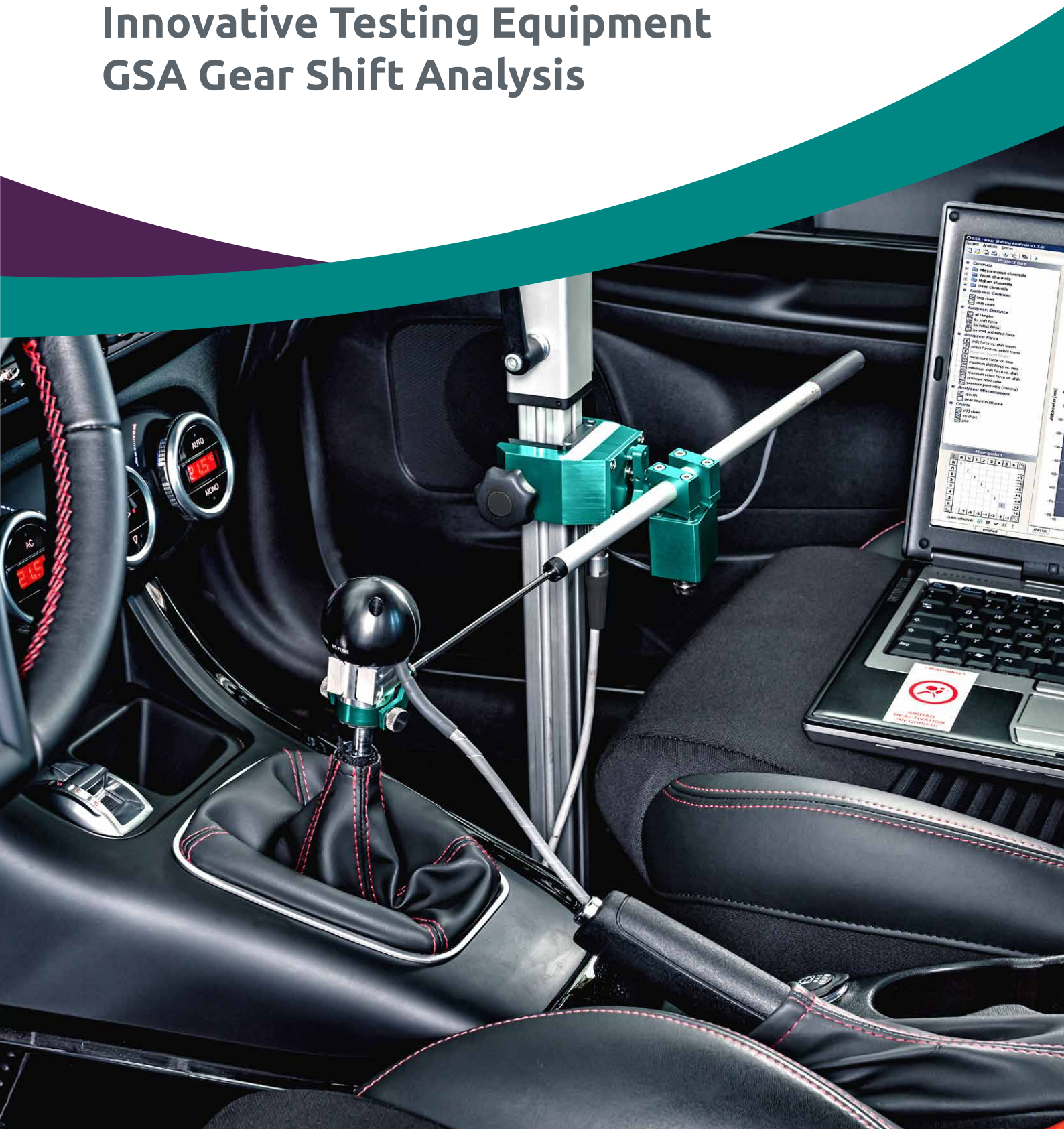
GRC

A member of ATESTEO Group

ATESTEO

Innovative Testing Equipment
GSA Gear Shift Analysis



The GSA system

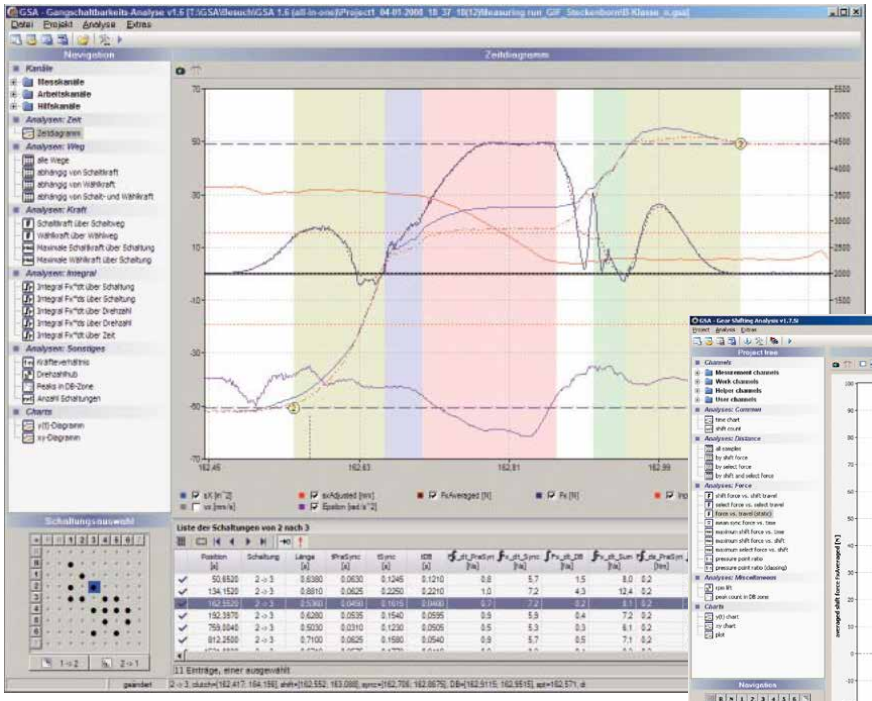
ATESTEO is the leading specialist for drivetrain testing along with automotive product validation and drivetrain testing-related engineering and equipment. Internationally, we rank first among the partners of the automotive industry and automotive suppliers. Our employees' great technical proficiency during customer-specific tests reliably ensures the operation and the quality of gear transmissions and their components. We are everywhere where transmission development in the automotive industry takes place. 120 test benches in Germany and China, along with representations in the USA, Japan, and Korea make possible smoothly solving a range of measurement, test engineering, and analytical challenges at all times. ATESTEO Gear Research Center (China) Co., Ltd., as the biggest operation oversea, is an exclusively-invested subsidiary of its parent company ATESTEO GmbH and provides the excellent drivetrain testing and engineering services.

