



**Cornaglia**®

Group

**BUSINESS UNIT COR-FILTERS**



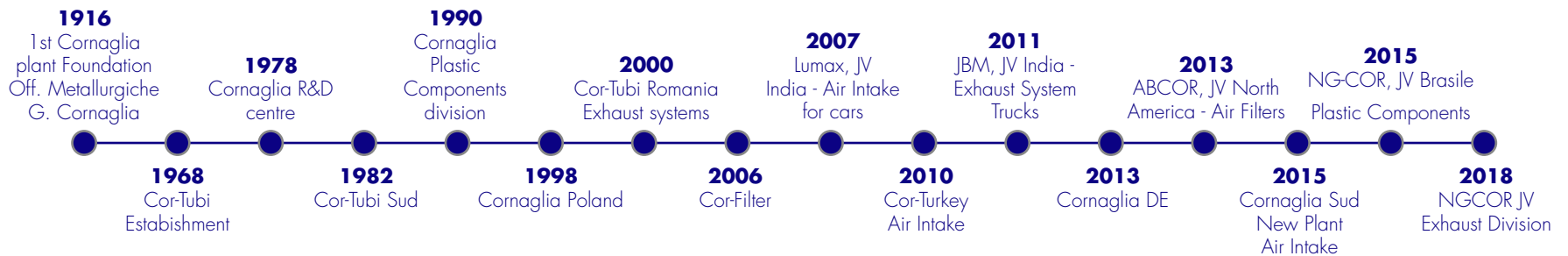
YEARS OF COMMITMENT

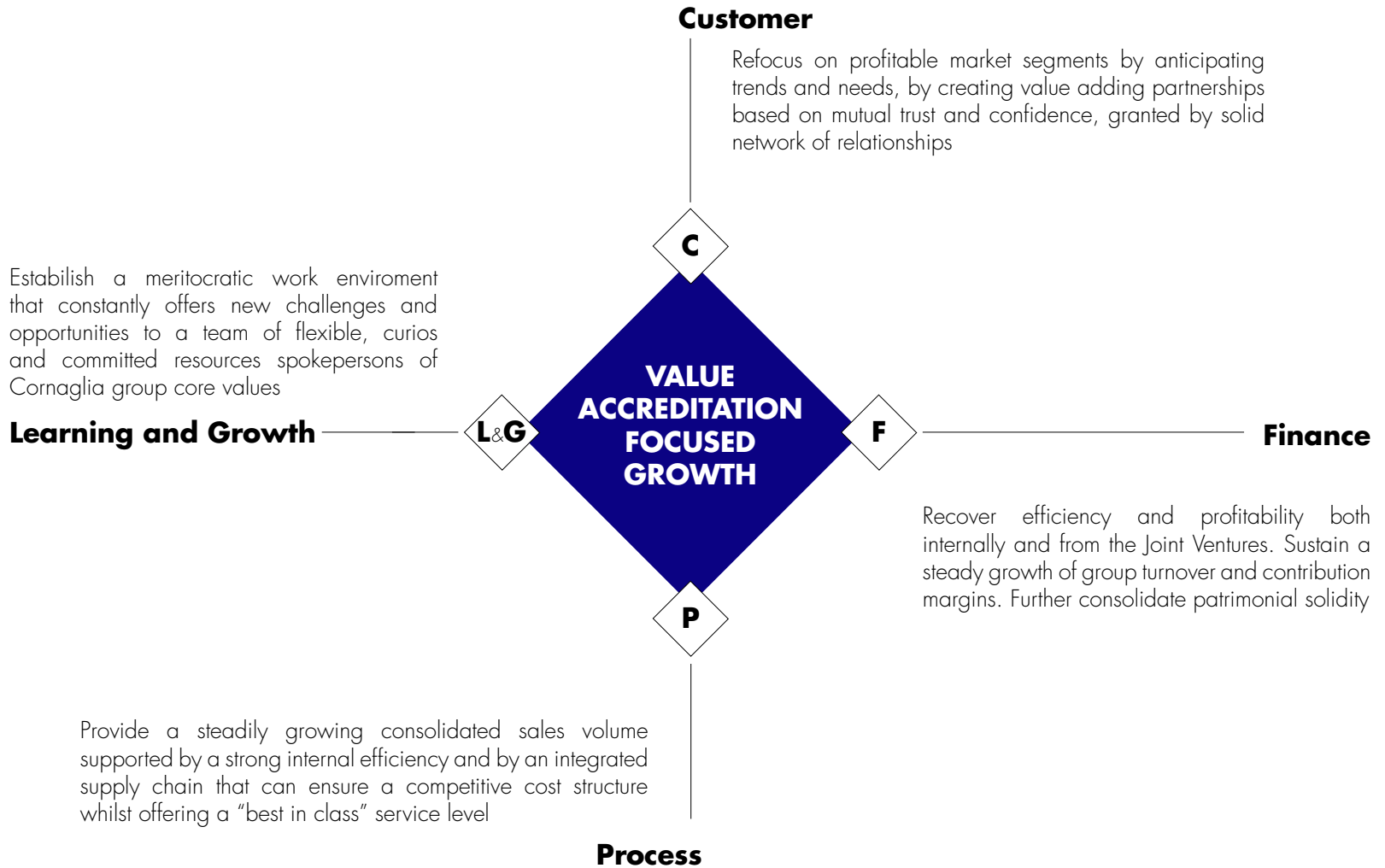
*PASSION, DETERMINATION, INNOVATION FROM ITALY TO THE WORLD*

Cornaglia is a **Multinational Group** partner for the automotive sector thus **constantly evolving**, capable, by leveraging on **entrepreneurial courage**, to **anticipate** the needs of the markets it competes on.

Able to offer forefront **technical and engineering solutions** highly valuable to our customers, achieved by integrating and coordinating its processes and leveraging on its **continuous improvement approach**.

