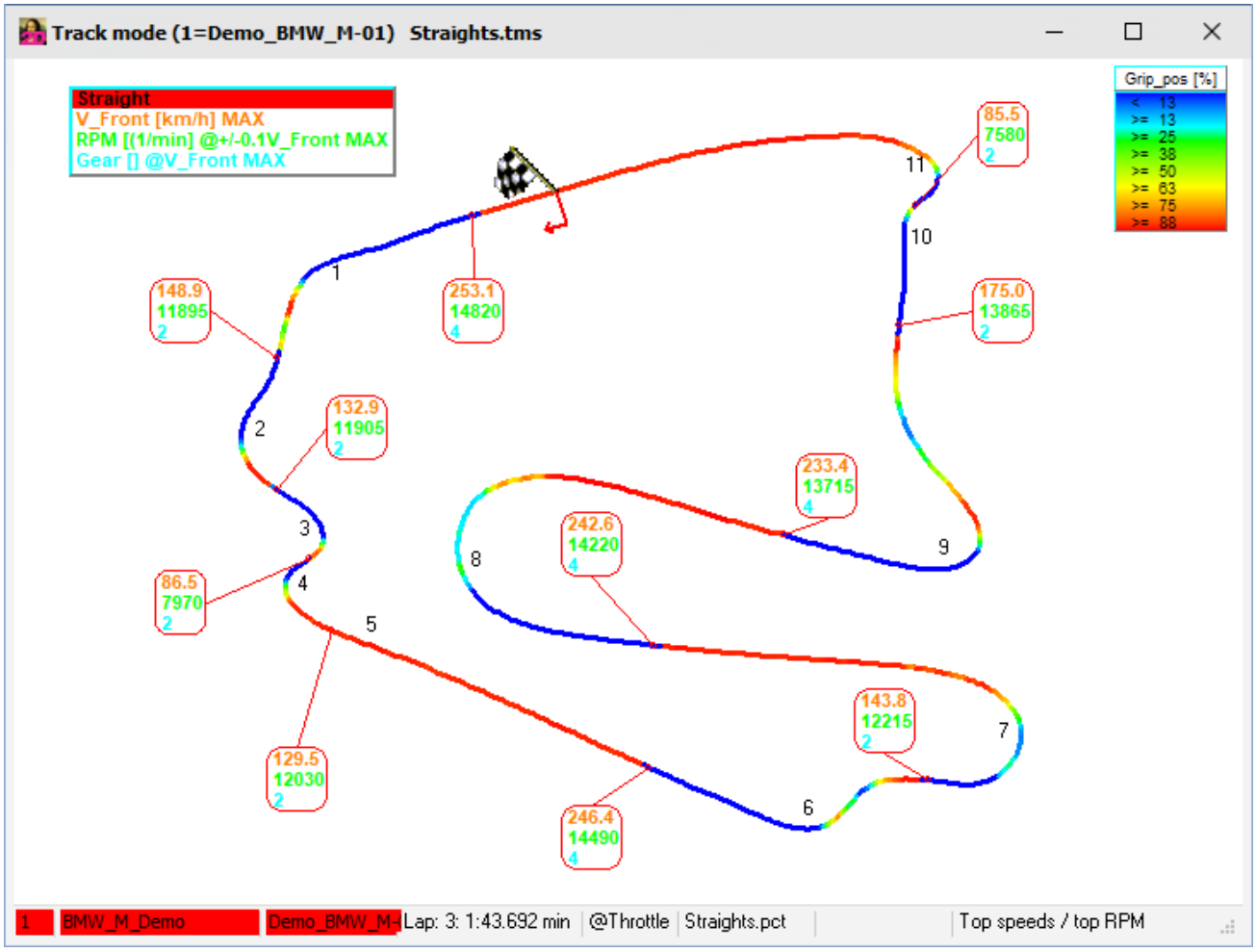
- Overview of the rear wheel brake use per lap
- Color-highlighted map of the track to show achieved rear wheel brake pressure

2.6 RPM Usage



- Overview of the rpm utilization per lap
- Plot of the max rpm and the used gear at significant points on the track

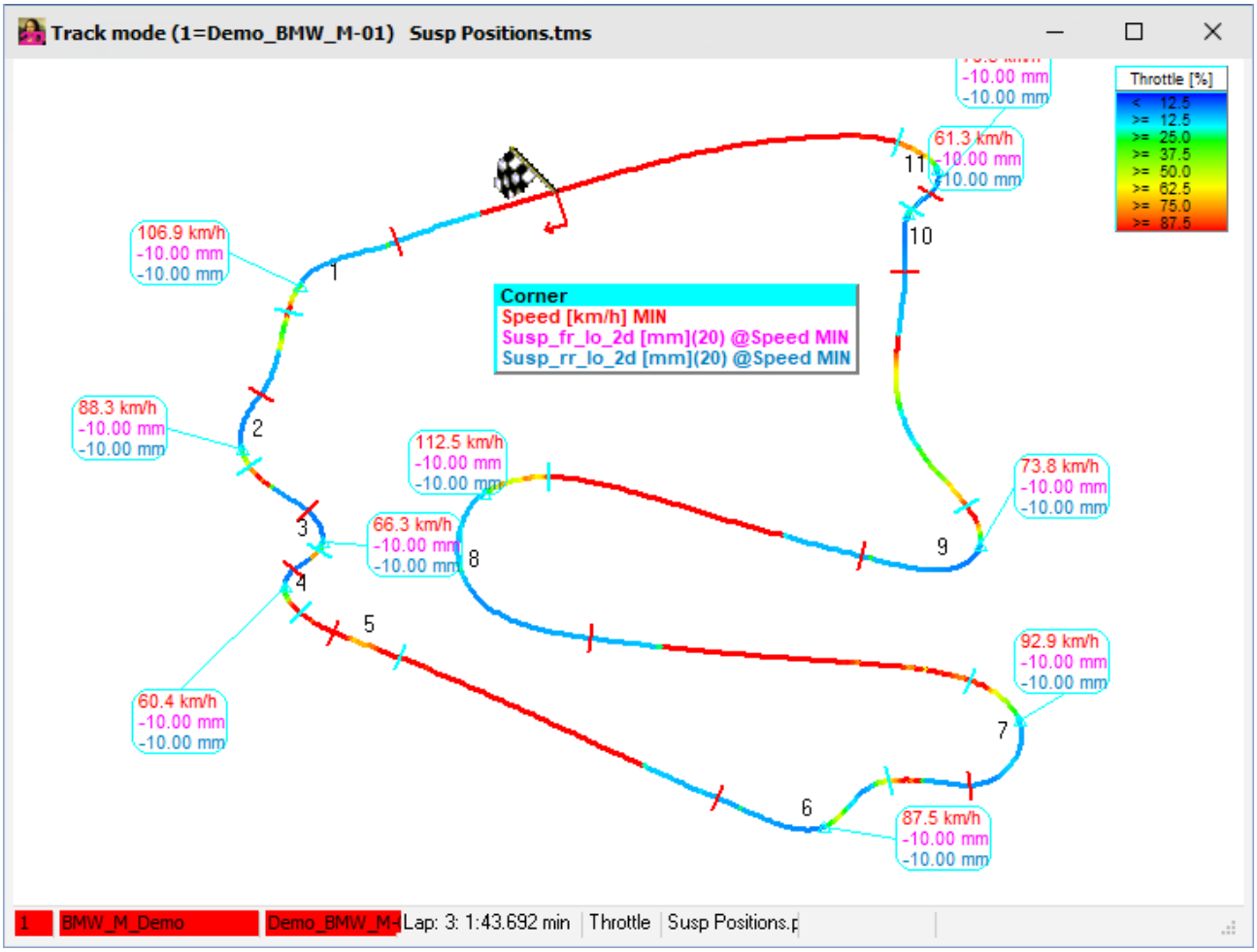
2.7 Straights



- Quick overview of the top speeds achieved per lap
- Engine rpm and gear at the points of highest speed
- Color-highlighted map of the track to show rider input on the basis of throttle grip position

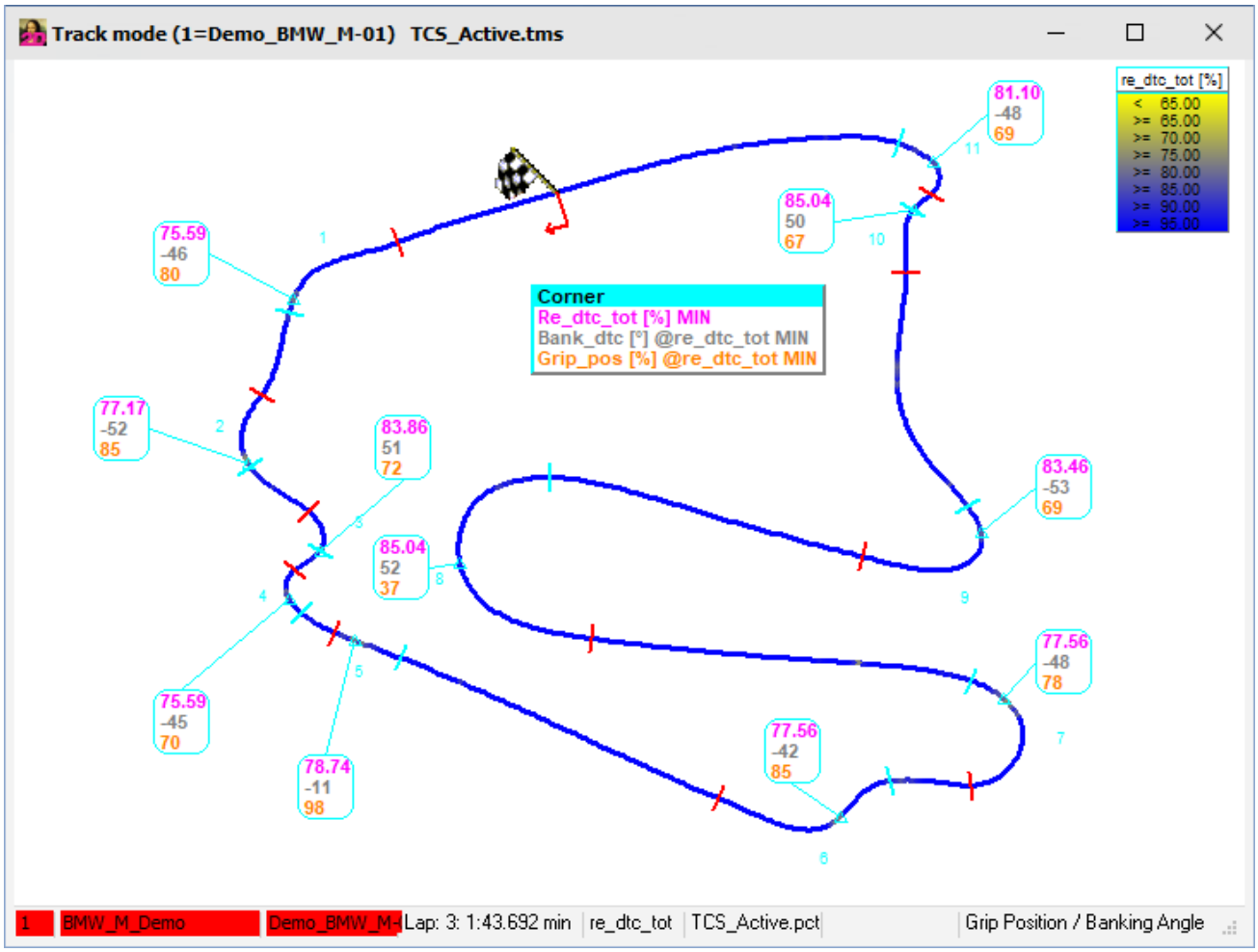
2.8 Susp Positions

This Track Mode is only working with mounted suspension sensors!



