



THETASCAN[®]
GET THE TRUTH

CarScan ECO 2.0 machine INTRODUCTION

CARSCAN - WE SEE V



CONTENTS

CARSCAN, ACTIVE THERMOGRAPHY TECHNOLOGY	3
ABOUT CARSCAN	3
HOW DOES IT WORK	3
REPORT	5
CARSCAN TECHNOLOGY DETECTS	6
PROSPECTIVE CARSCAN CUSTOMERS	7
THE TEAM	9
CARSCAN SERVICES	10
ECO 2.0 MACHINE COMPONENTS	11
SCANNER	11
GENERATOR	11
FLASH AND HALOGEN LAMP	11
IR-CAMERA	12
DRIVER WITH BUILT-IN CONTROLLER	12
STEPPER MOTOR	12
DIGITAL INPUT/OUTPUT MODULE, Bidirectional, 55 ns	13
ONE-SLOT BUS-POWERED USB	13

▼ CARSCAN, ACTIVE THERMOGRAPHY TECHNOLOGY

ABOUT CARSCAN

CarScan is an international award-winning, innovative and contactless method for examining the state of cars, other vehicles, boats and various carbon components.

Among others, the CarScan method has won the prestigious award as the "Innovation of the year 2017!" by the German magazine "Auto Bild".



HOW DOES IT WORK

The method of active thermography, like most non-invasive measurement methods, is based on the stimulation of the measured object / material. CarScan technology is a combination of a photo-thermal measurement method that uses a **combination of light and thermal stimulation of the surface of the analyzed object.**



To capture data of light and thermal waves passing into and out of the material, we use a **high-performance IR thermographic camera** capable of capturing temperature modulations from the entire observed body surface at once. On the basis of taken images, the patented algorithm of ThetaScan software, performs amplitude and phase processing of the temperature path. Using the "Fourier Analysis" algorithm, each pixel is processed individually for each recorded image.

The presented method used in the ThetaScan report is called **Multiplex photothermics**, or phase-sensitive modulation thermography. A key component of this technology and algorithm lies in **matching the stimulation and detection of light and thermal waves**. The algorithm mathematically processes and converts the measured data into an image that shows the inhomogeneity in the material in a way that is understandable to our Clients.



REPORT

ThetaScan technology uses ultra-sensitive IR camera to capture data by stimulating the surface with a high-performance flash and halogen lights. Together with special software program it displays the results in a simple and transparent manner.

The report separately shows data for changes of material structure in two stages (up to 500 microns and over 500 microns). **The darker the colour in the picture, the thicker the structure of the measured material.** Based on the colour display, you can determine the extent of damage and repairs done on the vehicle. You receive a hard-copy and an e-copy of the report. Information included in the report you can find on our web site: www.thetascan.de

CARSCAN REPORT

PODATKI O VOZILU		Datum:	21.11.18	Merilec:	John Smith
Brand:	Audi	Type of service:	CAR Scan	Color:	Grey
Model:	A4	ID num. (VIN):	12345678910111213		
Model year:	2015				

Image 0-500 micro

Right side

Comment
When measuring with Impulse stimulation we detect structural changes of inspected material only on front bumper.

Opinion:
Damage repairs are up to 500 microns (0,5mm) deep. Other measured parts were not damaged and repaired.