**Milestones**

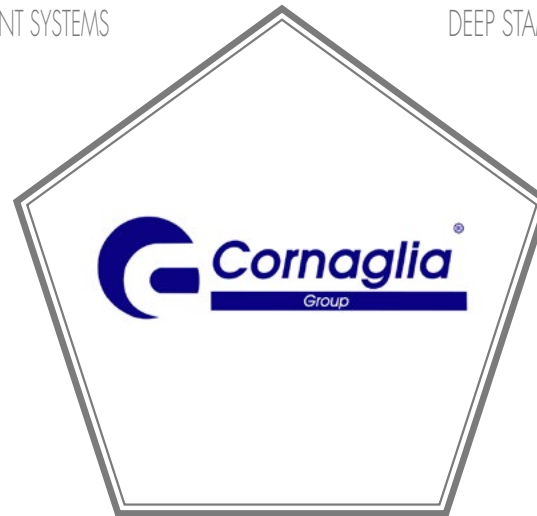






**COR-TUBI EXHAUST DIVISION**  
COMPLETE EXHAUST AND AFTER TREATMENT SYSTEMS

**METAL SHEET DIVISION**  
DEEP STAMPING AND ASSEMBLY



**PLASTIC DIVISION**  
COMPLETE AIR INTAKE SYSTEMS  
AND PLASTICS COMPONENTS

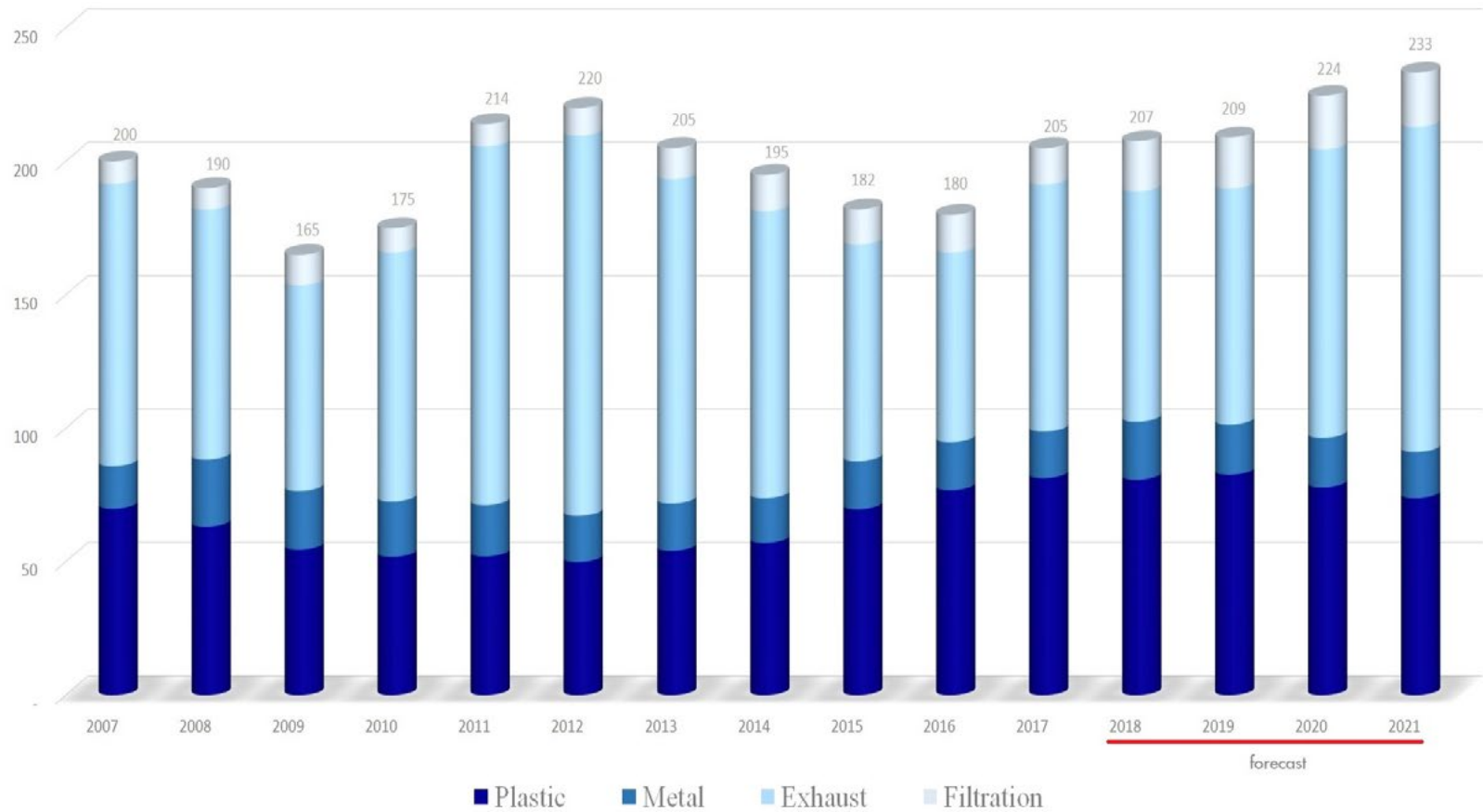
**FILTER DIVISION**  
FILTER ELEMENT

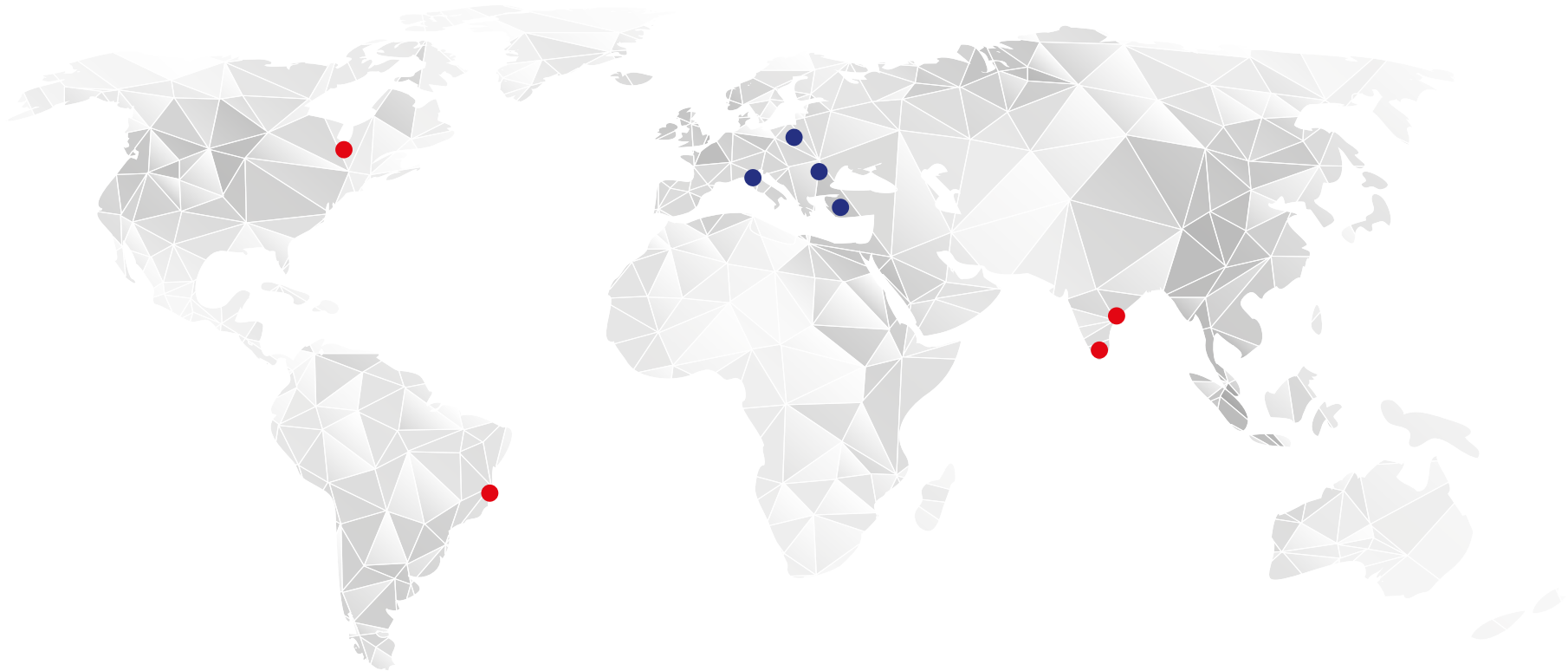


**RESEARCH & DEVELOPMENT CENTRE**



in milion euros





ITALY - POLAND - ROMANIA - TURKEY - INDIA - CANADA - BRASIL

● 100% owned    ● Joint venture



**BU Plastic & Metal  
CORNAGLIA POLAND**

ul. Grazynskiego 141  
R.I. di Bielsko- BIALA (PL) 7443



**BU Plastic  
CORNAGLIA TURKEY**

NOSAB 113 SOK. no: 10-16140  
Nilufer Bursa - TURKEY



**BU Plastic  
CORNAGLIA SUD**

Via Sorlati, 50  
82011 - Airola (BN)



**BU EXHAUST  
COR-TUBI ROMANIA**

Titesli, Sat Valea Stanii, nr 277-A  
117754, Arges - Romania



**BU EXHAUST  
COR-TUBI SUD**

Strada Statale 154 km 6  
66041 Atessa (CH)



**BU Filtration  
COR-FILTERS SRL**

Via Alcide de Gasperi, 50  
16030 - Casarza Ligure (GE)



**BU Plastic  
CORNAGLIA SPA**

Via Rivoli, 118  
10090 - Villarbasse (TO)