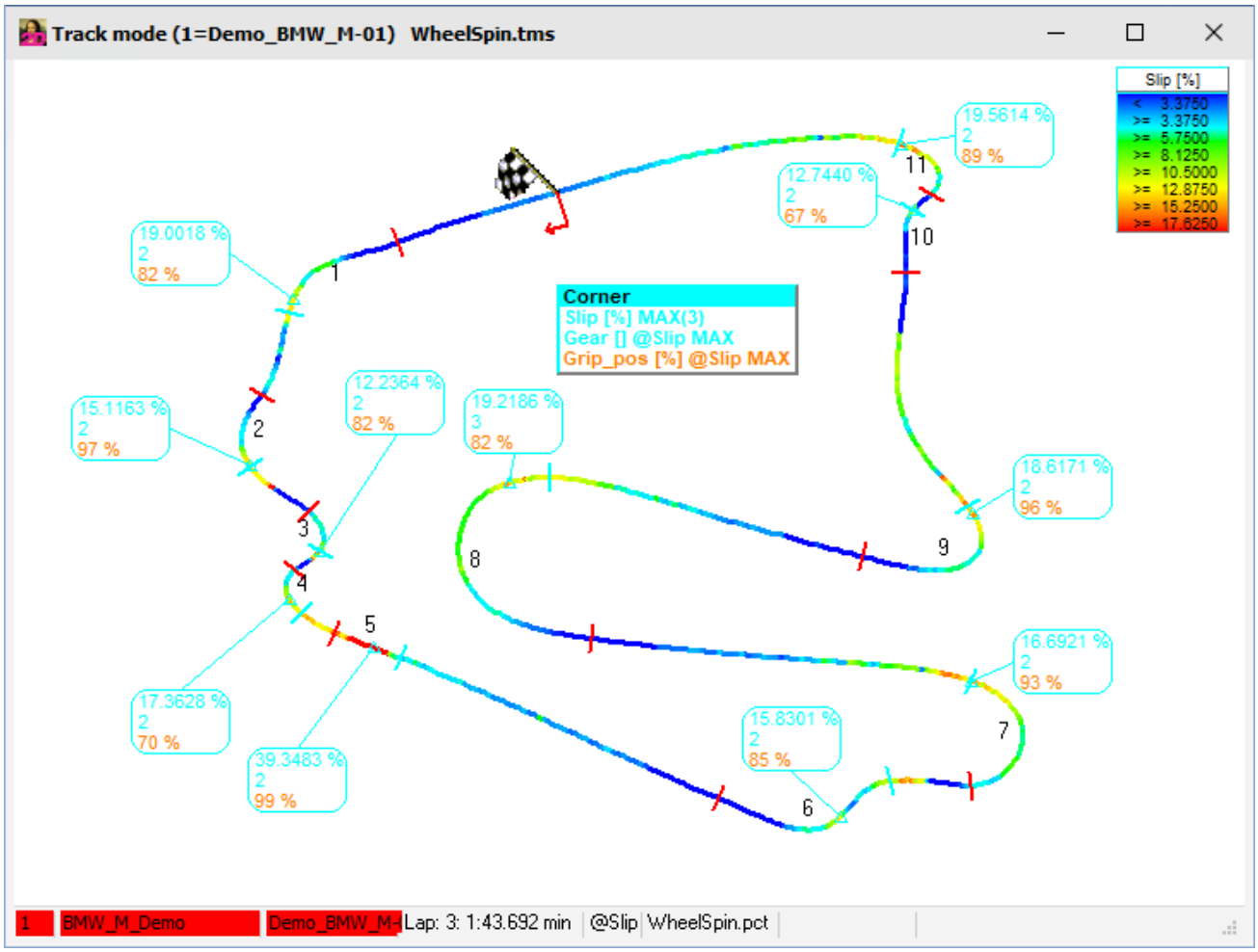
- Quick overview of the front and rear bike position per lap
- Minimum speed in each corner
- Front and rear bike position close to the minimum corner speed
- Color-highlighted map of the track to show throttle useage

2.9 TCS Active



- Quick overview of intervention by the traction control system per lap
- Where on the track traction control reduces engine torque to avoid slip or wheelies.
- Rider's input and bank angle
- Color-highlighted map of the track to show DTC control intervention

2.10 Wheel Spin

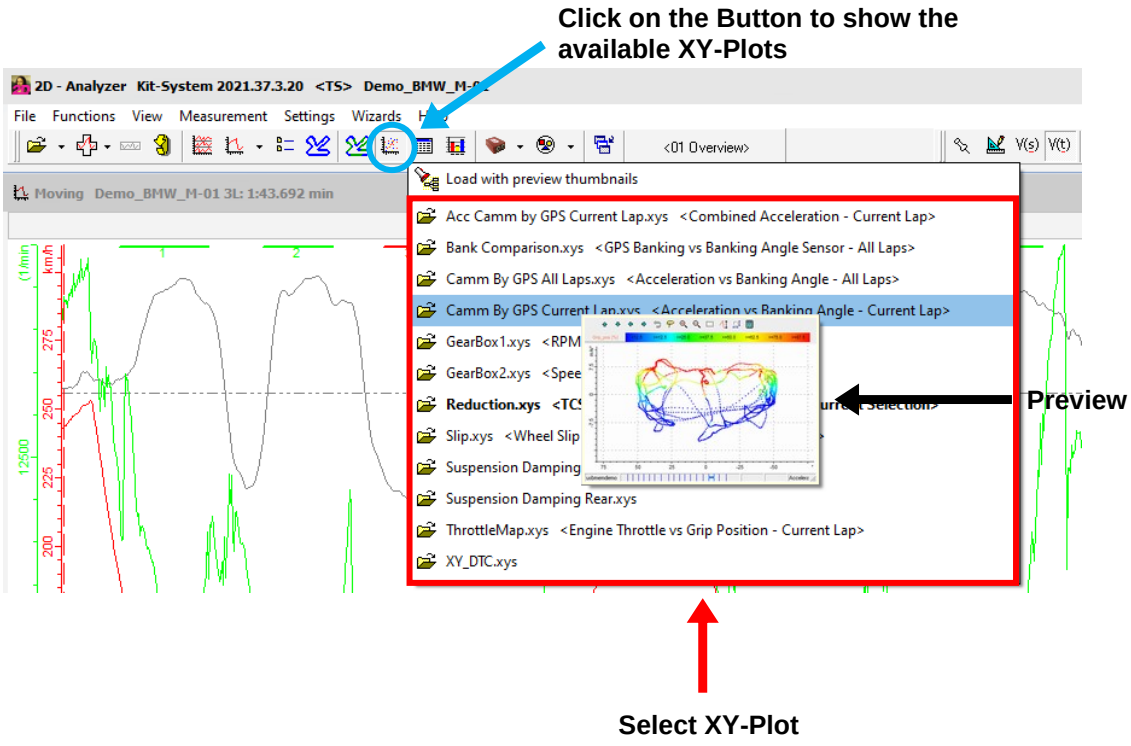


- Quick overview of the max Wheelspin per lap
- Plot of twistgrip and gear
- Color-highlighted map of the track to show the Wheelspin amount

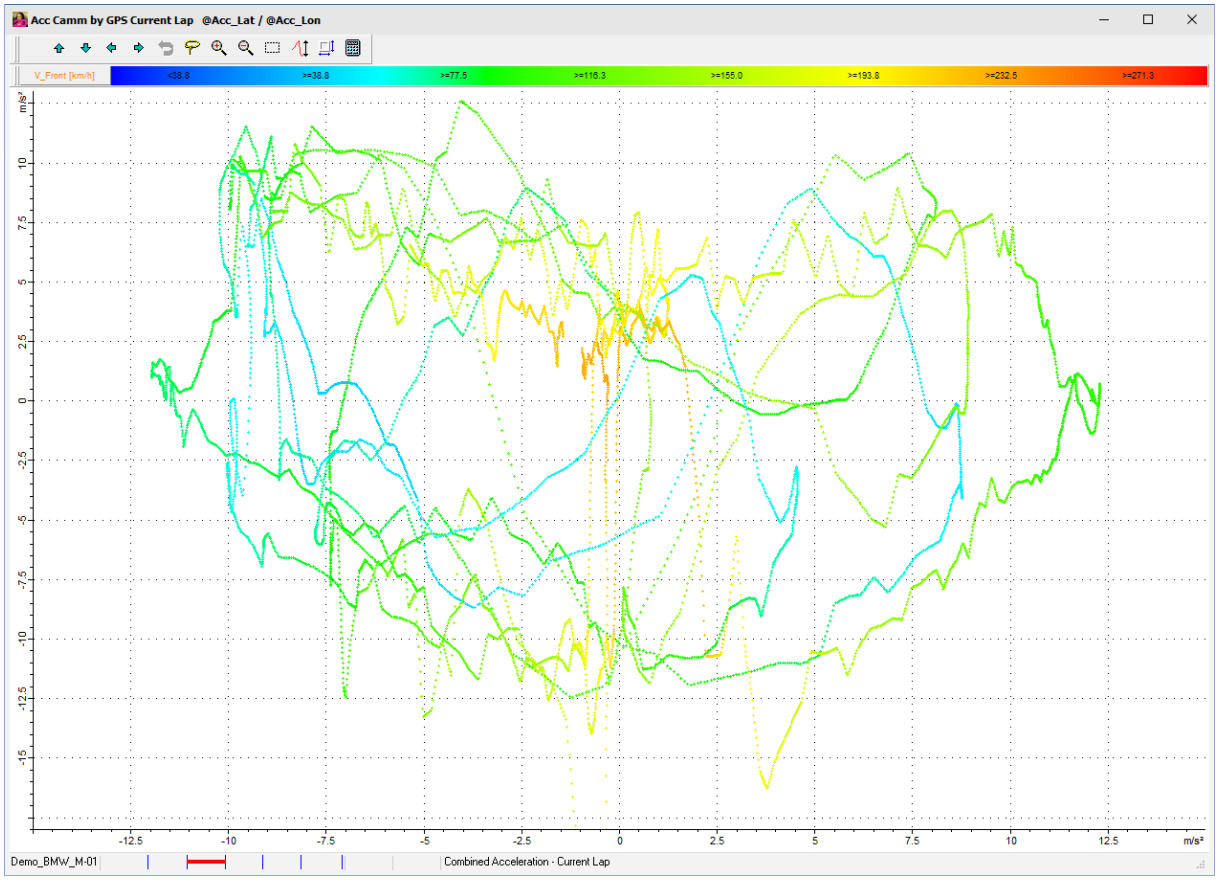
3 XY-Plots

The following predefined XY plots are available.

3.1 Selecting an XY-Plots

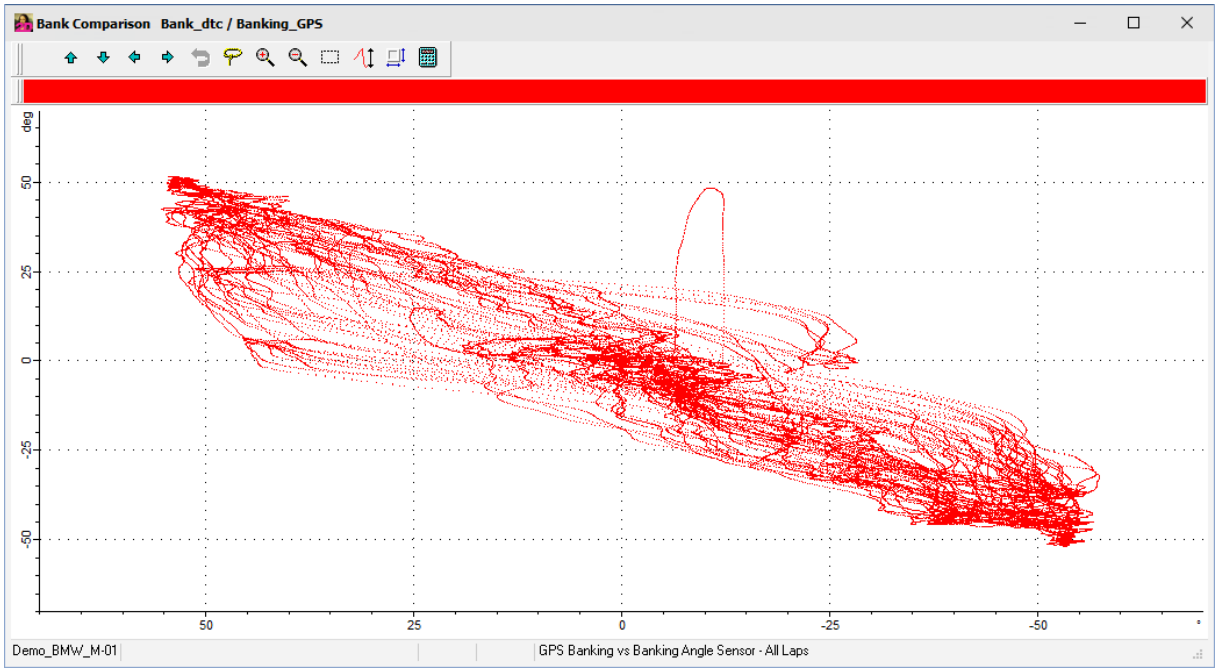


3.2 Acc Camm by GPS Current Lap



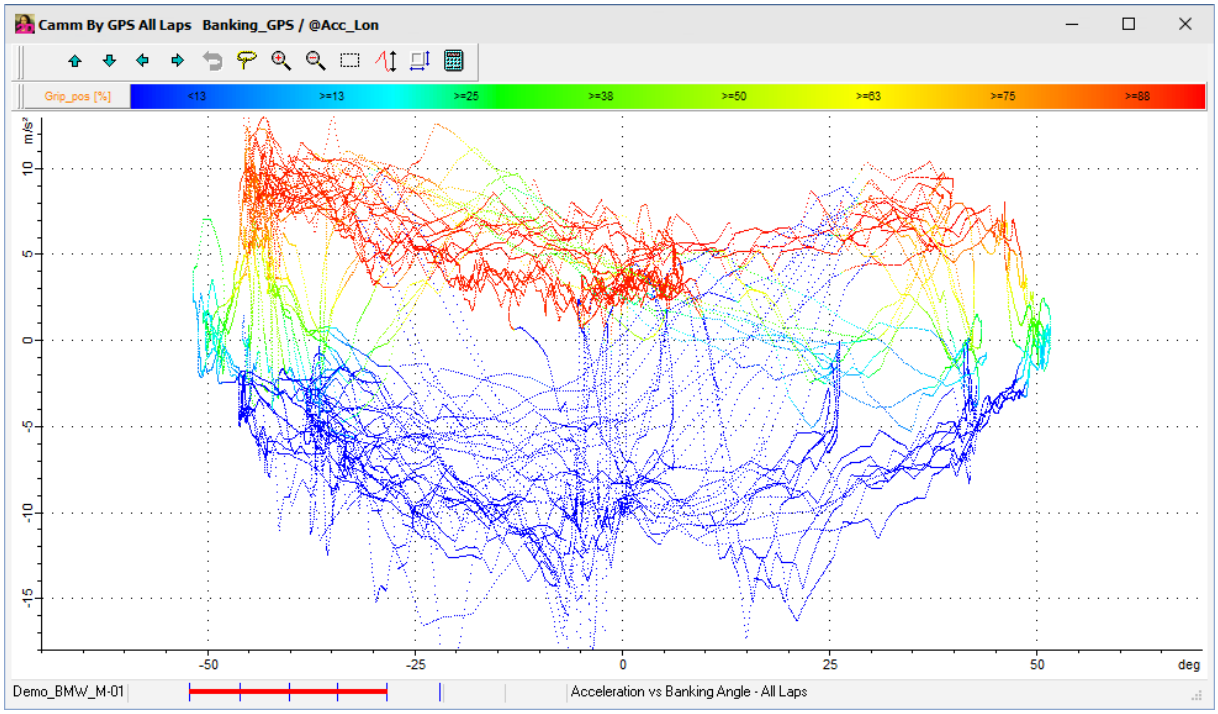
- Lateral acceleration vs. longitudinal acceleration
- Color-coded speed channel
- Lap-based view
- Shape and size of the plot are indicative of the rider's skill

