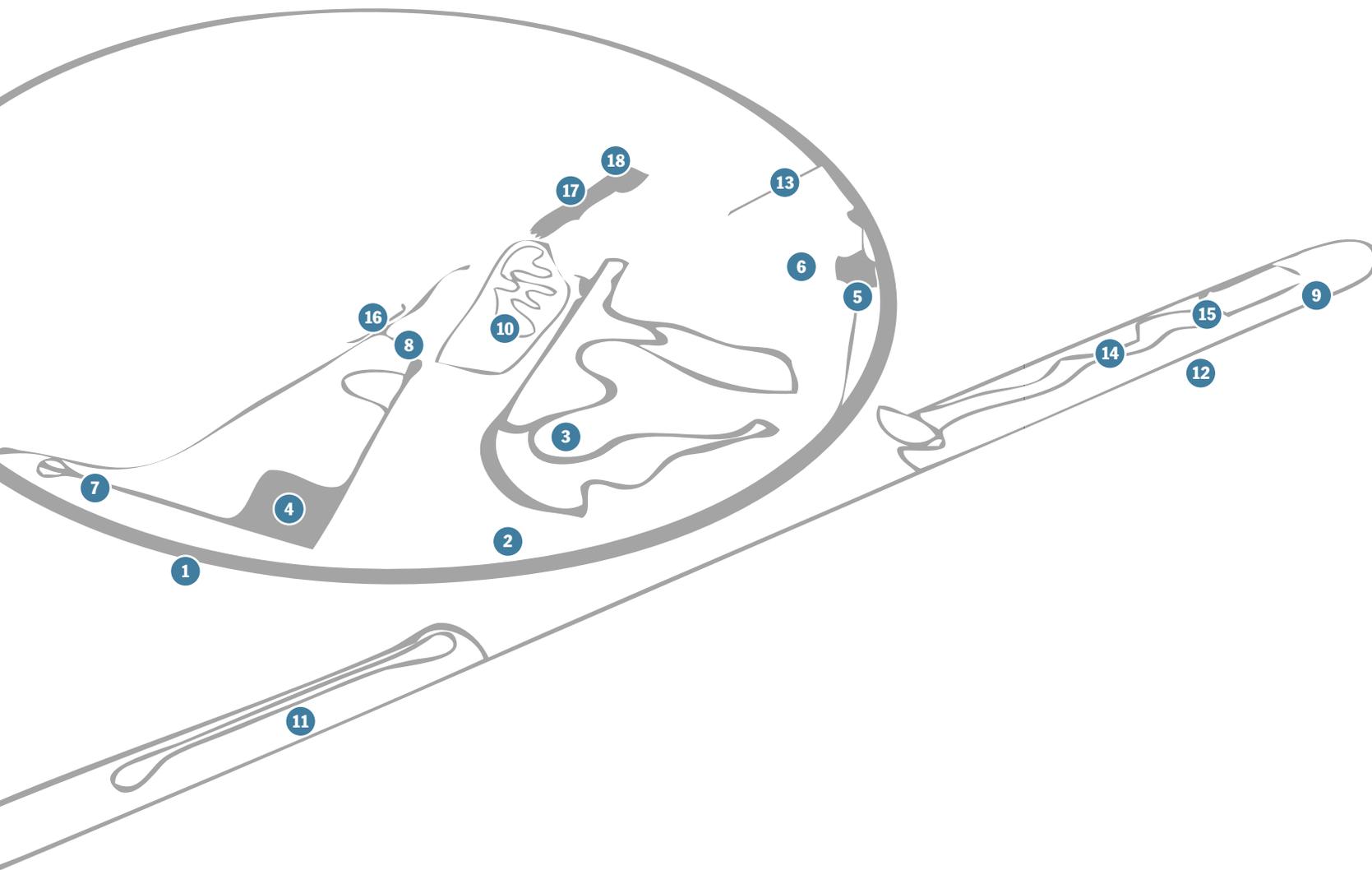


The logo is a circular emblem with a double-line border in a dark blue color. Inside the circle, the text is arranged in a stacked, slightly curved layout. At the top is the name 'Nardò' in a large, bold, dark blue sans-serif font. Below it is 'Technical Center' in a smaller, lighter blue sans-serif font. The bottom half of the circle features a commemorative message: '40 YEARS' in dark blue, followed by a vertical bar, and the years '1975' and '2015' in a light grey sans-serif font, with '2015' positioned directly below '1975'.