**BU Metal  
CORNAGLIA SPA**

Strada Mirafiori, 31  
10092 - Beinasco (TO)



**BU Exhaust  
CORNAGLIA SPA**

Via San Michele, 33  
14017 - Valfenera (AT)



**BU Research & Development Centre  
CORNAGLIA SPA**

Borgo Brassicarda, 18  
14019 - Brassicarda (AT)



**BU Plastic & Exhaust - NGCOR Group**

Alcebiades da Cruz, nº 195 – Bloco: 02  
São José dos Pinhais - Brazil



**BU Filtration - ABCOR Filters Inc.**

41 City View Drive  
Toronto, ON, M9W 5A5 - Canada



**BU Exhaust - JBM Cor-Tubi**

Plot No. 268 Sector-24  
Faridabad - HR 121005 India



**BU Plastic - LCAT  
Lumax Cornaglia Auto Tecnology**

Ambethan Road, Chakan, Tal. khed  
Pune 410501, Maharashtra - India







# **BUSINESS UNIT**

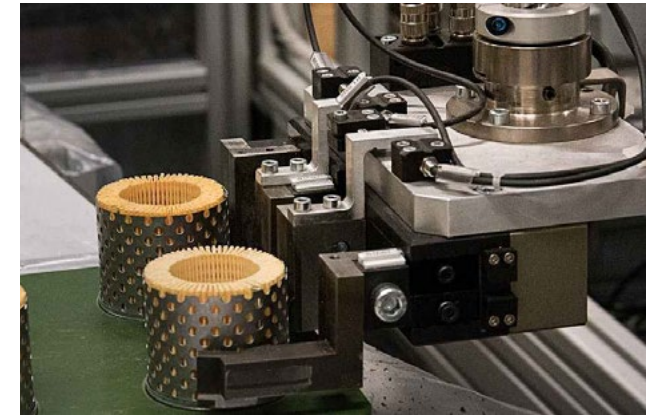
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**FILTRATION**

R&D CENTRE

The **COR-FILTER FILTRATION BU** has a complementary role to the other factories in the Group. In this market sector, we work on the design of components that anticipate three or four years the construction of the vehicle for which they are planned.

FILTRATION COR-FILTERS has as main goal on the improvement of its products with the technical support provided by our R&D center.



## Technologies

- CAROUSEL lines
- ROTARY PLEATING machines
- Paper PLEATING machines with electronic knives
- AUTOMATIC GLUEING MACHINES
- Inkjet or Laser MARKERS
- Oil filter TEST BENCHES
- Air filters TEST BENCHES
- LASER CUT