3.3 Bank Comparison

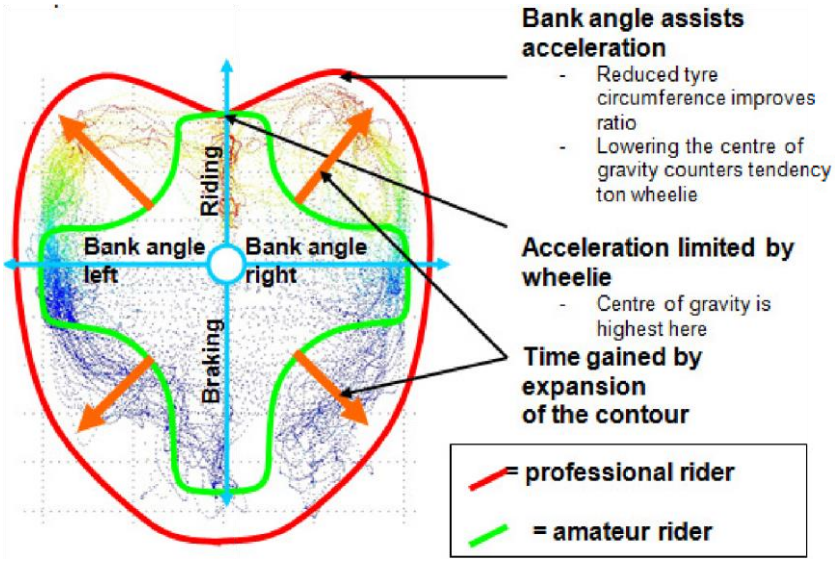


- GPS bank angle vs. bank angles registered by sensor
- Deviation between GPS bank angle and internal on-board sensor
- Information for all laps

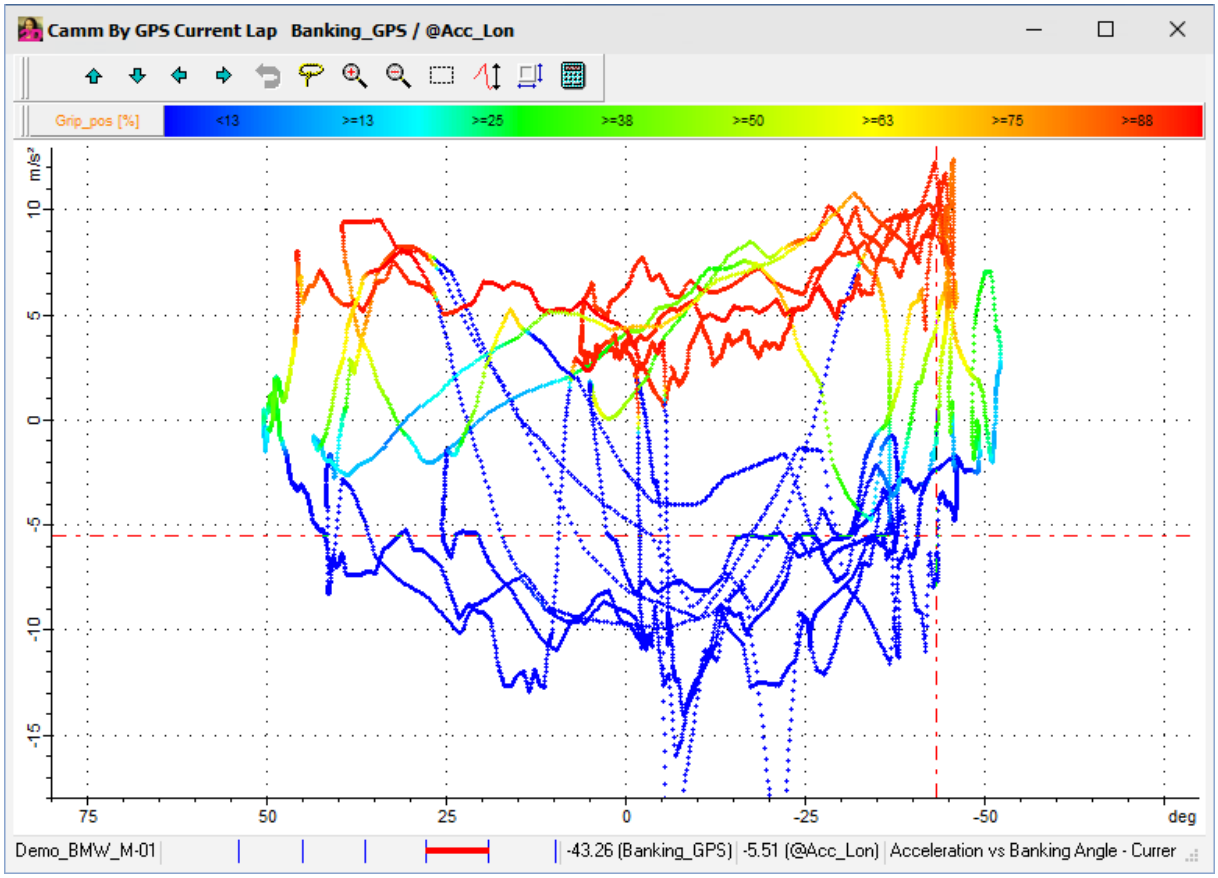
3.4 Camm by GPS All Laps



- Bank angle vs. longitudinal acceleration
- Color-coded throttle-twistgrip position
- View for all laps
- Shape and size of the plot are indicative of the rider's skill
- A heart-shaped contour indicates a professional

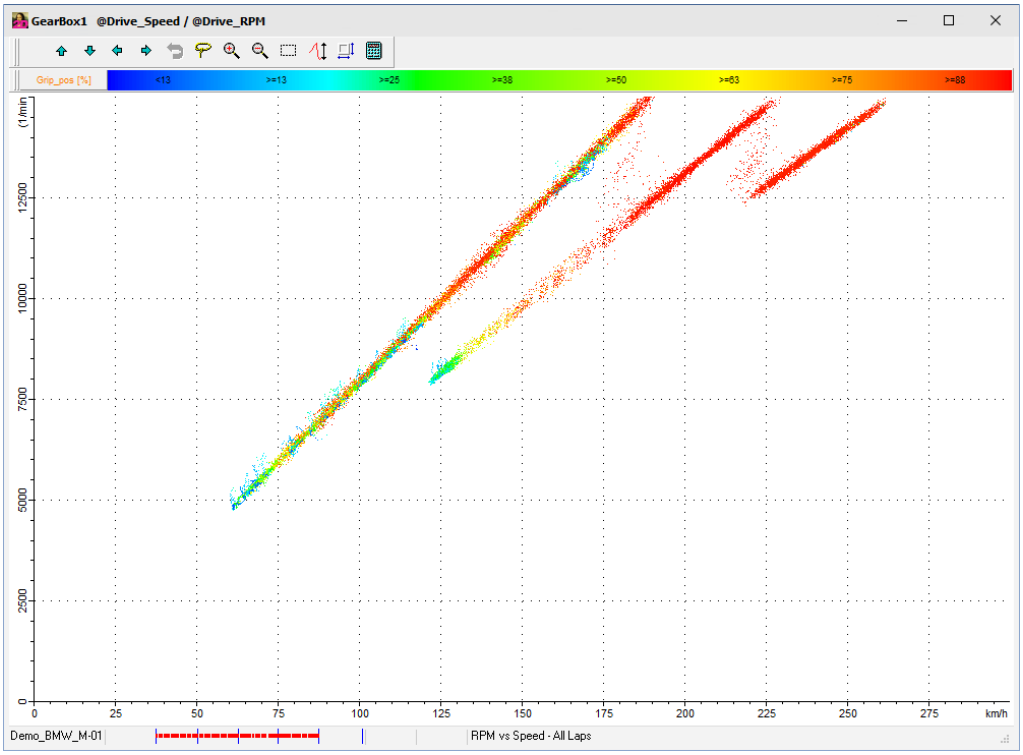


3.5 Camm by GPS Current Lap

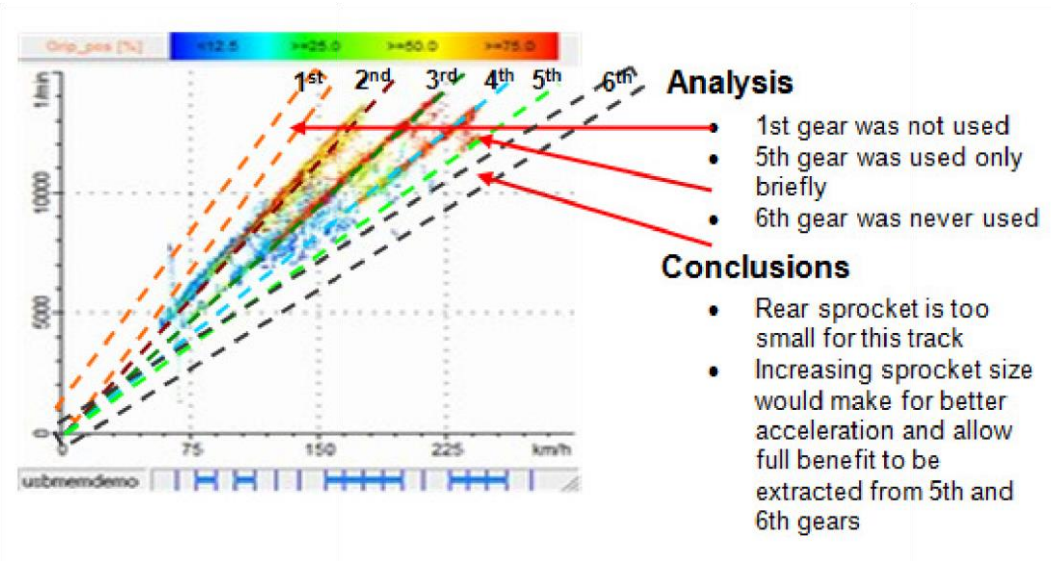


- Bank angle vs. longitudinal acceleration
- Color-coded throttle-twistgrip position
- Lap-based view
- Shape and size of the plot are indicative of the rider's skill

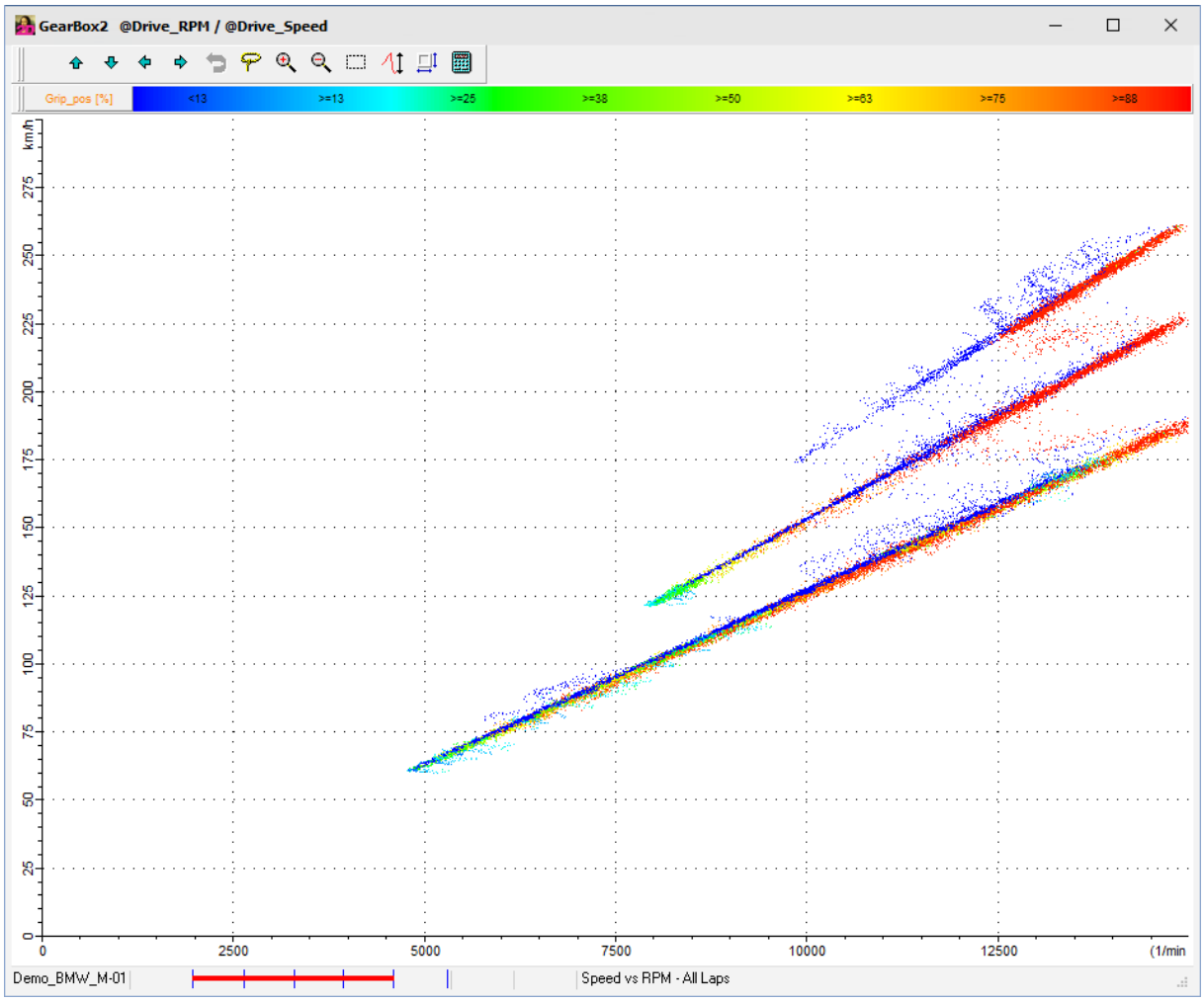
3.6 GearBox 1



- Engine rpm vs. speed
- Color-coded throttle-twistgrip position
- All gears engaged during a measurement
- Max. engine rpm per gear
- Min/max speeds