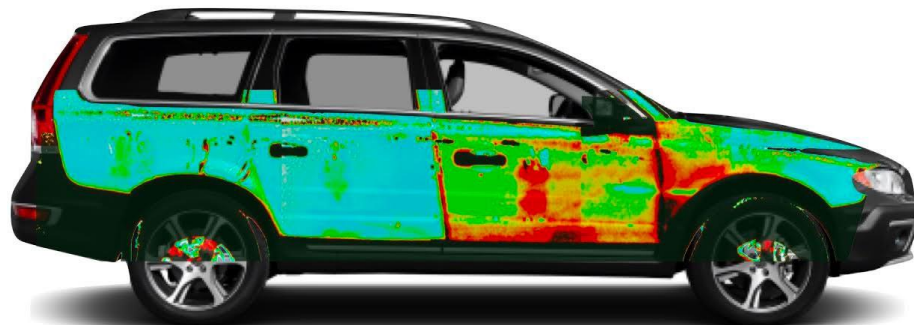
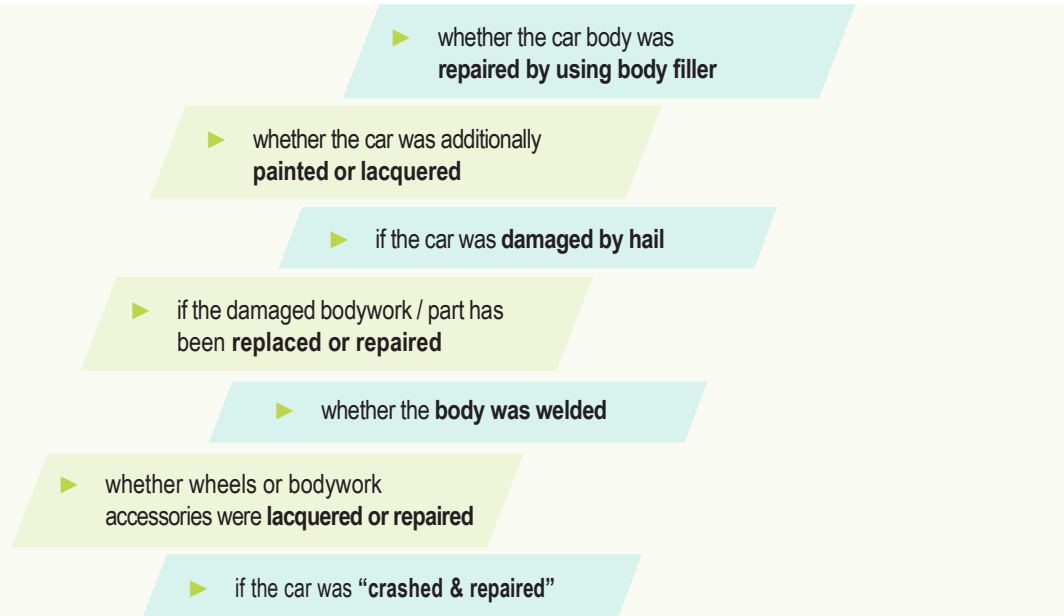
Left side

Comment
When measuring with Impulse stimulation we detect structural changes of inspected material are on the front and rear left doors.

Opinion:
Damage repairs are up to 500 microns (0,5mm) deep. On the picture light blue color shows original material. Orange-brown color show thickest application of non original material. Green color shows smaller thickness of non original material application. Dark blue color shows smallest thickness of non original material application.

AT-Scan d.o.o., Office: Parmova ulica 51, 1000 Ljubljana, Slovenia | t: +386 (0)40 766 100 | e: mor@at-scan.com | w: www.at-scan.com

CARSCAN TECHNOLOGY DETECTS



PROSPECTIVE CARSCAN CUSTOMERS



INDIVIDUALS

- » who before buying a car want to make sure about its actual condition. With the use of the report they can reduce the asked price or avoid purchasing "heavy repaired" car
- » who are selling a pre-owned car in a good condition and want to increase the bid price. Customers are willing to pay more for a well-preserved car



CAR DEALERSHIPS / CLASSIC CAR DEALERSHIPS

- » who understand market value of the full-disclosure CarScan report. Full disclosure and transparency positively builds dealer's brand
- » to fully inspect trade-in cars to see their real state and value
- » to increase the value of the "well-preserved" cars
- » to use the report in dealing with skeptical customers
- » to use the report in dealing with problematic suppliers
- » to protect its good name in consignment sale
- » to determine actual state of vehicle in case where measurement by hand-held devices can not be carried out (newer cars are made from very different and complex materials)
- » to determine state of Classic cars



INSURANCE COMPANIES

- » to detect fraud and establish the quality of repairs in the event of loss
- » for preventive check of high valued or rare cars, before insurance policy to customer is granted