Nardò

Technical Center

40 | 1975
YEARS | 2015



- 1 Car Circular Track 2 Lorry Circular Track 3 Handling Track 4 Car Dynamic Platform
- 5 Lorry Dynamic Platform 6 Curbstone Area 7 Low Friction Area 8 Noise Track 9 Special Pavements Track
- 10 Strada Bianca Off-Road 11 Dust & Gravel Oval 12 Africa Road 13 Tire Laceration Road
- 14 Cross Country Road 15 Off-Road Slopes 16 Mud Road 17 Concrete Slopes 18 Rolling Track

Buongiorno!

Dear Readers,

40 years of the Nardò proving ground: 40 years of testing, innovation, and top performances. We're delighted to be able to celebrate this anniversary together with you.

Ever since the Nardò Technical Center was founded in 1975, the test center has been continuously upgraded and enhanced. Much has changed over the years—and yet in spite of all the innovations, the Nardò Technical Center has maintained its tradition: the tradition of comprehensive vehicle testing, openness to all customers, and the tradition of always being a reliable partner.

But we've kept one tradition above all: advancement. We've always striven to identify and prepare ourselves for the challenges of tomorrow and beyond. So 40 years ago we opened the groundbreaking circular track and today we're preparing for the development tasks of the future.

The anniversary year is marked by this exciting combination of tradition, many years of experience, and a forward-looking orientation—and that's exactly what we want to present in the articles and images in the following pages.

We would like to thank all of our customers, friends, and business partners for their loyalty through the years. We look forward to many more years of successful collaboration and hope you enjoy this issue.

Francesco Nobile Edmund Sander
 Management, Nardò Technical Center



GROUNDBREAKING.

BREATH TAKING.





POWERFUL.



**THEN AS NOW. ONE OF A KIND.
THE NARDÒ TECHNICAL CENTER.**



PORSCHE 918 SPYDER

CO₂ emissions
(combined): 72 (70*) g/km
Fuel consumption
(combined): 3.1 (3.0*) l/100 km;
Power consumption
(combined): 12.7 kWh/100 km
Efficiency class: A+
* 918 Spyder with Weissach package

Destination: Future.

New roads being opened up through innovation

____ Nardò: for the first time, the vehicle prototype demonstrates what it can do on the road—a big moment for the developers. Not on public roads where everyone can see, but in the closed test center; a painstaking process of alternating driving tests and development steps begins to take shape. Porsche Engineering's Nardò Technical Center offers service packages for every conceivable stage of testing.

*By Thomas Knoll and Katharina Hug
Photos by Stefan Bogner*

The Nardò Technical Center (NTC) in the Italian region of Apulia has enjoyed a legendary reputation for some 40 years. Remotely located in one of Italy's quieter areas, many carmakers take advantage of the unique testing conditions here. The most famous of these is undoubtedly the 12.6-kilometer circular track for high-speed drives. Many speed records have been set on this track by various vehicle manufacturers.

Yet Nardò has much more to offer. With more than 20 test tracks and facilities spread over more than 700 hectares, customers have access to a wide range of testing options—not least thanks to the mild climate almost every day of the year. So Nardò is more than just asphalt, cobblestones, and the rough road course. Like its parent company

Porsche Engineering, the NTC is a reliable partner for many vehicle manufacturers worldwide: as a development partner throughout the entire process of vehicle testing on the way to series-production maturity.

More than just asphalt:
intelligent testing services

From driving dynamics testing and endurance tests to measurements for sound development, vehicle diagnostics and homologation according to country-specific regulations—the NTC is equipped with all the tracks and facilities necessary to get the job done. It fulfills the widest range of requirements faced by vehicle manufacturers. >



Ready to go: the Porsche 918 Spyder shortly before a test drive on the proving ground.

It's also accompanied by the engineering services of Porsche Engineering and the expertise gained through the development work of a series manufacturer.

The objective of the Nardò Technical Center and Porsche Engineering is to offer customers optimal working conditions and even take on complete development tasks. The spectrum of services ranges from the simple provision of optimal testing tracks and courses, including the associated infrastructure, to complete packages of specific testing programs. The testing services encompass test drives on individual tracks, on test benches or in the lab, precise recording, preparation and analysis of data, as well as expert consulting services for the optimization of test sequences. Precisely what the customer needs.