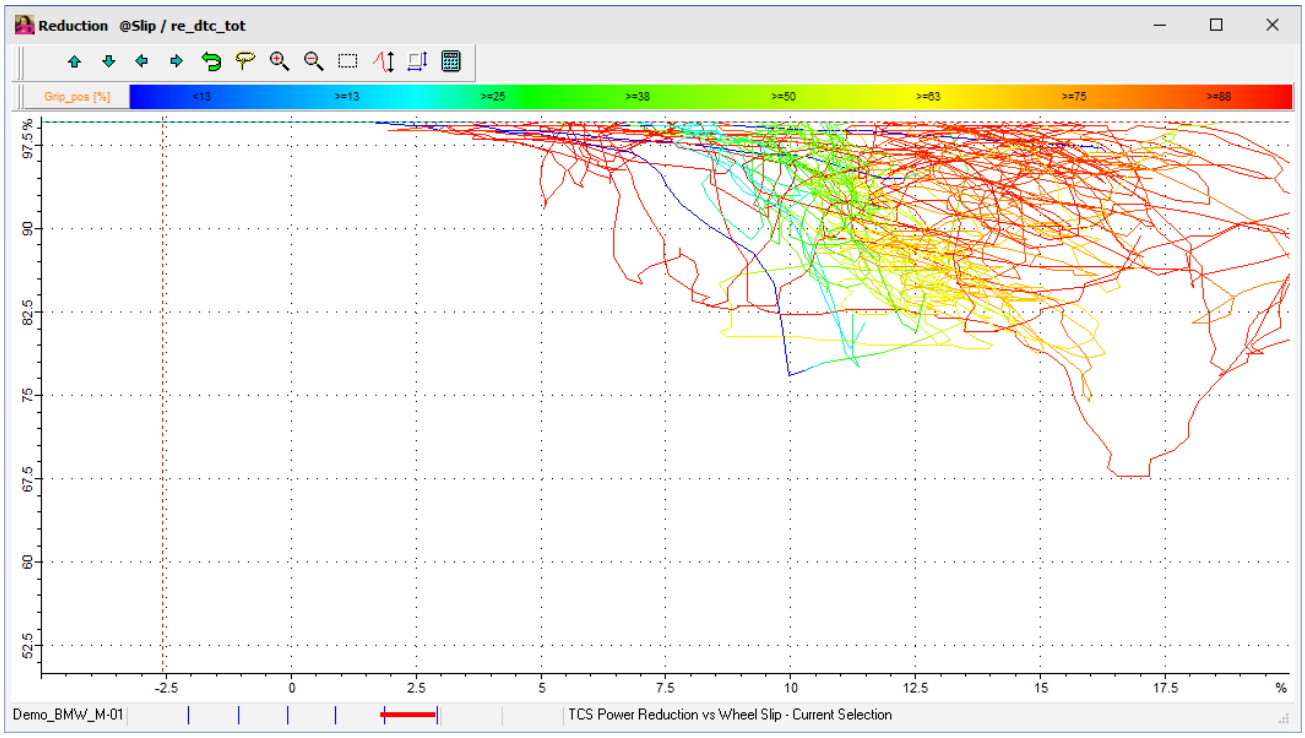


3.7 Gearbox 2



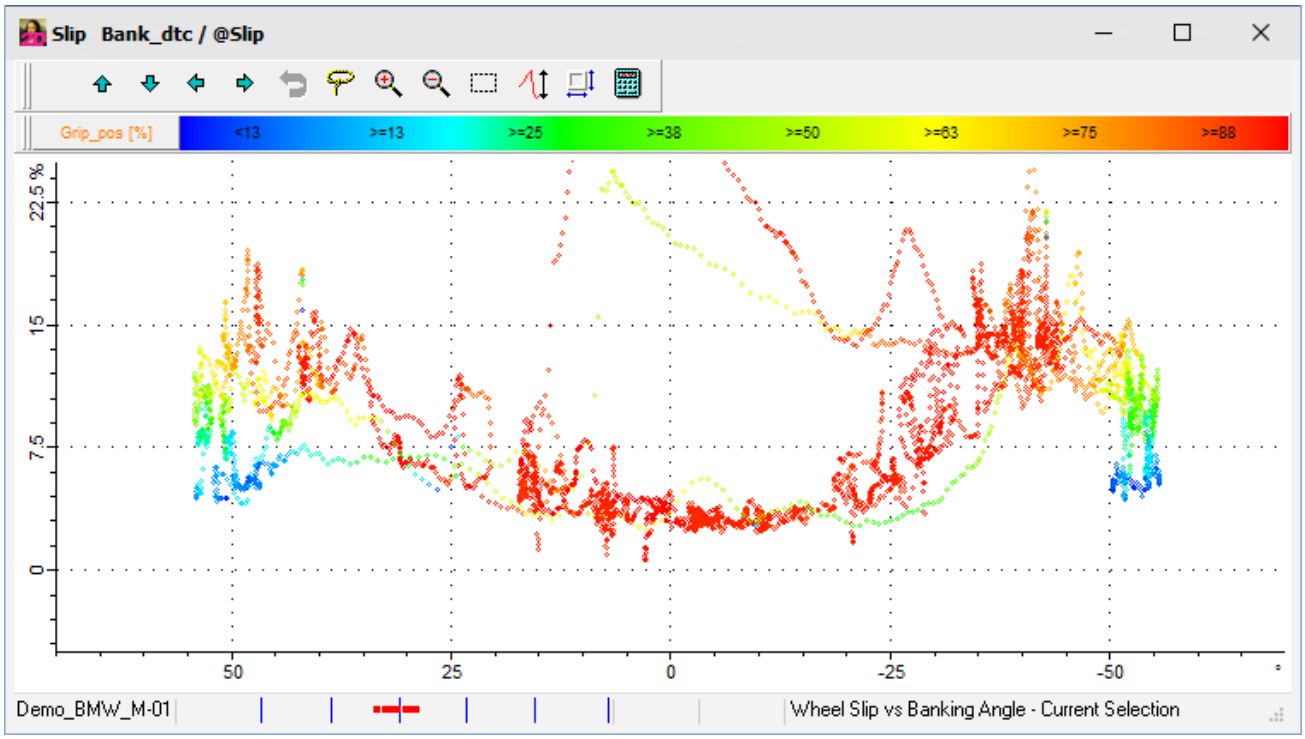
- Speed vs. engine rpm
- Color-coded throttle-twistgrip position
- All gears engaged during a measurement
- Max. engine rpm per gear
- Min/max speeds

3.8 Reduction



- DTC torque reduction vs. wheel slip
- Color-coded throttle-twistgrip position
- Dynamic view of the data in the selected window section
- Analysis of DTC control strategy

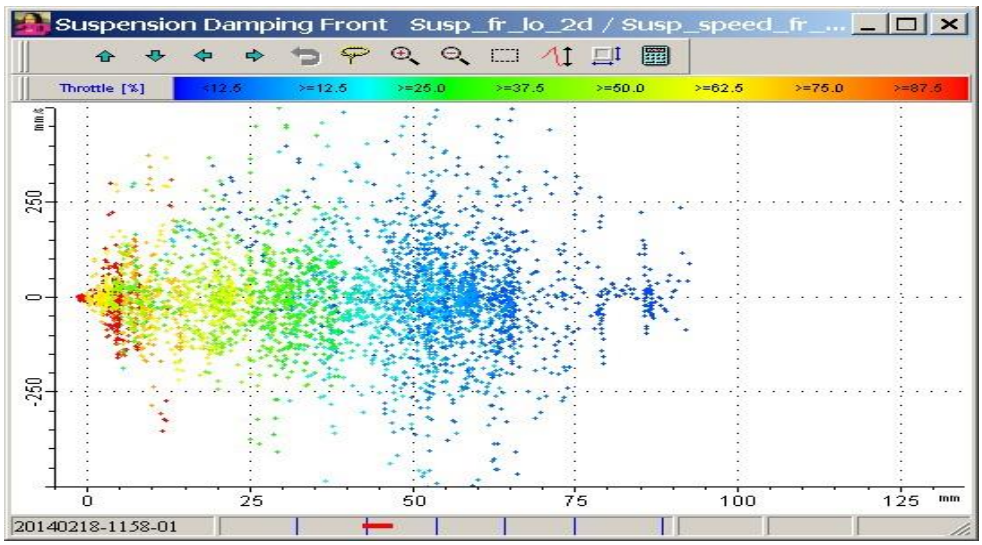
3.9 Slip



- Wheel slip vs. bank angle
- Color-coded throttle-twistgrip position
- Dynamic view of the data in the selected window section
- Wheel slip at each bank angle for current rider input

3.10 Suspension Damping Front

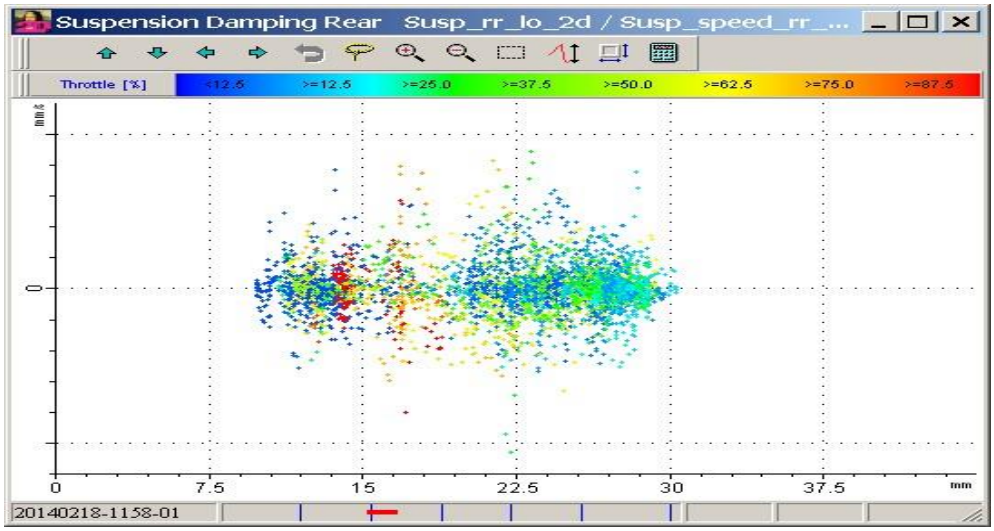
This XY-Plot is only working with mounted suspension sensors!



- Susp_fr_lo_2d vs. Susp_speed_fr_2d
- Color-coded by Throttle
- Focused on current selection
- Shows relation of front bike position to suspension speed

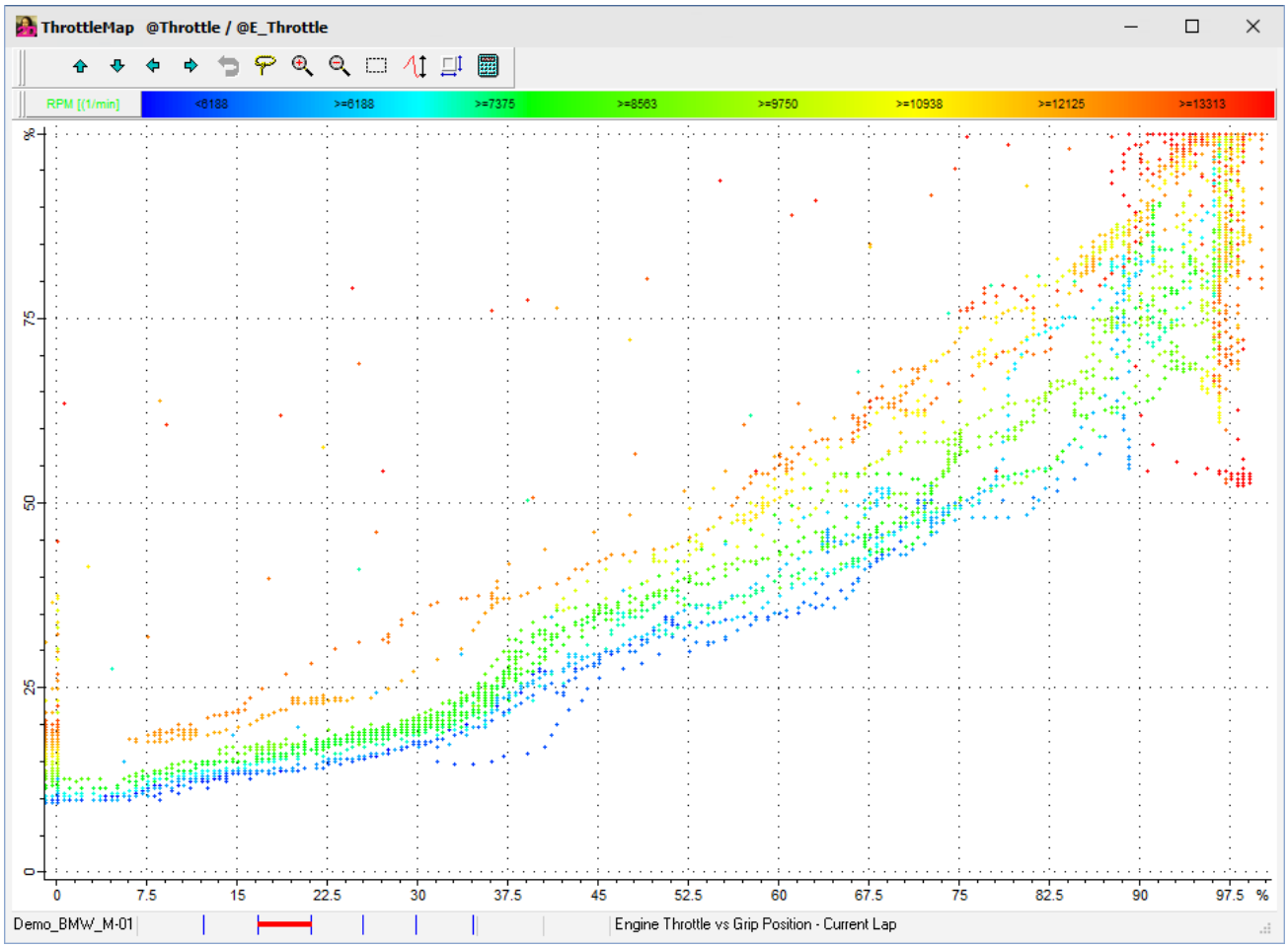
3.11 Suspension Damping Rear

This XY-Plot is only working with mounted suspension sensors!