LEASING COMPANIES

- » to fully inspect and assess the potential damage of traded-in cars



COURT EXPERTS

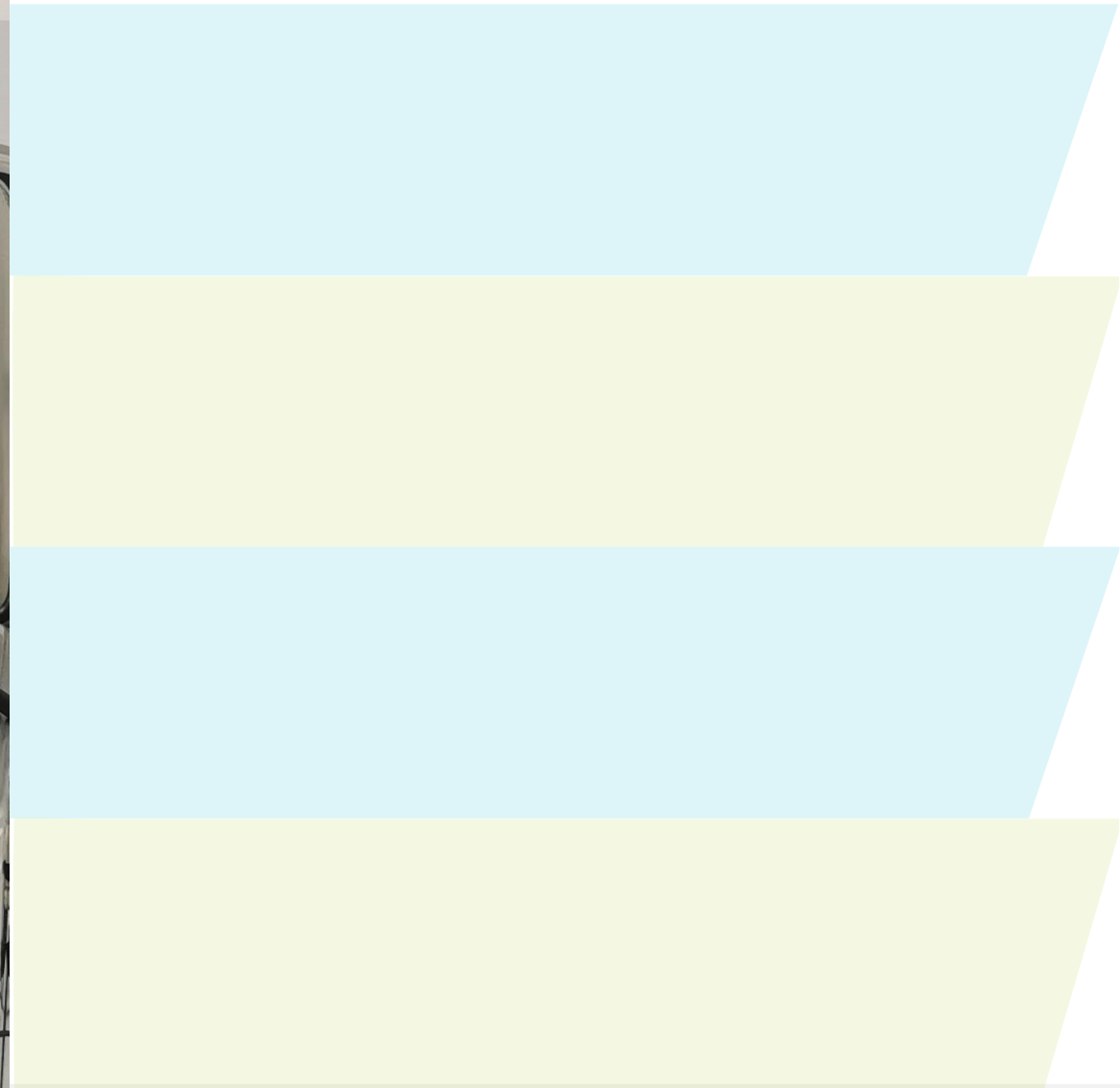
- » to provide help with expert opinions

OTHERS

- » all those who have been determining whether something is wrong on a certain part of the car with a classical, hand-held coating-thickness gauge and would rather want to obtain accurate information about the damage or repair that is hidden behind it



Dipl. Ing. Volker Carl is "The Father" of Thetascan and CarScan systems. Volker has been providing optical and infrared optical measuring services in the field of non-destructive material testing since 1999. Volker is also one of rare experts who is certified according to EN4179, Level III, i.e. for tests in the field of aerospace technologies. Because of his unique expertise Volker also trains the personnel at Airbus in Bremen.