The GSA system from us is a tool for the optimisation of synchronised manual transmissions. The measured data is analysed to yield objective key values for evaluating the quality of shifting gears. The system delivers the hardware to collect, process, and visualise the relevant data in the vehicle or at the test bench.

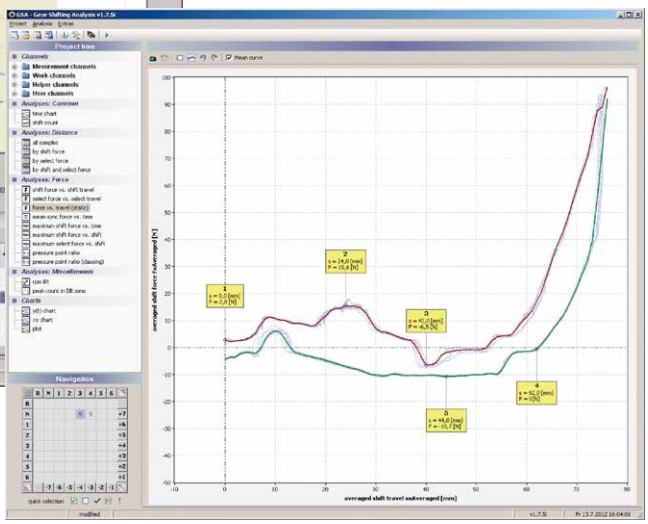
- It measures the forces and travel at the gear stick or directly at the transmission. Optionally, the force and travel at the clutch along with further analogue and CAN signals may also be measured
- It supports users in conducting measurement tests
- It analyses and sorts the specific values in an easy-to-read form with the aid of a variety of filters
- It displays the analysed values in user-friendly tables and typical diagrams
- It offers the possibility of comparing the results of different analyses across different projects

The experience of our specialists coupled with that of many customers in Germany and abroad has made the GSA system a tool recognised around the globe for improving the quality of gear shifting.

ATESTEO Gear Research Center (China)



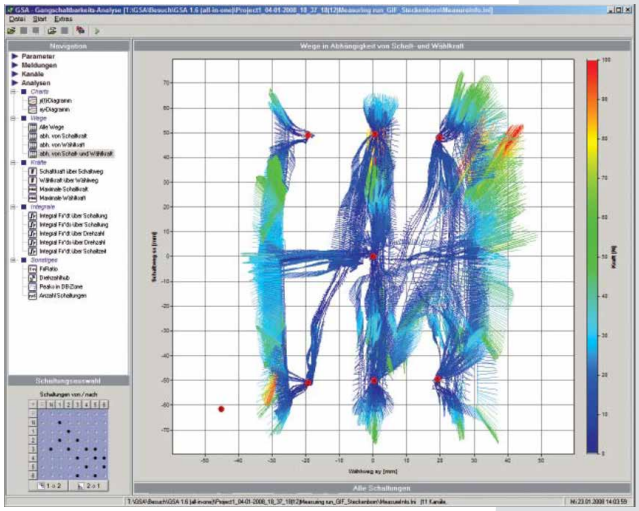
Time history of a shifting event with phases of shifting