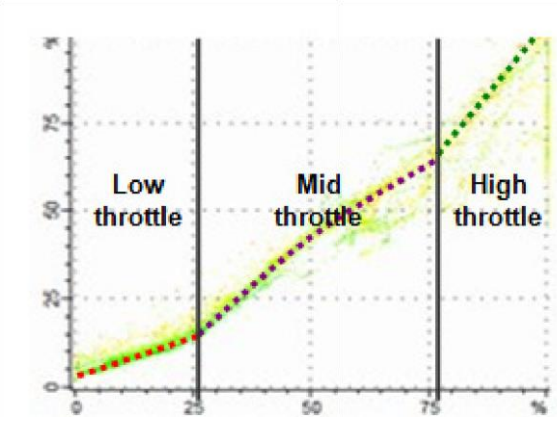


- Susp_rr_lo_2d vs. Susp_speed_rr_2d
- Color-coded by Throttle
- Focused on current selection where throttle is opened
- Shows relation of rear bike position to suspension speed

3.12 Throttle Map



- Driver input at throttle twistgrip vs. throttle-valve position
- Color-coded engine rpm
- Lap-based view
- Comparison of driver's input vs. electronically controlled throttle valve

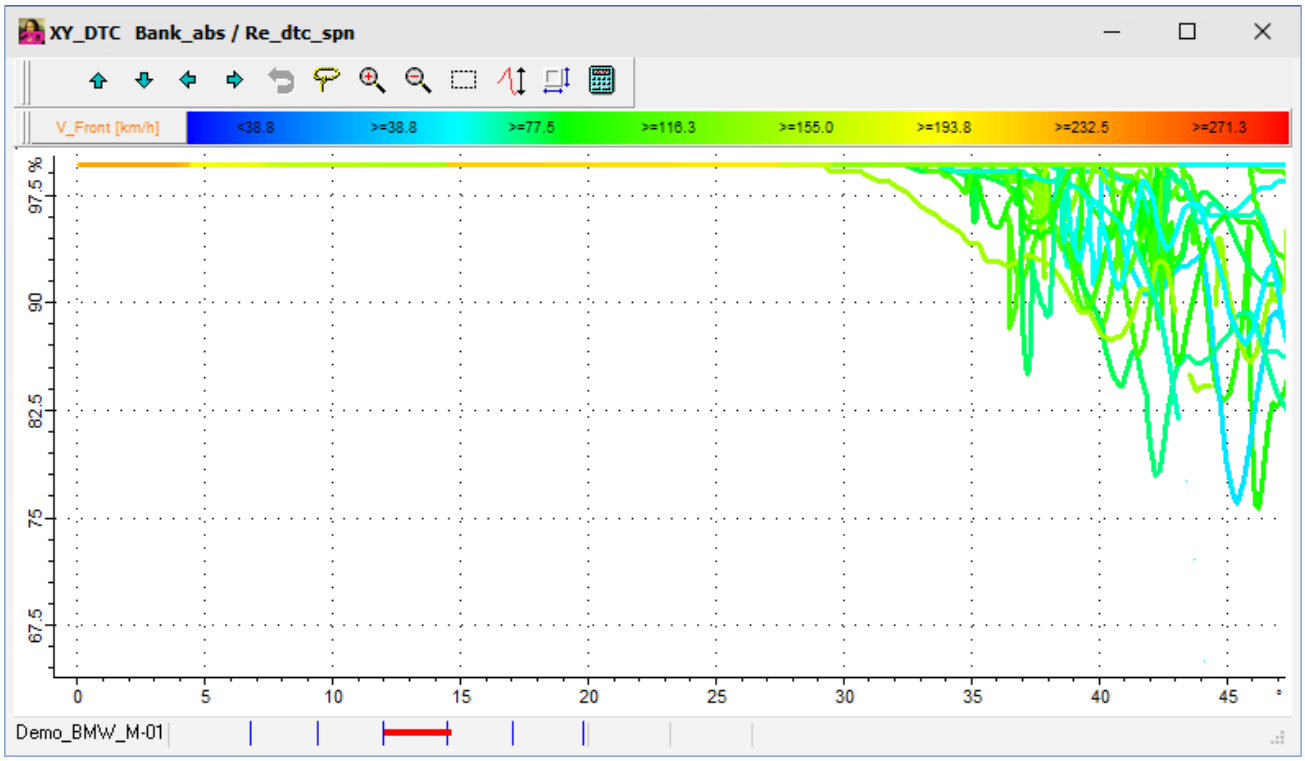


Low: DTC overrides driver input to stabilise the vehicle.

Mid: DTC allows more leeway

High: DTC intervention minimised so that the throttle valve can respond as rapidly as possible to rider input and the motorcycle can achieve maximum performance

3.13 XY DTC

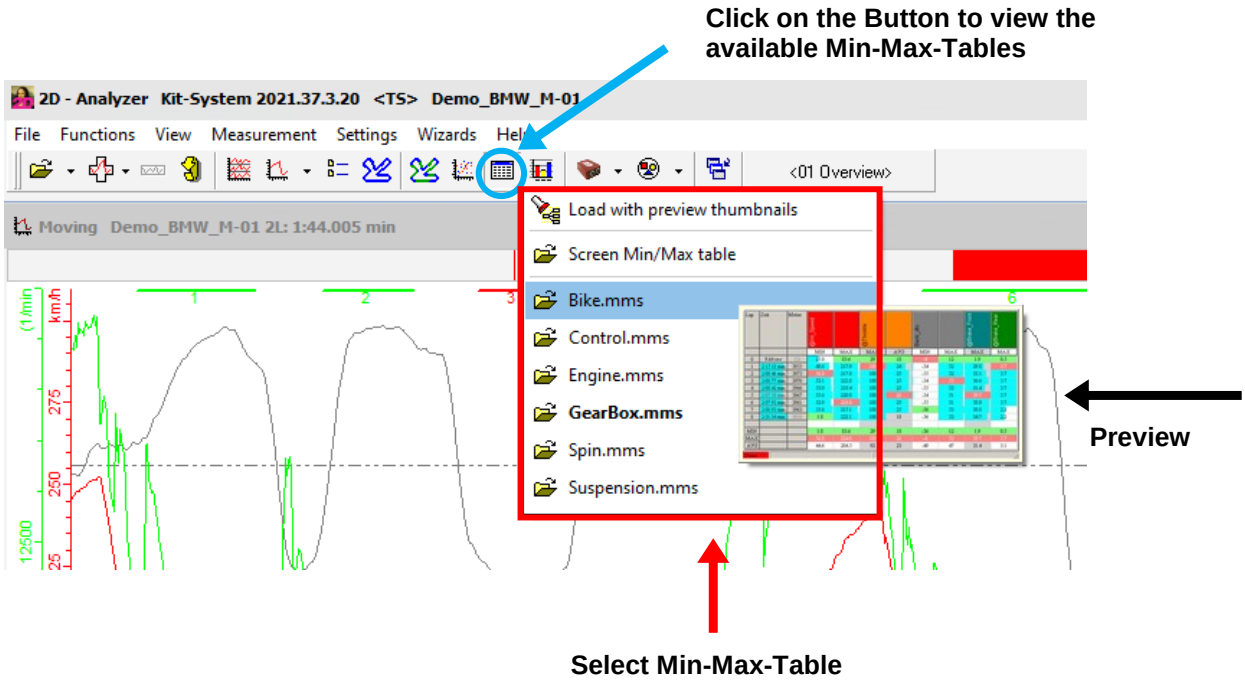


- Bank_abs vs. Re_dtc_spn
- Color-coded by V_Front
- Focused on current selection
- Analysis of traction control in relation to banking

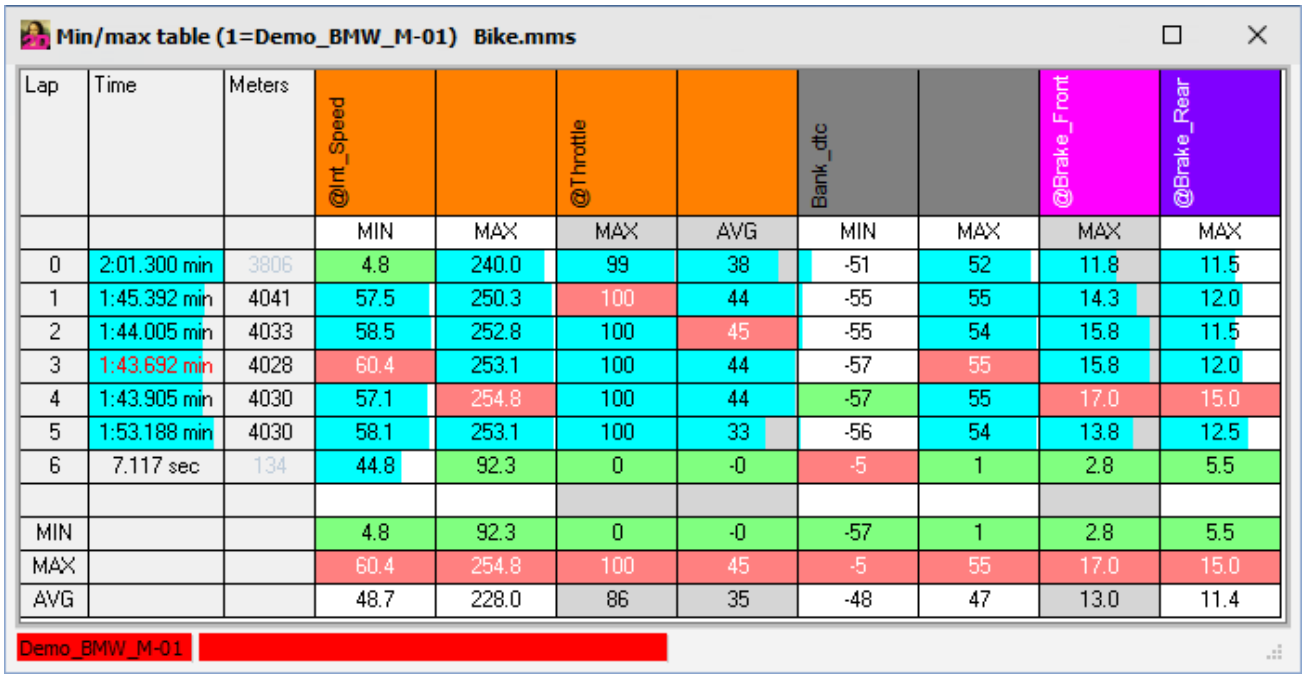
4 Min-Max-Tables

The following predefined min/max tables are available.

4.1 1.8 Selecting a min-max table



4.2 Bike



Lap	Time	Meters	@Int_Speed		@Throttle		Bank_dtc		@Brake_Front	@Brake_Rear
			MIN	MAX	MAX	AVG	MIN	MAX	MAX	MAX
0	2:01.300 min	3806	4.8	240.0	99	38	-51	52	11.8	11.5
1	1:45.392 min	4041	57.5	250.3	100	44	-55	55	14.3	12.0
2	1:44.005 min	4033	58.5	252.8	100	45	-55	54	15.8	11.5
3	1:43.692 min	4028	60.4	253.1	100	44	-57	55	15.8	12.0
4	1:43.905 min	4030	57.1	254.8	100	44	-57	55	17.0	15.0
5	1:53.188 min	4030	58.1	253.1	100	33	-56	54	13.8	12.5
6	7.117 sec	134	44.8	92.3	0	-0	-5	1	2.8	5.5
MIN			4.8	92.3	0	-0	-57	1	2.8	5.5
MAX			60.4	254.8	100	45	-5	55	17.0	15.0
AVG			48.7	228.0	86	35	-48	47	13.0	11.4

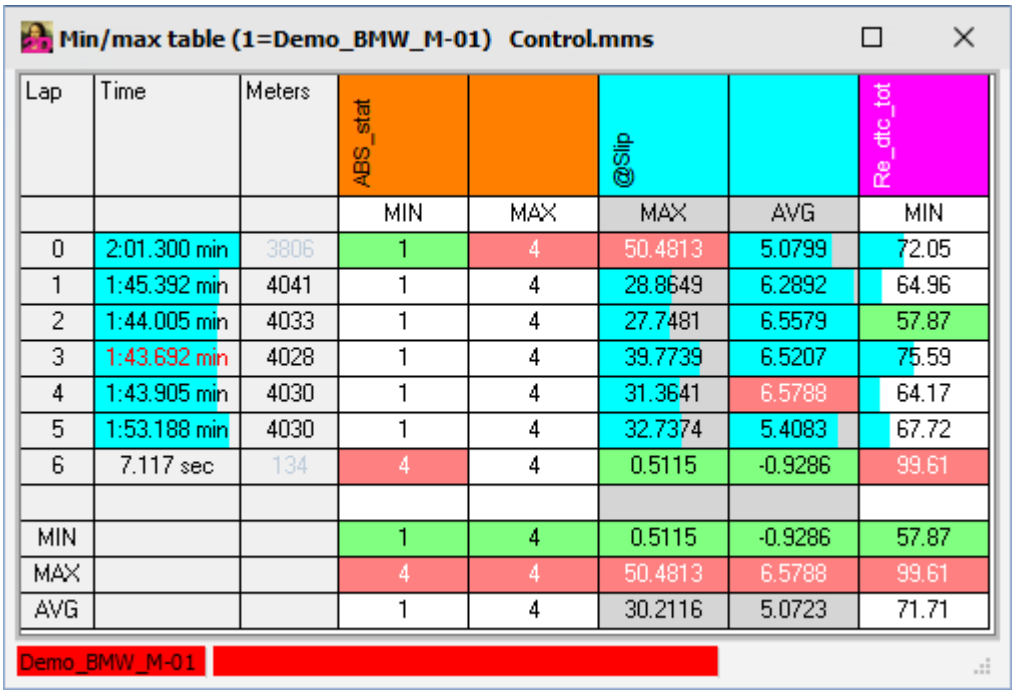
- Quick overview of rider and vehicle performance
- Overview of all lap times
- Overview of all min./max. speeds
- Rider input, throttle twistgrip maximum & average
- Max. bank angle (GPS & sensor)

Hint

If you click on a value in the table, say speed for example, the point at which this speed was reached is shown automatically in the Overview window.