In the vehicle testing phase, the engineers test the entire vehicle—from the minor details to the major components, from the power windows, to the engine, to the complete vehicle system. The aim is to confirm the functionality of all elements step-by-step and to identify and eliminate all problems that could occur under every conceivable set of conditions. The engineers distinguish between the principles of verification and validation. If the prototype tends to understeer under extreme cornering situations, the engineer verifies the causes of the misbehavior in the validation process in order to eliminate the issue—for example through optimized wheel carrier geometry.

Efficient testing and wide-ranging options

The primary focus in vehicle testing is on efficiently designing, optimizing and streamlining test programs. The NTC engineers, or “test experts,” always

strive to gain all required insights and knowledge with fewer test repetitions and development steps—and thus fewer resources and lower costs. For its part, Nardò's varied range of testing and development facilities provide the ideal testing conditions. It is possible, for example, to conduct tests that deliver robust data regarding the corrosion resistance of a vehicle over its entire lifecycle within just a few weeks.

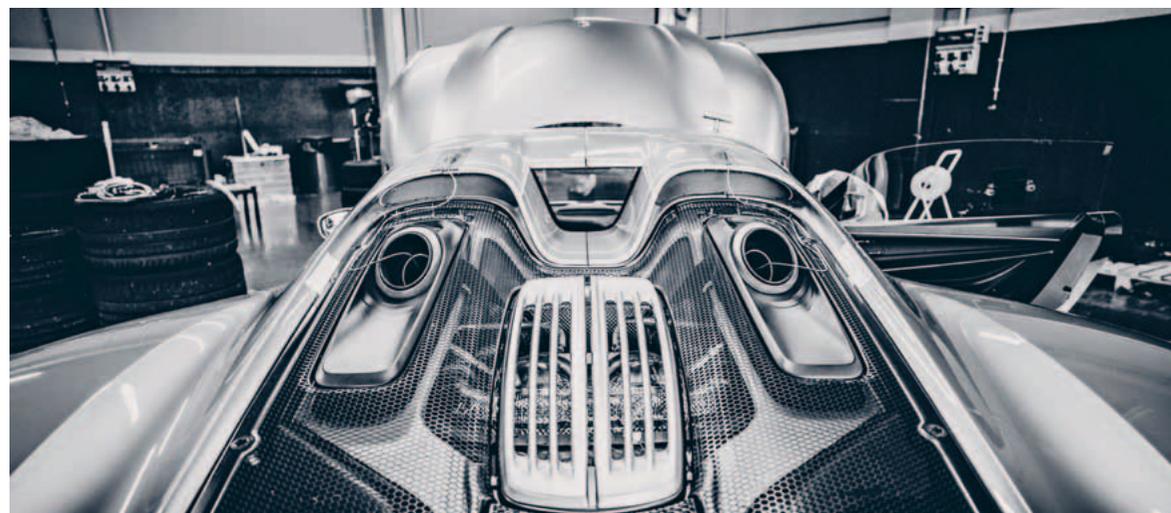
Climatic conditions from different countries and regions can be replicated here. It is also possible to test and make appropriate adjustments for the demands of the different target markets in terms of robustness, driving dynamics or product lifetime. Road conditions, fuels and even the traffic signs can vary widely from country to country. With its variable testing capabilities, the NTC allows customers to avoid time-consuming location changes and high transport costs. In Nardò, vehicle manufacturers can drive on courses that approximate African offroad conditions, or conduct

driving dynamics tests on reproducibly rain-wet road surfaces on the sunniest of days. The great diversity of the testing courses enables developers to conduct a wide variety of tests in a single location in the immediate proximity of development facilities.

Ready for testing for the future

The testing of driver assistance systems is currently a major priority in vehicle development. Such systems are designed to assist the driver safely in difficult driving situations or ease the burden of tiresome routine tasks. “Adaptive cruise control,” for example, automatically maintains a safe gap to the car in front regardless of the driving situation and speed. Other driver assistance systems such as the blind-spot assistant or emergency braking assistant with pedestrian recognition can prevent dangerous evasive maneuvers or carry out automatic emergency braking.

The Nardò Technical Center provides every option—even for testing super sports cars. Pictured here is the exhaust system with top pipes of the Porsche 918 Spyder.