CARSCAN SERVICES

We market the following services:

PARTIAL SERVICE

Measurement of one part of the car
Verbal interpretation of findings



QUICK SERVICE

Measurement from left and right side of the car
Verbal interpretation of findings



CARSCAN SERVICE

Measurement from left and right side of the car
Verbal interpretation of findings
Written report containing colour images with crucial findings explained
Report in pdf and jpg on email



GENERAL SERVICE

Measurement from left and right side of the car
Front and rear measurement
Verbal interpretation of findings
Written report containing colour images with crucial findings explained
Report in pdf and jpg on email



DETAILED SERVICE

Measurement from left and right side of the car
Front and rear measurement
Verbal interpretation of findings
Written report containing colour images with crucial findings explained
Report in pdf and jpg on email
Detailed numerical data on measured points



Normally Clients start with ThetaScan service and expand to General or Detailed service if findings require.

ECO 2.0 MACHINE COMPONENTS

SCANNER

▶ Notebook:	Lenovo V320
▶ Camera:	IR Camera
▶ Software:	CarScan
▶ Dimensions:	800 x 800 x 1300 B x T x H
▶ Weight:	approx. 40 kg
▶ Movement control:	stepper motor

GENERATOR

▶ Power connection:	230 – 240 V / 10 A 50 Hz
▶ Flash output:	6000 Ws (Factory settings 990 VDC)
▶ Flash voltage:	max. 1000 VDC (Factory settings 990 VDC)
▶ Fuse:	10 AM
▶ Charging time:	6000 Ws approx. 15 seconds
▶ Casing dimensions:	580 x 380 x 250 B x T x H
▶ Weight:	23 kg
▶ Scope of delivery:	1 x Generator G6000Z Special 1,5 m Power cord Sync cable USB cable

FLASH AND HALOGEN SYSTEM

▶ Flash system:	1 x 6000 W, 230 Volt
▶ Weight:	approx. 4 kg
▶ Halogen system:	2 x 1500 W, 230 Volt
▶ Weight:	approx. 2 kg



IR-CAMERA

▶ Optical resolution:	382 x 288 Pixel
▶ System accuracy:	± 2 °C or ± 2%, the larger value applies
▶ PC Interfaces:	USB 2.0
▶ Ambient temperature:	0 ... 70° C
▶ Storage temperature:	- 40 ... 85° C
▶ Relative humidity:	20 - 80%, non-condensing
▶ Casing (protection level):	IP 67 (NEMA 4)
▶ Shock / Vibration:	IEC 60068-2
▶ Power supply:	via USB

DRIVER WITH BUILT-IN CONTROLLER

- Multi-axis control
- Network (network converter)



▶ Power Supply:	24/48 VDC
▶ RoHS Compliant:	These products do not contain substances that exceed the regulation values in the RoHS Directive.
▶ Safety Standards:	CE
▶ Protocol:	Modbus RTU Mode

STEPPER MOTOR

▶ Driver Voltage Input Power:	DC
▶ Type:	Planetary Gear
▶ RoHS Compliant:	CE
▶ Safety Standards:	EMC Directives
▶ CE Marking:	Class B
▶ Ambient Temperature:	0 ~ 40°C (32 ~ 104°F) (non-freezing)
▶ Ambient Humidity:	85% or less (Non-condensing)
▶ Degree of Protection:	Motor: IP66. Gearhead: IP54
▶ Permissible Axial Load:	179.85 lb



DIGITAL INPUT/OUTPUT MODULE Bidirectional, 55 ns

- BNC connectivity
- Individually configurable channel directions



ONE-SLOT BUS-POWERED USB

These specifications are for the NI cDAQ-9171 chassis only. These specifications are typical at 25 °C unless otherwise noted. For the C Series module specifications, refer to the documentation for the C Series module you are using.