This makes it all the easier to evaluate the min/max values.

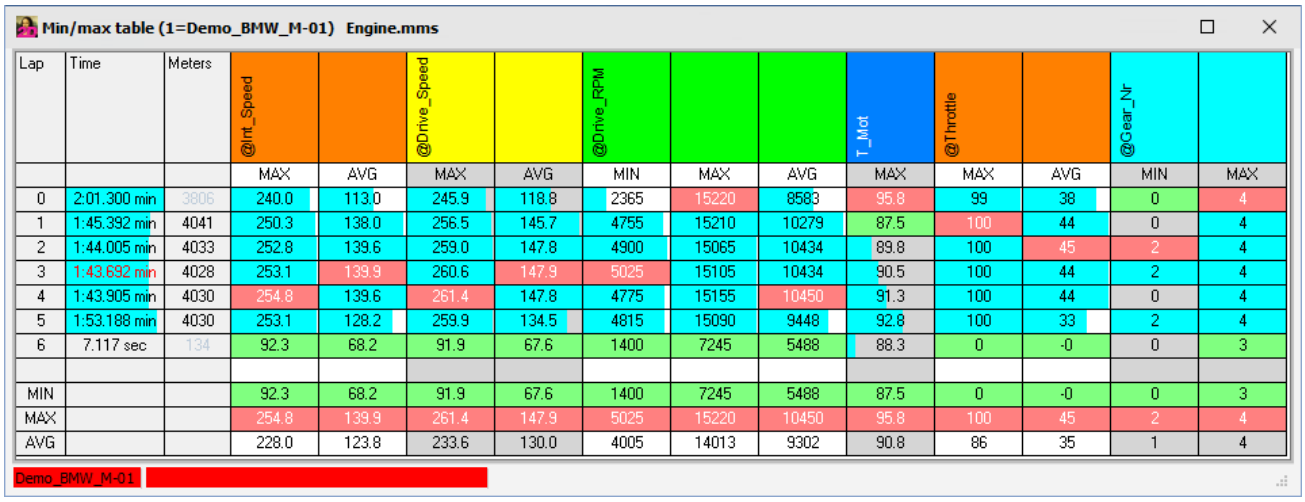
4.3 Control



Lap	Time	Meters	ABS_stat		@Slip		Re_dtc_tot
			MIN	MAX	MAX	AVG	MIN
0	2:01.300 min	3806	1	4	50.4813	5.0799	72.05
1	1:45.392 min	4041	1	4	28.8649	6.2892	64.96
2	1:44.005 min	4033	1	4	27.7481	6.5579	57.87
3	1:43.692 min	4028	1	4	39.7739	6.5207	75.59
4	1:43.905 min	4030	1	4	31.3641	6.5788	64.17
5	1:53.188 min	4030	1	4	32.7374	5.4083	67.72
6	7.117 sec	134	4	4	0.5115	-0.9286	99.61
MIN			1	4	0.5115	-0.9286	57.87
MAX			4	4	50.4813	6.5788	99.61
AVG			1	4	30.2116	5.0723	71.71

- Quick overview of ABS and DTC interventions
- ABS status – min. & max.
- Wheel slip - max. & average
- Wheel slip with DTC intervention - min.
- Absolute torque reduction - min.

4.4 Engine



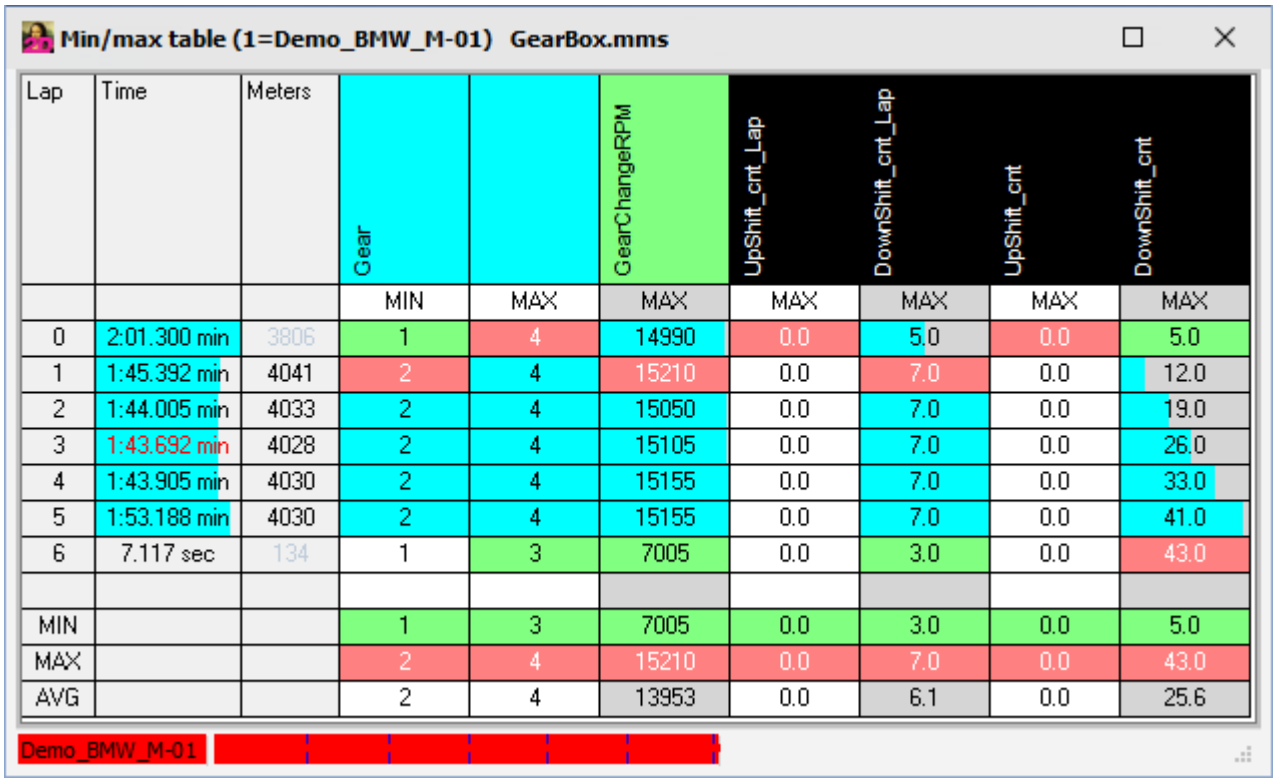
Min/max table (1=Demo_BMW_M-01) Engine.mms

Lap	Time	Meters	@Int_Speed		@Drive_Speed		@Drive_RPM			T_Mot	@Throttle		@Gear_Nr	
			MAX	AVG	MAX	AVG	MIN	MAX	AVG	MAX	MAX	AVG	MIN	MAX
0	2:01.300 min	3806	240.0	113.0	245.9	118.8	2365	15220	8583	95.8	99	38	0	4
1	1:45.392 min	4041	250.3	138.0	256.5	145.7	4755	15210	10279	87.5	100	44	0	4
2	1:44.005 min	4033	252.8	139.6	259.0	147.8	4900	15065	10434	89.8	100	45	2	4
3	1:43.692 min	4028	253.1	139.9	260.6	147.9	5025	15105	10434	90.5	100	44	2	4
4	1:43.905 min	4030	254.8	139.6	261.4	147.8	4775	15155	10450	91.3	100	44	0	4
5	1:53.188 min	4030	253.1	128.2	259.9	134.5	4815	15090	9448	92.8	100	33	2	4
6	7.117 sec	134	92.3	68.2	91.9	67.6	1400	7245	5488	88.3	0	-0	0	3
MIN			92.3	68.2	91.9	67.6	1400	7245	5488	87.5	0	-0	0	3
MAX			254.8	139.9	261.4	147.9	5025	15220	10450	95.8	100	45	2	4
AVG			228.0	123.8	233.6	130.0	4005	14013	9302	90.8	86	35	1	4

Demo_BMW_M-01

- Quick overview of top speed, gear and engine rpm
- Speed maximum & average
- Rear-wheel speed, maximum and average
- Engine rpm, min., max. and average
- Throttle - max. and average

4.5 GearBox



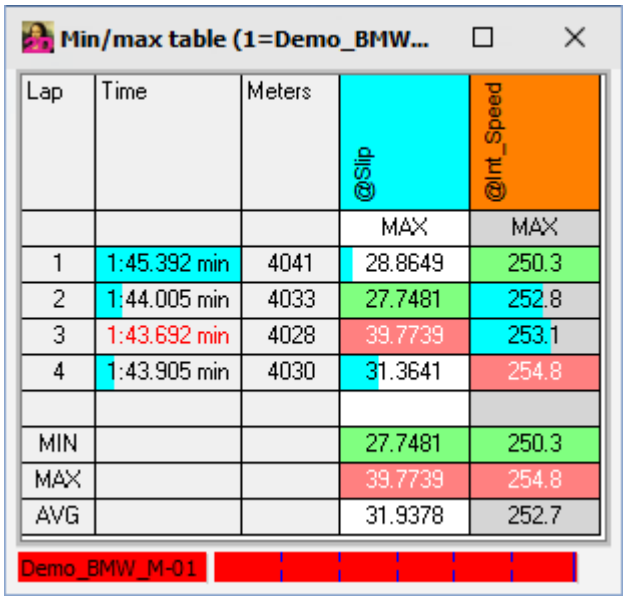
Min/max table (1=Demo_BMW_M-01) GearBox.mms

Lap	Time	Meters	Gear		GearChangeRPM	UpShift_cnt_Lap	DownShift_cnt_Lap	UpShift_cnt	DownShift_cnt
			MIN	MAX	MAX	MAX	MAX	MAX	MAX
0	2:01.300 min	3806	1	4	14990	0.0	5.0	0.0	5.0
1	1:45.392 min	4041	2	4	15210	0.0	7.0	0.0	12.0
2	1:44.005 min	4033	2	4	15050	0.0	7.0	0.0	19.0
3	1:43.692 min	4028	2	4	15105	0.0	7.0	0.0	26.0
4	1:43.905 min	4030	2	4	15155	0.0	7.0	0.0	33.0
5	1:53.188 min	4030	2	4	15155	0.0	7.0	0.0	41.0
6	7.117 sec	134	1	3	7005	0.0	3.0	0.0	43.0
MIN			1	3	7005	0.0	3.0	0.0	5.0
MAX			2	4	15210	0.0	7.0	0.0	43.0
AVG			2	4	13953	0.0	6.1	0.0	25.6

Demo_BMW_M-01

- - Quick overview of gear and shifting
- - Overview of all lap times
- - Gear, top engine revolution at upshift, shift counts
- - Masked out gear idle phases

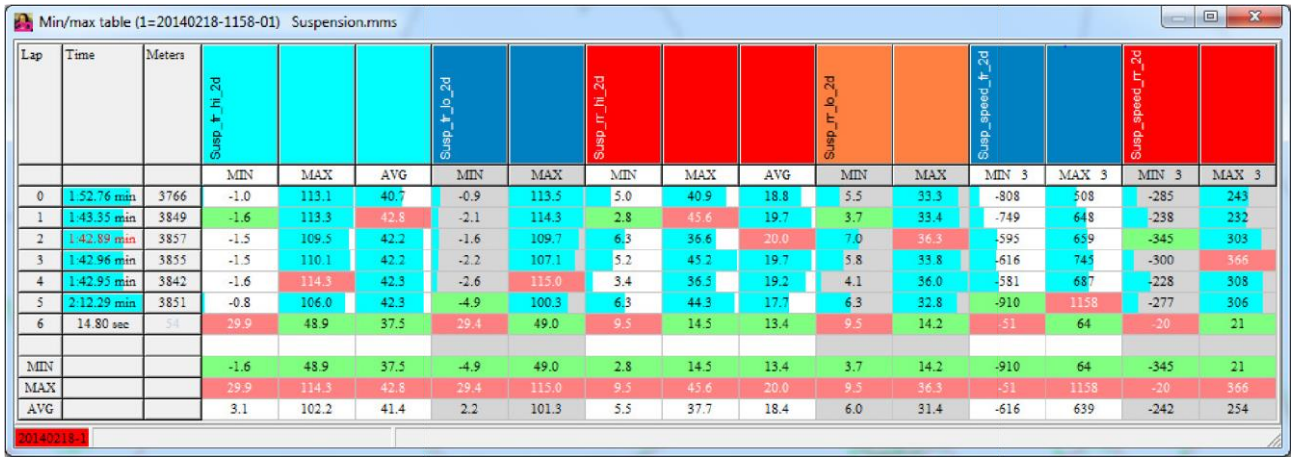
4.6 Spin



- Quick overview of wheel slip
- Lap times of all valid laps
- Wheel slip - max.
- Speed - max.