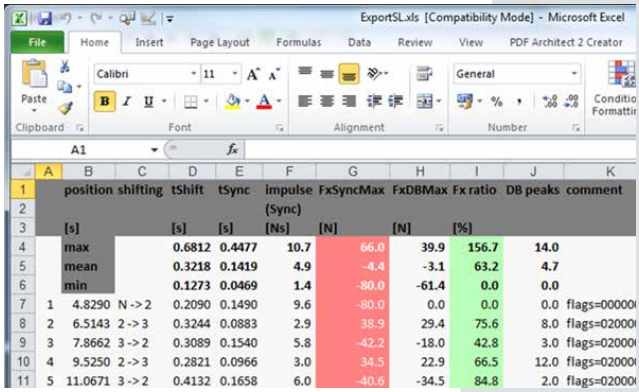
Data analysis

Performance features

- Quick and easy installation of measurement equipment
- Low inertia and friction minimise the influence of the measurement equipment on measurement results
- User-friendly navigation through any number of measurement tasks during dynamic and static measurements (for instance: free play, stiffness, and detent mechanism tests)
- Automatic determination of gear changes and shifting phases; The results can then be reviewed graphically and, if necessary, be adjusted
- Calculation of important parameters, for instance, shifting speed, momentum, and energy
- Display of the calculated values as a function of shifting type, shifting phase, relative time, and travel
- Statistical values, such as minimum and maximum values, time values, and force ratios, are determined as a function of shifting events and shift phases, and are listed in the table form as the user defines
- By exporting the specific values to Excel®, further parameters can be determined and processed into the desired form
- A comparison tool supports loading several measurement projects. The simultaneous display of project parameters shows the existing differences in a clearly structured form
- With the help of measured GPS data, the shift events can be displayed and evaluated in relation to the given locations (OpenStreetMap®)
- Support during transmission and transmission component testing, the integration of transmissions in various vehicle types, design comparisons, documentation of production variation, comparisons of transmission lubricants, and the analysis of inner and outer shifting systems



Force vectors dependent on travel



	position	shifting	tShift	tSync	impulse (Sync)	FxSyncMax	FxDBMax	Fx ratio	DB peaks	comment
	[s]		[s]	[s]	[Ns]	[N]	[N]	[%]		
	max		0.6812	0.4477	10.7	66.0	39.9	156.7	14.0	
	mean		0.3218	0.1419	4.9	-4.4	-3.1	63.2	4.7	
	min		0.1273	0.0469	1.4	-80.0	-61.4	0.0	0.0	
1	4.8290	N -> 2	0.2090	0.1490	9.6	-80.0	0.0	0.0	0.0	flags=00000
2	6.5143	2 -> 3	0.3244	0.0883	2.9	38.9	29.4	75.6	8.0	flags=02000
3	7.8662	3 -> 2	0.3089	0.1540	5.8	-42.2	-18.0	42.8	3.0	flags=02000
4	9.5250	2 -> 3	0.2821	0.0966	3.0	34.5	22.9	66.5	12.0	flags=02000
5	11.0671	3 -> 2	0.4132	0.1658	6.0	-40.6	-34.5	84.8	2.0	flags=02000