These innovations are developments of the automotive industry towards autonomous driving. Such systems are highly safety-relevant and must be tested in all situations over vast distances and demonstrate driver-friendly functionality. Nardò is optimally suited to such tests. The developers conduct the verification and validation of these systems under reproducible external conditions such as climate, road surfaces, light conditions and traffic conditions—over many kilometers of test driving and with as many test repetitions as needed or desired. Nardò is ideal for the simulation of a wide variety of traffic situations to test driver assistance systems.

In Porsche Engineering, the Nardò Technical Center has a parent company that is both highly accomplished and highly service-oriented in the engineering sciences. That applies equally to customer projects, the transfer of technical expertise from large-scale series production as well as the continual enhancement of the testing grounds. The trend towards autonomous driving, for example, underscores the need to adapt the vehicle testing of the future to the technological trends of the automotive industry. Moreover, the internationally recognized exacting standards of Porsche Engineering in terms of quality, safety and efficiency ensure that the NTC is maintained to optimal standards in every way.

Further development of the proving ground

New track surfaces and a guardrail system specially designed for the circular track in Nardò are the result of the exceptional expertise of the partners. A new guardrail system was developed in close collaboration between the engineers at the NTC and other branches of Porsche Engineering. The result is a completely new type of design comprised of steel beams, supporting steel posts and bolts. It ensures maximum energy absorption in case of impact. In combination with the new track surface, it makes the NTC's circular track better and, above all, even safer.

The organization and improved equipment of the safety and emergency facilities

are also the result of a continuous improvement process in the operation of the testing grounds. For example, two unusual rescue vehicles have been added to the fleet. Two Porsche Cayennes ensure speedy and safe deployment: one vehicle as a fire extinguishing vehicle, the other for technical assistance and emergency rescue services. The always-present rescue personnel are intensively trained and optimally prepared for duty during high-speed driving tests.

The overall vehicle expertise of Porsche Engineering, the development services provider with the OEM know-how of the Porsche company, critically impacts the capabilities of the Nardò Technical Center with regard to the requirements of the automotive industry. With this kind of vehicle development expertise backing it up, the Nardò testing facilities are able to offer the complete spec-

trum of testing services. After decades of experience with customer projects, Porsche Engineering is also intensifying its activities on the multifaceted Chinese market with location in Shanghai, which opened at the beginning of 2015. This gives the Nardò Technical Center direct access to specific regional requirements and thereby improves intercultural understanding in the process. This knowledge and the ability to simulate Chinese testing conditions guarantee European carmakers additional optimal and efficient development options.

The Nardò Technical Center therefore offers a very broad spectrum of services, including complete service packages that ultimately improve the performance of customers. ○



*Ready for the challenges
of the future: the Nardò
Technical Center.*

A Well-Rounded History

40 years of successful testing in pictures

Founding of the test center

The test center was inaugurated as the “Corporation for Automobile Test Tracks Nardò” (“Società Autopiste Sperimentale Nardò”) on July 1st, 1975. At the time, the circular track with lanes for cars and trucks, the dynamic platform for cars and the watchtower were in place.



Niki Lauda tests a six-wheeled Formula One Ferrari

The Ferrari 312 T2 tested by Niki Lauda on the circular track on March 13th, 1977 was a unique prototype. With the aim of improving the car's aerodynamics, the Ferrari was outfitted with six wheels—with four front wheels mounted on the rear axle.



Mercedes-Benz sets the Italian land-speed record

With a 4.82-liter biturbo V8 engine and an output of 373 kW (500 hp) at 6,200 rpm, a Mercedes-Benz C111-IV reached a speed of 403.978 km/h. On May 5th, 1979, chief engineer Hans Liebold drove a “flying lap” in the car on the Nardò circular track in 1:57 minute.



Improved safety standards

With the installation of “anti-dozing bumps” (stone bumps bordering the circular track), the safety standards in Nardò were already highly advanced by 1980. The bumps ensured that drivers who succumbed to microsleep at the wheel would be warned if they moved off the track. Safety continued to be the focus of ongoing enhancements in the years to follow. In 1990, the first accident warning system was installed on the circular track which would warn all drivers on the track in the event that dangerous situations arose.



ARVW posts six class records and two world records

Over five meters long, with a top speed of 360 km/h, just 13.6 liters of fuel consumption per 100 kilometers at top speed and space for just one person: meet the ARVW (Aerodynamik Research Volkswagen), which in September 1980 set six class speed records and two world speed records on the track in Nardò.



Construction of the lorry dynamic platform

1982: Just a few years after its opening, the test center was expanded to include a dynamics platform for trucks. The platform itself encompassed an area of 175 x 150 meters. Two acceleration and run-off lanes were built adjacent to the platform.