ANALOG INPUT

▶ Timing accuracy:	50 ppm of sample rate
▶ Timing resolution:	12.5 ns

ANALOG OUTPUT

▶ Timing accuracy:	50 ppm of sample rate
▶ Timing resolution:	12.5 ns

DIGITAL WAVEFORM CHARACTERISTICS

▶ Timing accuracy:	50 ppm
--------------------	--------

BUS INTERFACE

▶ USB specification:	USB 2.0 Hi-Speed
----------------------	------------------

POWER REQUIREMENTS

▶ Power consumption from USB:	5 V, 500 mA maximum
▶ Suspend mode:	2.5 mA maximum

ENVIRONMENTAL

▶ Operating temperature (IEC-60068-2-1 and IEC-60068-2-2)	-20 °C to 55 °C
▶ Storage temperature (IEC-60068-2-1 and IEC-60068-2-2)	-40 °C to 85 °C
▶ Operating humidity (IEC-60068-2-56)	10% to 90% RH, noncondensing
▶ Storage humidity (IEC-60068-2-56)	5% to 95% RH, noncondensing
▶ Pollution Degree (IEC 60664)	2
▶ Maximum altitude	5,000 m


Indoor use only.

HAZARDOUS LOCATIONS	
▶ U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
▶ Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
▶ Europe (ATEX) and International (IECEX)	Ex nA IIC T4 Gc

SHOCK AND VIBRATION	
To meet these specifications, you must panel mount the NI cDAQ-9171 system, use an NI locking USB cable, and affix ferrules to the ends of the terminal lines.	
▶ Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile
▶ Random vibration	
▶ Operating	5 Hz to 500 Hz, 0.3 g _{rms}
▶ Non-operating	5 Hz to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC 60068-2-64. Non-operating test profile exceeds the requirements of MIL PRF-28800F, Class 3.)

SAFETY AND HAZARDOUS LOCATIONS STANDARDS	
This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:	
▶ IEC 61010-1, EN 61010-1	
▶ UL 61010-1, CSA 61010-1	
▶ EN 60079-0:2012, EN 60079-15:2010	
▶ IEC 60079-0: Ed 6, IEC 60079-15; Ed 4	
▶ UL 60079-0; Ed 6, UL 60079-15; Ed 4	
▶ CSA 60079-0:2011, CSA 60079-15:2012	
Note:	For UL and other safety certifications, refer to the product label or the Online Product Certification section.

ELECTROMAGNETIC COMPATIBILITY	
This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:	
▶ EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity	
▶ EN 55011 (CISPR 11): Group 1, Class A emissions	
▶ EN 55022 (CISPR 22): Class A emissions	
▶ EN 55024 (CISPR 24): Immunity	
▶ AS/NZS CISPR 11: Group 1, Class A emissions	
▶ AS/NZS CISPR 22: Class A emissions	
▶ FCC 47 CFR Part 15B: Class A emissions	
▶ ICES-001: Class A emissions	
Note:	In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.
Note:	Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.
Note:	For EMC declarations and certifications, and additional information, refer to the Online Product Certification section.

CE COMPLIANCE 	
This product meets the essential requirements of applicable European Directives, as follows:	
▶ 2014/35/EU; Low-Voltage Directive (safety)	
▶ 2014/30/EU; Electromagnetic Compatibility Directive (EMC)	
▶ 2014/34/EU; Potentially Explosive Atmospheres (ATEX)	

ONLINE PRODUCT CERTIFICATION	
Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification , search by model number or product line, and click the appropriate link in the Certification column.	

For further enquiries and questions of any matter relating to information from the Prospectus, call or email us at your convenience:

ThetaScan GmbH.

Address

Thyssenstrasse 183a
46535 Dinslaken

w: www.thetascan.de
fb: SCAN dein Fahrzeug

Contact persons

Volker Carl

DACH region

t: +49 2064 603 512

e: carl@thetascan.de