Customized list of gear shift events

GPS track

GSA suit

GSA by the numbers

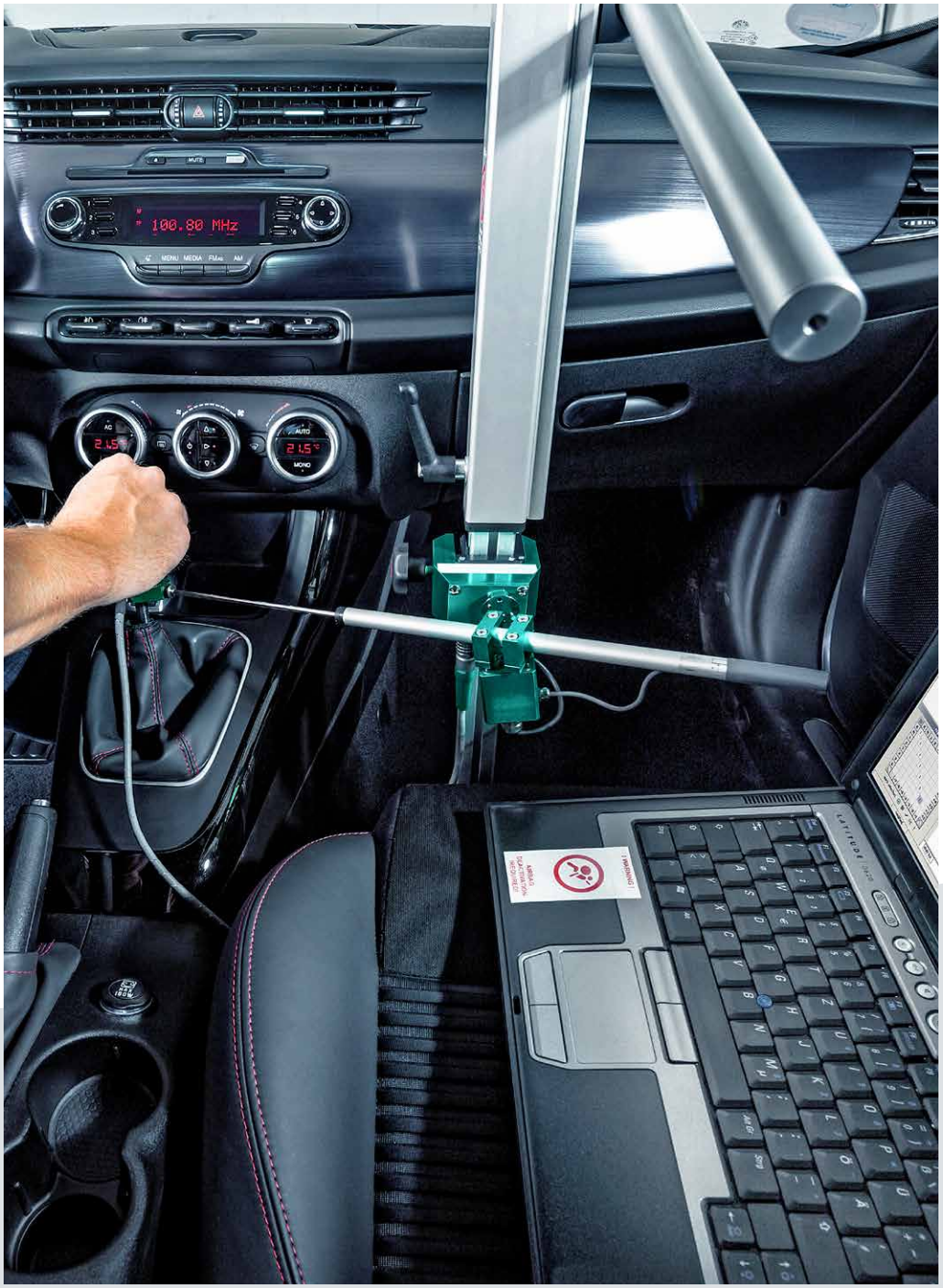
Analogue inputs:	8 (optional 16)
Difference inputs:	✓
Voltage:	✓
Electric current:	✓
Thermocouples:	✓
PT100:	✓
Strain gauges/bridges:	✓
Bridge types and operation:	1/4, 1/2, 1/1 DC
Powered sensors (ICP):	(optional)
Total sampling rate:	400 kHz
Maximum sampling rate/channel:	100 kHz
Bandwidth:	14 kHz
Voltage measurement range:	±5 mV… ±50 V
Current measurement range:	±100 µA … ±50 mA
Bridges:	±0.5 ... ±1000 mV/V
Sensor supply:	✓

Measurement ranges:

Force in X-Y-Z direction:	±200 N (opt. 500 N)
Shifting travel in X-Y-Z direction:	±125 mm (opt. 150 mm)

Operating temperature:

Front-end:	-10° C ... +55° C
GSA sensors:	0° C ... +60° C 20° C ... +80° C (comp.)



The quality and feeling of shifting gears as a characteristic specific to a given brand deliver a decisive contribution to the personal driving experience. Subjective estimates of the driving experience depend on the technical know-how and form of the day of the test driver, leading to insufficient evaluation criteria. Are you looking for a tool that supports you in improving gear shifting quality and delivers you objective parameters?

GRC

A member of ATESTEO Group

ATESTEO

If you would like to learn more about our products, solutions and services in the area of Gear Shift Analysis, just call us at +86 512 6289 6000 or send us an email to info@atesteo.cn.com. We will be pleased to assist you for every inquiry.

ATESTEO Gear Research Center (China) Co., Ltd.
No. 11 Anzhi Street Suzhou Industrial Park
215024 Suzhou, Jiangsu Province
China
Telephone +86 512 6289 6000
Fax +86 512 6289 6039
info@atesteo.cn.com

ATESTEO GmbH
Konrad-Zuse-Strasse 3
52477 Alsdorf
Germany
Telephone +49 2404 9870 0
Fax +49 2404 9870 109
info@atesteo.com

www.atesteo.cn.com