1994

World record with the fastest natural gas vehicle by Bugatti

Reaching a speed of 344.7 km/h, in July 1994 the Bugatti EB110 GT set a new world speed record for street-legal natural gas vehicles.



1994

Bertone Z.E.R. (Zero Emissions Record)

Shaped like a cigar, just barely shoulder width, electrically powered and with a top speed of over 300 km/h—the brainchild of Oscar De Vita, a student at the Polytechnic University of Milan. The vehicle was ultimately further developed and built together with Bertone. In 1994, De Vita broke the flying kilometer record in Nardò with a speed of 303.977 km/h.



1999

Acquisition by Prototipo

After 24 years, the testing and trial grounds were taken over by the Prototipo Group. Founded in Piedmont in 1991, the testing service provider significantly expanded its range of testing equipment with the acquisition of the Nardò Technical Center.



2000

Construction of additional workshop buildings

To keep pace with the ever-increasing number of customers, in 2000 Prototipo built four new workshop buildings. The newly built workshop and office space for customers amounted to some 5,000 m².



2000



2002

Additional test tracks for testing driving comfort and sound development

The courses with special pavements opened in 2002 were an important expansion of the testing grounds. Over a distance of 1.15 kilometers, 8-meter-wide sections of different surfaces were laid for optimal testing of vehicle comfort. Another new feature is the noise track with a special surface for measuring the noise of passing vehicles.

Opening of the handling track

The new handling track was opened to great fanfare on June 5th, 2008. Modeled on the Nürburgring, the dynamic track, with its 16 corners and a 6.2 km straightaway, offers views of the Gulf of Taranto (Ionian Sea) in some sections. The handling track is recognized by the FIA (Fédération Internationale de l'Automobile) and offers optimal conditions for driving dynamics testing.



2008



2012



2012

Porsche Engineering takes over the Nardò Technical Center

In May 2012, Porsche Engineering, the engineering services subsidiary of Porsche AG, took over the Nardò Technical Center. The test center in the south of Italy expanded the service portfolio of Porsche Engineering—with over 80 years of experience in the field of engineering services both for the automotive industry and other sectors—in ideal fashion.



The testing grounds celebrate their 40th anniversary

On its 40th anniversary, the Nardò Technical Center is looking fresher and more dynamic than ever: the resurfacing of the asphalt on the circular track and other test tracks is well under way. The safety standards at the complex are also being further improved. In addition to the newly installed, highly innovative guardrail on the circular track, major investments are also being made in the emergency infrastructure, including new vehicles. Many more developments are in the works as well: extensive expansion and renovation plans are slated for the coming years to ensure that customer demands can always be met in full in the future as well.



EDMUND SANDER

After many years as the head of the drivetrain department at Porsche Engineering in Germany, in 2013 Edmund Sander took over as the technical director of the Nardò Technical Center.

FRANCESCO NOBILE

He knows the Nardò Technical Center like the back of his hand, including its special features: since 2007, Francesco Nobile has headed the proving ground and is now the Chairman of the Executive Board and responsible for the commercial area.



MALTE RADMANN

The Nardò Technical Center has been operated by Porsche Engineering since its acquisition by Porsche in 2012. Malte Radmann, Chairman of the Executive Board of Porsche Engineering, has been involved in the takeover, integration and ongoing development of the proving ground since the outset.

Finger on the Pulse of the Age

A talk about the testing grounds of today and tomorrow

___ The Nardò Technical Center (NTC) has been available to the automotive industry for testing for 40 years and today is fresher and more innovative than ever. Francesco Nobile, Edmund Sander and Malte Radmann elaborate on the extent to which that is related to its acquisition by Porsche in 2012, or simply reflects the tradition of these great testing grounds.

Interview: Katharina Hug Photos by Davide Faggiano



“Thinking today of tomorrow
and beyond has always been
our approach.”

Francesco Nobile

The Nardò Technical Center is one of the most important and well-known testing centers in the world. What makes it so special in your opinion?

Malte Radmann: The centerpiece of the testing center has always been the circular track. Building a test track on this scale 40 years ago was extraordinary. All the more impressive is the fact that this high-performance track, with its size and special profile, has remained unique to this day. The test center has continued to develop over the years and always had a finger on the

pulse of the age. Even now, the Nardò Technical Center has retained its ability to handle a vast spectrum of highly exacting customer demands.