4.7 Suspension

This Min-Max-Table is only working with mounted suspension sensors!



Min/max table (1=20140218-1158-01) Suspension.mms

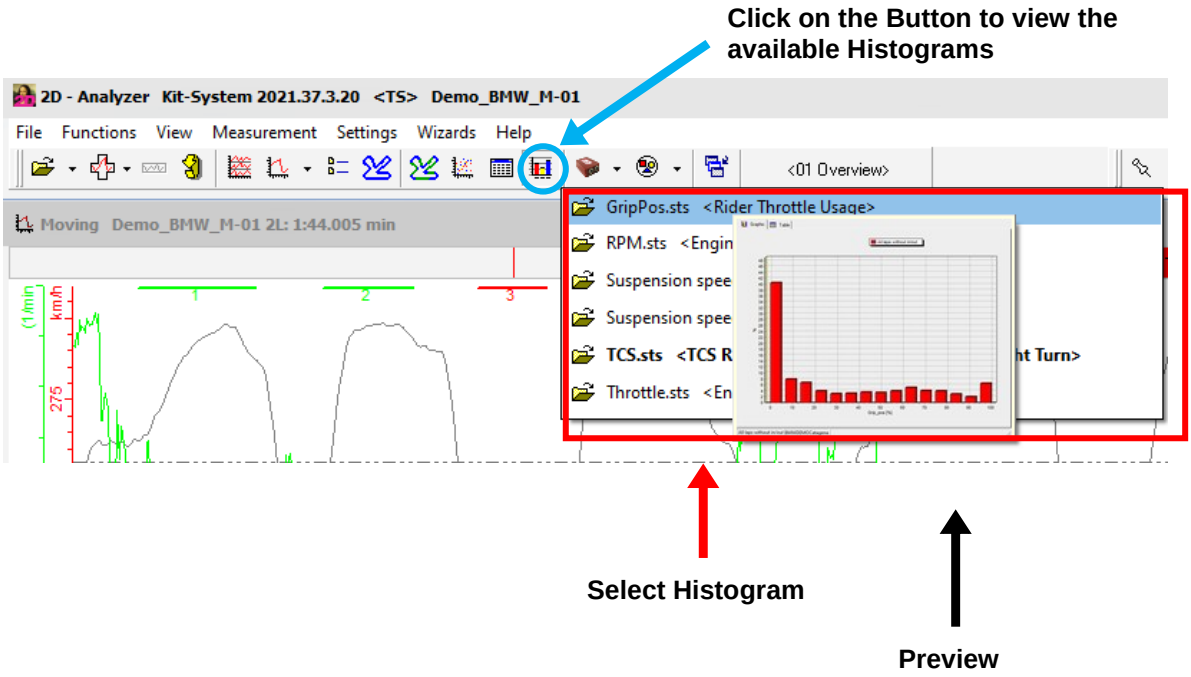
Lap	Time	Meters	Susp_fr_hi_2d			Susp_fr_lo_2d		Susp_rr_hi_2d			Susp_rr_lo_2d			Susp_speed_fr_2d		Susp_speed_rr_2d	
			MIN	MAX	AVG	MIN	MAX	MIN	MAX	AVG	MIN	MAX		MIN 3	MAX 3	MIN 3	MAX 3
0	1:52.76 min	3766	-1.0	113.1	40.7	-0.9	113.5	5.0	40.9	18.8	5.5	33.3		-808	508	-285	243
1	1:43.35 min	3849	-1.6	113.3	42.8	-2.1	114.3	2.8	45.6	19.7	3.7	33.4		-749	648	-238	232
2	1:42.89 min	3857	-1.5	109.5	42.2	-1.6	109.7	6.3	36.6	20.0	7.0	36.3		-595	659	-345	303
3	1:42.96 min	3855	-1.5	110.1	42.2	-2.2	107.1	5.2	45.2	19.7	5.8	33.8		-616	745	-300	366
4	1:42.95 min	3842	-1.6	114.3	42.3	-2.6	115.0	3.4	36.5	19.2	4.1	36.0		-581	687	-228	308
5	2:12.29 min	3851	-0.8	106.0	42.3	-4.9	100.3	6.3	44.3	17.7	6.3	32.8		-910	1158	-277	306
6	14.80 sec	54	29.9	48.9	37.5	29.4	49.0	9.5	14.5	13.4	9.5	14.2		-51	64	-20	21
MIN			-1.6	48.9	37.5	-4.9	49.0	2.8	14.5	13.4	3.7	14.2		-910	64	-345	21
MAX			29.9	114.3	42.8	29.4	115.0	9.5	45.6	20.0	9.5	36.3		-51	1158	-20	366
AVG			3.1	102.2	41.4	2.2	101.3	5.5	37.7	18.4	6.0	31.4		-616	639	-242	254

20140218-1

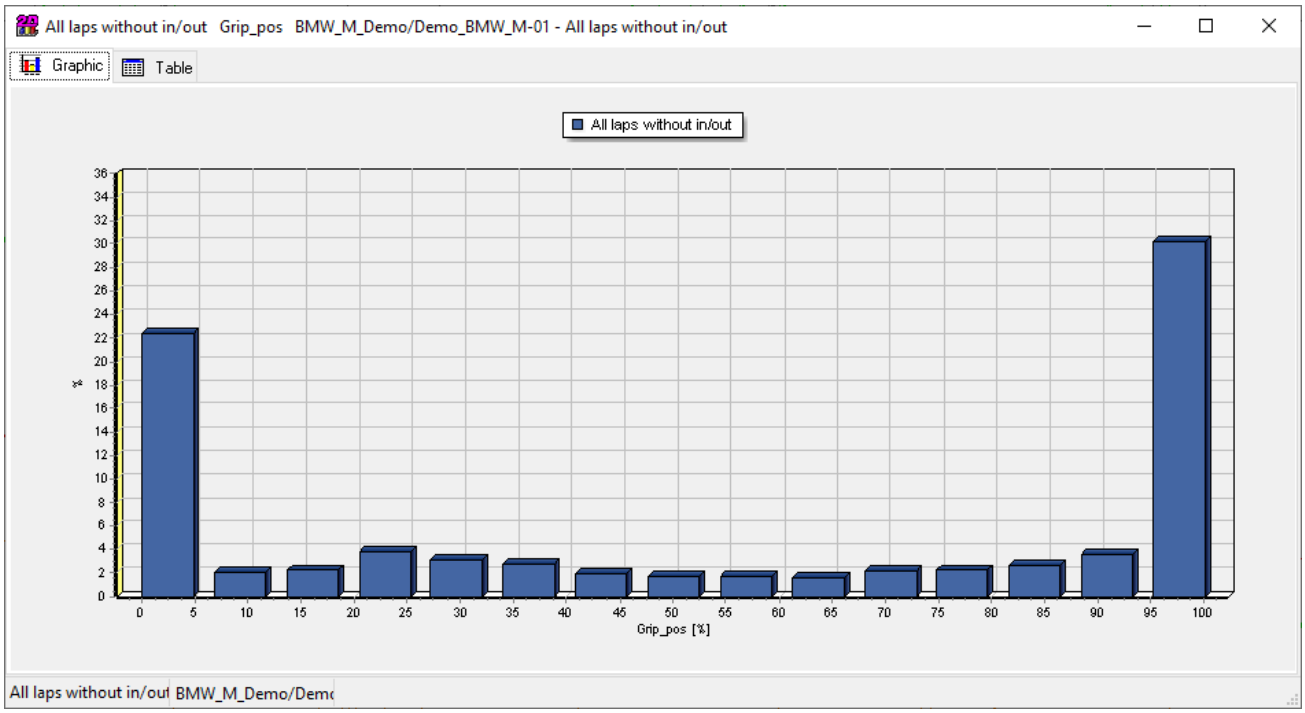
- Quick overview of fast and slow suspension movements
- Overview of all lap times
- Suspension, bike position, suspension speed for front and rear suspension

5 Histogram

5.1 Selecting a Histogram

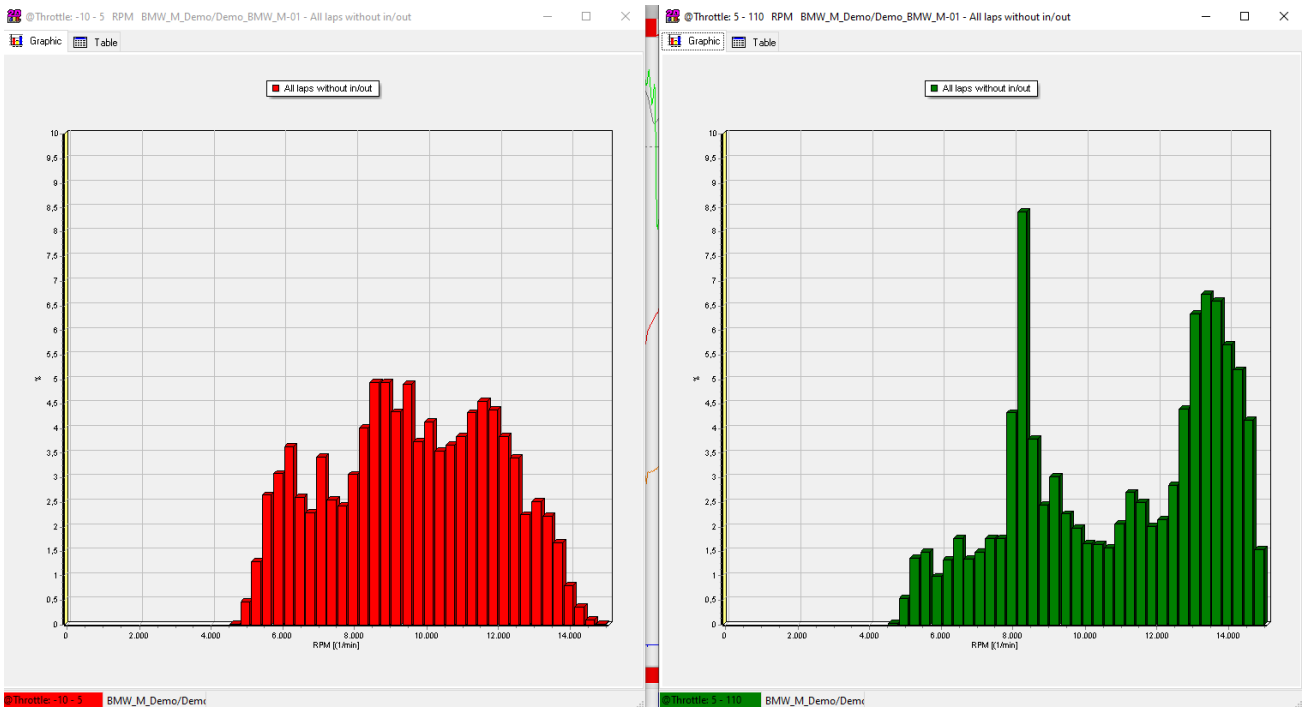


5.2 GripPos



- Quick overview of throttle grip position use
- Statistical overview of throttle grip position
- Throttle grip position percentages per lap

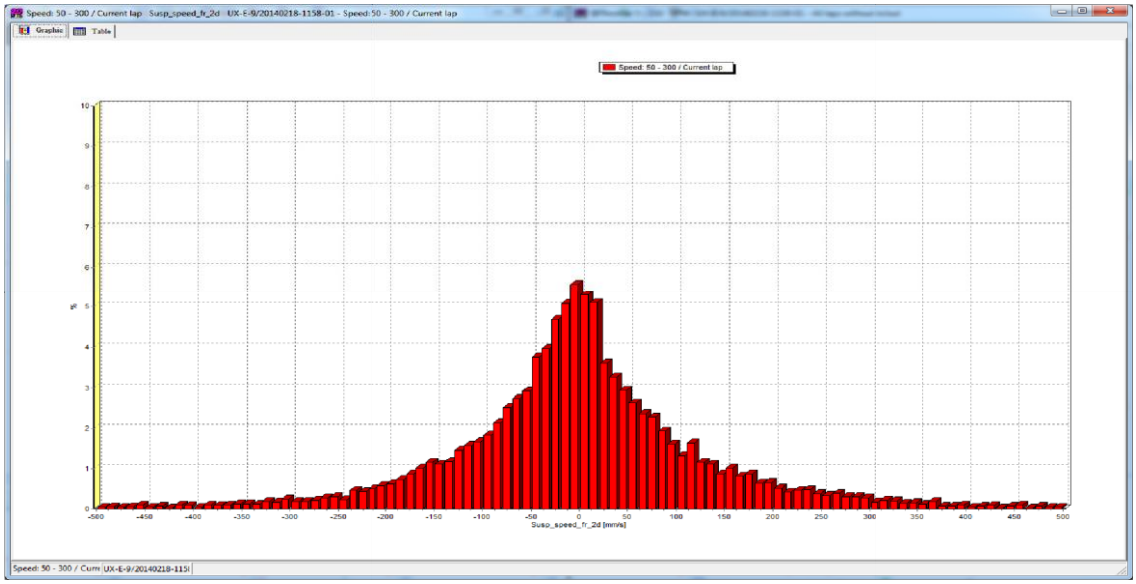
5.3 RPM



- Statistical overview of the engine speeds achieved
- Percentages for each engine rpm
- Lap times of all valid laps