Francesco Nobile: The Nardò Technical Center has always regarded itself as a close partner to the vehicle manufacturers in vehicle development. Over the last 40 years, the automotive industry has developed at a breakneck pace. We have experienced those changes “live” and have continually adapted to the new circumstances and requirements. But to make a significant contribu-

tion to the innovative developments in vehicle testing, it’s not enough to simply be “up to speed” with what’s going on. The dynamism of the industry makes it essential to think of tomorrow and beyond today. That remains our approach.

How do you view the future challenges in vehicle testing? And how is the Nardò Technical Center preparing itself for the future?

Edmund Sander: Topics that will certainly be occupying us in the coming years include the testing of driver assistance systems and autonomous driving. Development is making great strides in these fields. We’re already working on concepts for continued development of the testing facilities and building on our existing expertise in these areas. We’re also continuously expanding our range of services. Even in the traditional development areas such as chassis tuning, brake testing and drivetrain application, we are preparing ourselves for new challenges through planned course expansions and ongoing renovation and expansion measures for the existing courses and facilities. The aim is to provide the complete process chain of “testing as an engineering service” at the very highest level.

Radmann: ... this comprehensive range of services is increasingly expected by customers. Together with Porsche Engineering as an engineering services provider, we’re able to offer customers the execution of comprehensive testing programs and conduct them according to their requirements and to the absolute highest standards. In this process, the protected grounds of the NTC are the ideal location for transitioning functions from the computer to the track and make them a reality.

How does the fact that the NTC belongs to Porsche benefit customers?

Sander: The Nardò Technical Center is directly connected to a vehicle manufacturer and thus has a better understanding of development processes as a whole as well as the requirements that are associated with them. The customers definitely notice the difference.

Radmann: The improvements to the grounds are an especially visible aspect of this. The circular track and other courses are currently being resurfaced. The ongoing expansion and renovation work demonstrates that we’re not satisfied with merely being “good,” but are, as Mr. Nobile said at the outset, already thinking of tomorrow and beyond to ensure that we can provide the best possible testing conditions.

Nobile: ... and yet with all of the changes taking place, I would like to emphasize that one thing has remained the same: the diversity of customers. Just as in the past, the Nardò Technical Center remains open to all customers and is an important partner for the entire automotive industry.

To what extent are the employees and people living in the region around Nardò aware of these changes?

Nobile: First and foremost, there is the opportunity for new jobs, and for employees the Nardò Technical Center has also become notably more attractive, as belonging to the group has created the possibility that new career advancement options could open up.

Sander: Moreover, we’re already in contact with the university in Lecce as a possible future cooperation partner. Wherever possible, we try to support >



the region and its people in their interests. Our expansion and renovation measures are being conducted in harmony with the lovely natural surroundings here in the region.

What role do the regional conditions play in the services of the Nardò Technical Center?

Nobile: The regional conditions—in particular the climate—are a very special factor and make us absolutely unique.

Many long-standing customers appreciate the friendly atmosphere.”

Edmund Sander

Scarcely any other proving ground offers the possibility of conducting testing nearly 365 days a year. Routes outside of the grounds also offer a plethora of excellent driving opportunities.

Sander: Let's not forget the kindness of the people and the Italian way of life. Many long-standing customers appreciate the friendly atmosphere that characterizes this place.

Nobile: That's true. Here, German precision meets Italian openness and warm-heartedness. At the latest when they sit down for their first Italian dinner after a hard and successful day of testing, customers are often already planning their next visit. ○

A few words on the anniversary

People, Experiences, Emotions.

Matthias Müller

Chairman of the Executive Board of Porsche AG

I congratulate the Nardò Technical Center dearly on its anniversary! The testing ground has become an integral and fixed part of the Porsche Group within a very short time. Due to the prevailing unique conditions there, this proving ground is a valuable resource for efficient vehicle testing for the entire automotive industry. I am very proud of that!

Walter Röhrl

Former rally world champion

The handling track is obviously very interesting to drive on, but also really beautiful from the scenic point of view! Especially at the place where you drive over the summit and suddenly you have an amazing view over the Mediterranean Sea.



NTC IS THE ONLY CIRCUIT IN THE WORLD WITH THESE CHARACTERISTICS, PERFECT FOR OUR TESTING ACTIVITIES.

Luca Vassalli

Road Testing Manager—Germany, Brembo S.p.A.

Marcello Risi
Mayor of the city of Nardò

NTC IS ONE OF THE MOST PRECIOUS CORPORATE REALITIES OF OUR CITY. WITH ITS TRACKS AND ITS "WORLD-FAMOUS RING," IN THE LAST 40 YEARS, THE NTC HAS INTRODUCED NARDÒ AND ITS UNIQUE ATTRACTIONS ALL OVER THE WORLD. JEWEL OF INNOVATION, RESEARCH, AND TESTING, THE NTC HAS EARNED A SPECIAL PLACE IN THE HEARTS OF NARDÒ'S CITIZENS.

The facilities offer Jaguar Land Rover the opportunity to meet the most extreme dynamic conditions that are required of any modern motor vehicle in the world. The team at NTC is always prepared to offer extra support to ensure that the schedule is met and the customers are satisfied. There is also a culture of continuous improvement which is demonstrated with the high standards of facilities and services.

John M. Florida
Senior Manager, Jaguar Land Rover

Dr. Ulrich Hackenberg
Board Member for Technical Development of Audi AG

The Nardò Technical Center is one of the most important test tracks within Europe. When hearing the name Nardò, most of the customers probably have the circuit in mind, with its raised curves. The circuit allows testing in the absolute high-speed sector. However, the 6.2 km-long handling track inside of the oval should not be underestimated, offering great opportunities for testers and developers as well. We especially test our sports cars there. For me it is a highlight, again and again, to widen the boundaries of driving dynamics on the challenging course.

40° 19' 16" N
17° 50' 20" E

Omar Barbieri
Vehicle Testing Responsible, Maserati S.p.A.

I have often been at NTC's proving ground during the last few years and I have always found courtesy and great hospitality. NTC is more than just a supplier for me; I have made friends there.

Wolfgang Hatz
Board Member for Research and Development of Porsche AG

AS HIGHLY INNOVATIVE TESTING FACILITIES, THE NARDÒ TECHNICAL CENTER COMPLEMENTS OUR CAPACITIES IN WEISSACH IN THE BEST WAY. OUR EMPLOYEES LIKE TO KEEP COMING BACK TO NARDÒ AND APPRECIATE THE FAMILIAR AND ITALIAN ATMOSPHERE.

Many well-known OEMs and automotive suppliers from all over the world have been coming to Nardò for many years in order to execute important test procedures. I always look forward to welcoming our customers at the Nardò Technical Center and I am happy to provide advice and assistance whenever needed.

Anna Pascali
Customer Care, Nardò Technical Center

Maurizio Reggiani

Director Research and Development

Automobili Lamborghini S.p.A.

Every Lamborghini made its first steps in Nardò, simply because we are sure that here we find the best and most unique testing facilities worldwide. The conditions for testing are ideal, everything is in one place, the weather conditions fit, secrecy is a given, and the staff is highly professional with a very human approach.

Guido Morando, Product Development

Fiat Chrysler Automobiles Italy S.p.A.

**Organized.
Professional.
Exciting.**

**I WAS VERY
IMPRESSED
WHEN
I DROVE FOR
THE FIRST TIME WITH
OUR BUGATTI
VEYRON SUPER
SPORT OVER THE
BIG JUMP ON
THE GREAT
HANDLING TRACK,
JUST FACING
THE BLUE SKY AND
THE
AMAZING VIEW
OF THE SEA.**

Florian Umbach, Head of Chassis Development

Bugatti Engineering GmbH

IMPRINT

NARDÒ TECHNICAL CENTER 40 YEARS

A special supplement of the
Porsche Engineering Magazine 1/2015

PUBLISHER

Porsche Engineering Group GmbH
Porschestrasse 911
71287 Weissach
Germany
Tel. +49 711 911 0
Fax +49 711 911 8 89 99
Internet: www.porsche-engineering.com

EDITOR-IN-CHIEF

Frederic Damköhler

EDITING | COORDINATION

Nadine Guhl

DESIGN

VISCHER&BERNET, Stuttgart

TRANSLATION

RWS Group Deutschland GmbH, Berlin

PRINTING

Kraft Druck GmbH
76275 Ettlingen

All rights reserved. Reprinting, incl. excerpts, only with the permission of the publisher. No responsibility can be taken for the return of photos, slides, films, or manuscripts submitted without request. Porsche Engineering is a 100% subsidiary of Dr. Ing. h.c. F. Porsche AG.



www.porsche-nardo.com