5.4 Suspension Speed Front

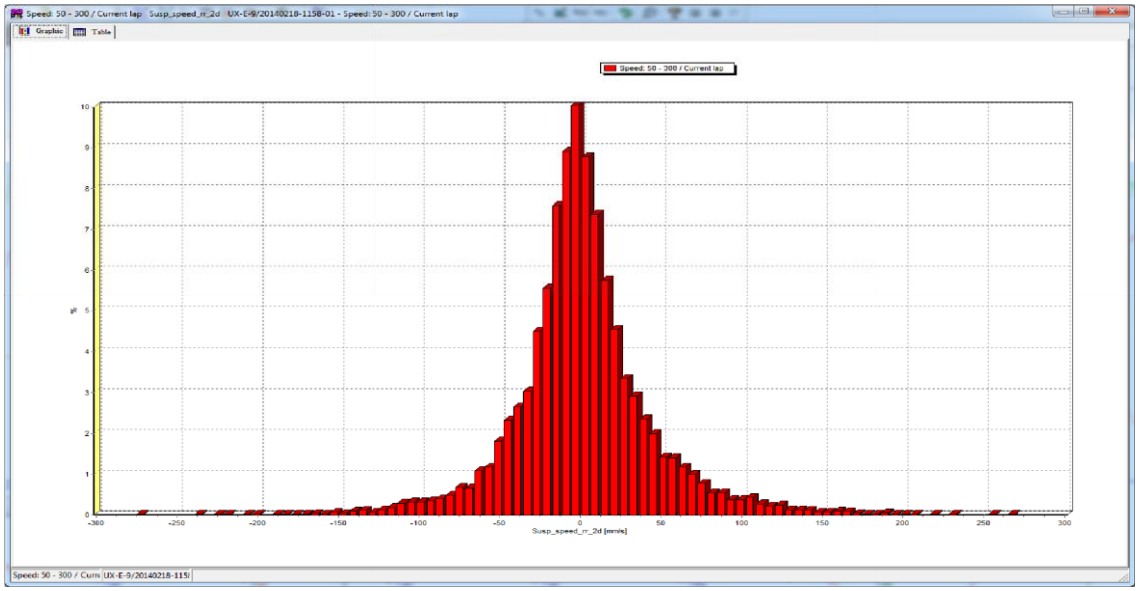
This Histogram is only working with mounted suspension sensors!



- Statistical overview of the front suspension speeds
- Percentages for susp_speed_fr_2d
- Focused on current lap where driving speed is greater than 50 km/h

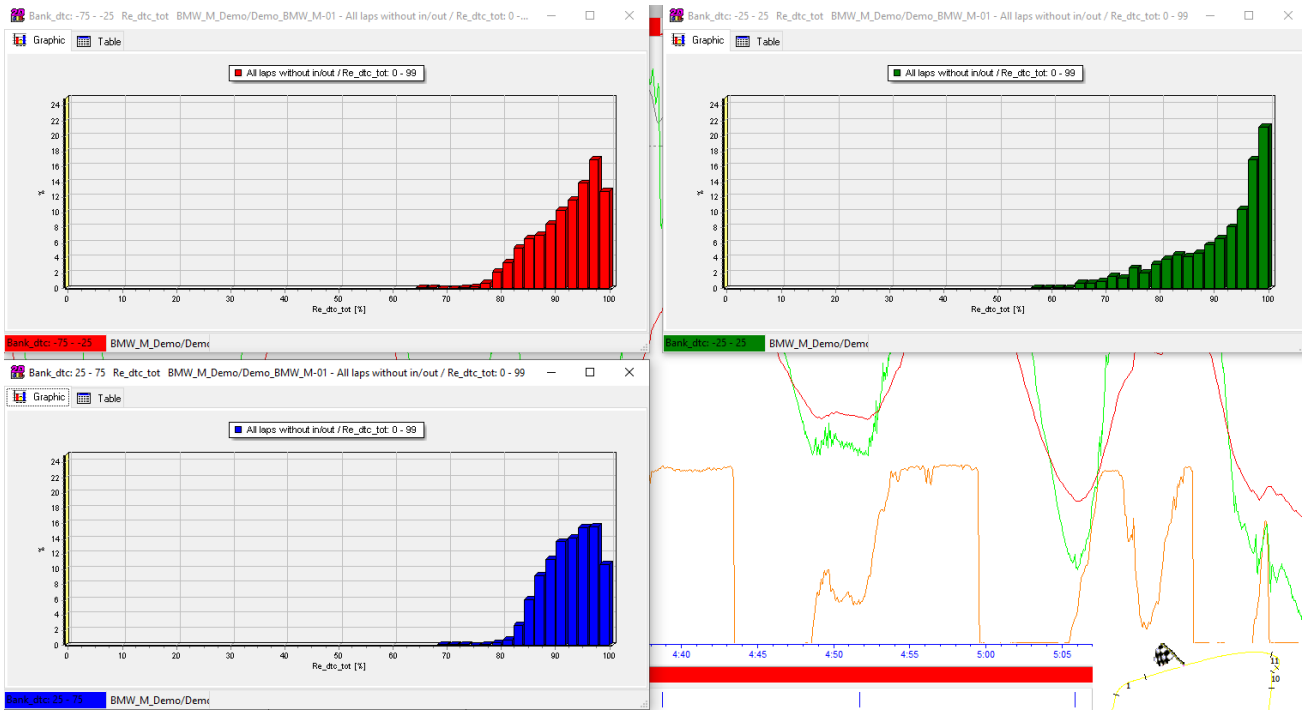
5.5 Suspension Speed Rear

This Histogram is only working with mounted suspension sensors!



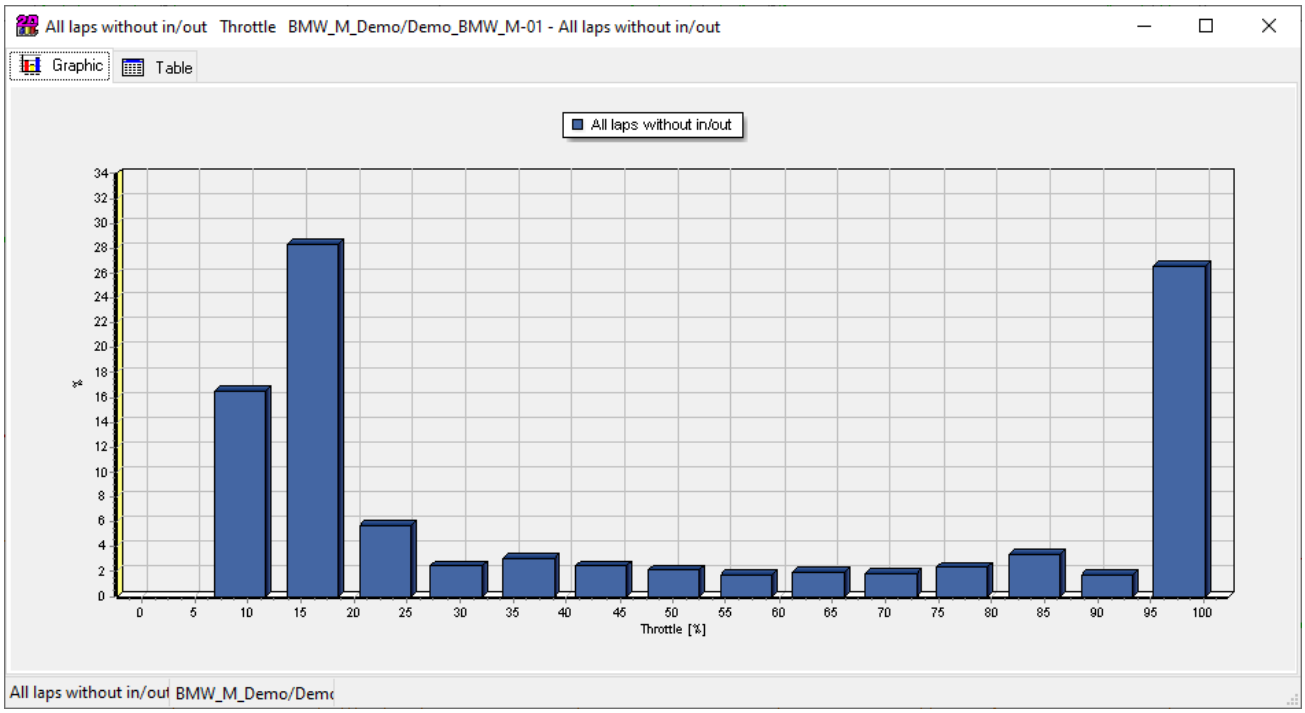
- Statistical overview of the rear suspension speeds
- Percentages for susp_speed_rr_2d
- Focused on current lap where driving speed is greater than 50 km/h

5.6 TCS



- Statistical overview of DTC interventions
- Lap times of all valid **laps**
- Relationship to bank angle – **left (red), upright (green), right (blue)**
- Lower values indicate TCS is working harder

5.7 Throttle



- Statistical overview of throttle twistgrip position
- Percentages for each position
- Lap times of all valid **laps**
- Comparison with GripPos histogram

6 Analyzer channel overview

6.1 Recorded channels

Channel	Description
Re_dtc_tot	Torque reduction final
Re_dtc_spn	Torque reduction ASC/DRC
Whl_Trq_DTC	Calculated ASC/DTC torque rear wheel
Re_DTC_PreCtrl	Relative torque reduction by ASC/DTC
V_Rear	Speed rear wheel
Speed	Speed Bike
V_Front	Speed front wheel
ST_Wheely	Status wheelie
Bank_dtc	Banking angle
Throttle	Throttle opening
Grip_pos	Rider demand opening
RPM	RPM engine
ABS_Stat	ABS on / off / active
Gear	Gear
T_Mot	Engine temperature
Brake_Press_F	Brake pressure front
Brake_Press_R	Brake pressure rear
DDC_sensor_fr_status	Front suspension sensor mounted
DDC_error_status	Status DDC
DDC_displacement_fr	Suspension position front
DDC_displacement_rr	Suspension position rear
Drv_Mod	Drive mode
T_Air	Intake air temperature
ACC_Y	Lateral acceleration
YAWRATE	Yaw rate
ACC_X	longitudinal acceleration
ROLLRATE	Roll rate
ACC_Z	vertical acceleration
PITCHRATE	Pitch rate
RacePro1_WhlCtr	Setup RACEPRO1 DDC
RacePro1_TrackCtrl	Setup RACEPRO1 Traction control
RacePro1_Engbrk	Setup RACEPRO1 Engine brake
RacePro1_Engine	Setup RACEPRO1 engine
RacePro1_ABS	Setup RACEPRO1 ABS
RacePro2_WhlCtr	Setup RACEPRO2 DDC
RacePro2_TrackCtrl	Setup RACEPRO2 Traction control

RacePro2_Engbrk	Setup RACEPRO2 Engine brake
RacePro2_Engine	Setup RACEPRO2 engine
RacePro2_ABS	Setup RACEPRO2 ABS
RacePro3_WhlCtr	Setup RACEPRO3 DDC
RacePro3_TrackCtrl	Setup RACEPRO3 Traction control
RacePro3_Engbrk	Setup RACEPRO3 Engine brake
RacePro3_Engine	Setup RACEPRO3 engine
RacePro3_ABS	Setup RACEPRO3 ABS
V_Sat	GPS speed
ValidSat	Visible satellites
SSHH	Seconds : Hundredth
Course	Driving direction
Lat_dez	Position in decimal degree
Lon_dez	Position in decimal degree
Altitude	m above sea level
MMDD	Month : Day
HHMM	Hour : Minute
V_KL_30	Power
vUSB	Power USB
Longitude	Position in decimal degree
Latitude	Position in decimal degree
GPSValid	GPS data valid

The channels below are only available with DDC suspension control and software version 7/21 onwards!	
DDC_Rebd_Rear	Rear damping setup rebound
DDC_Comp_Rear	Rear damping setup compression
DDC_Rebd_Front	Front damping setup rebound
DDC_Comp_Front	Front damping setup compression

6.2 Calculated channels

Channel	Description
V_GPS	GPS speed filtered
GPS_Yaw	Yaw rate from GPS
A_Lon_GPS	Longitudinal acceleration from GPS
A_Lat_GPS	Lateral acceleration from GPS
Banking_GPS	Banking angle from GPS
SOD_raw	time channel
Time2D	time channel
SOD_Jump_pos	time channel
SOD_Jump_neg	time channel
SOD_UPD_Index	time channel
SOD_Extrapol	time channel
SOD_Valid	time channel valid
SOD	time channel seconds since 00:00
Susp_fr_2D	Suspension travel front
Susp_rr_2D	Suspension travel rear
Drive_Modus	Drivemode as text
Speed	Speed bike
Slip	Slip calculated by V_Front And V_rear
s_Lap	Running Distance per Lap
s_Run	Run Distance
Bank_abs	Bankangle no direction
UpShift_cnt_Lap	Upshift actual lap
DownShift_cnt	Downshift since start
DownShift_cnt_Lap	Downshift actual lap
GearChangeRPM	Gearchange RPM

6.3 Special Channels for Compatibility

These channels have only valid results with mounted suspension sensors!
(Channels are compatible to compare data with older models)

Kanal	Beschreibung
Susp_fr_hi_2d	Federweg Vorderrad gefiltert
Susp_rr_hi_2d	Federweg Hinterrad gefiltert
Susp_fr_lo_2d	Federweg Vorderrad mit 3 Hz gefiltert für Mittelwertlage Fahrzeug
Susp_rr_lo_2d	Federweg Hinterrad mit 3 Hz gefiltert für Mittelwertlage Fahrzeug
Susp_speed_fr_2d	Ein- / Ausfedergeschwindigkeit Vorderrad
Susp_speed_rr_2d	Ein- / Ausfedergeschwindigkeit Hinterrad