IVECO DAILY



FIAT 1.3 JTD  
E4 - E5 - E6

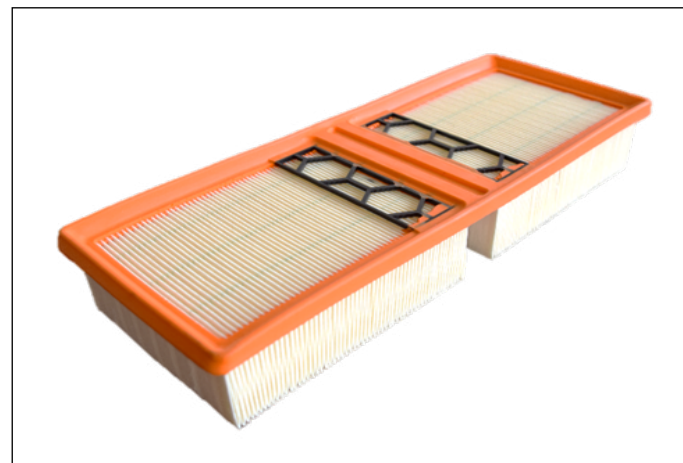




FIAT 1.4 ABARTH



ALFA ROMEO  
GIULIA

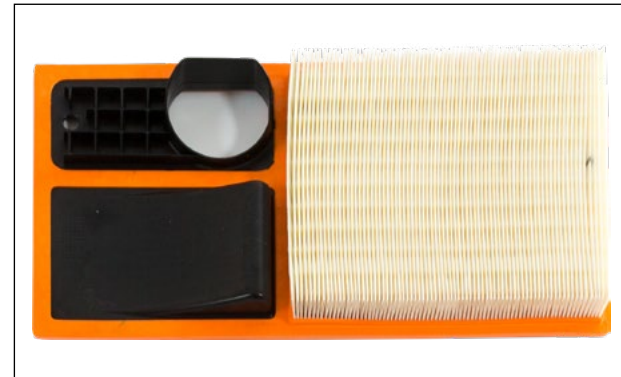




VW POLO 1.6 TDI



VW GOLF 1.4





MASERATI



FERRARI







BRP ROTAX FOR BMW

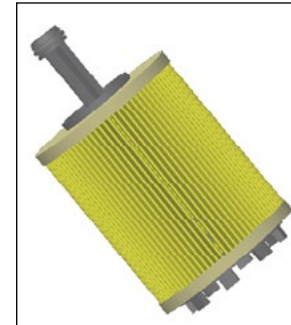




**BRP ROTAX**



**BRC (ENGINE LPG)**





APRILIA  
RACING TEAM



DUCATI  
RACING TEAM





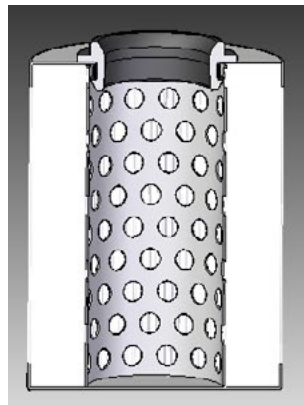
KTM



## Different types of filter cartridge



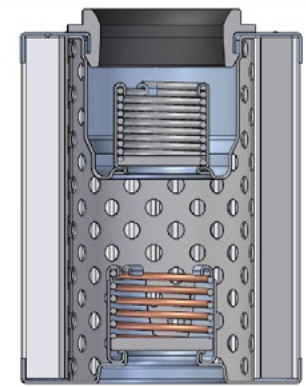
with double gaskets



without by-pass and anti-drain valve



with by-pass valve



with by-pass and anti-drain valve

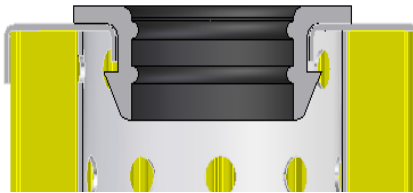
## Different sealing types:



Gasket with radial seal

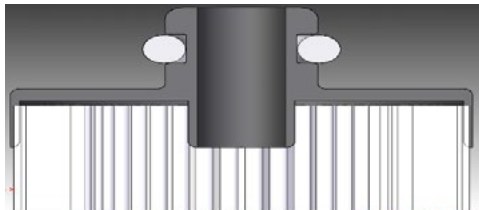
Advantages: Maximum seal

Disadvantages: Requires more space in height



Gasket with another type of radial seal

Advantages: Maximum seal – Requires less space



O-ring seal with interference



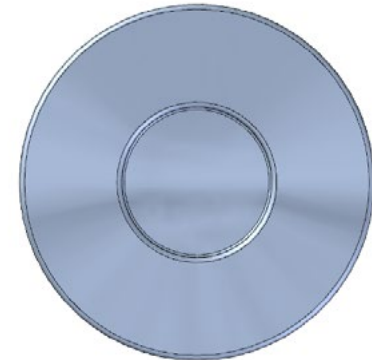
Gasket with axial seal

Disadvantages: Requires more space in height because a contrast spring is required

Actual dimensions range:



From  $\varnothing$  20 mm



To  $\varnothing$  300 mm



To height 400 mm



From height 30 mm

## Oil efficiency test directly from engine:

Automatic Report



Electronic  
Contaminant  
Counter



SampleID:

Sample 1, Meas. 1

2012-03-15 15:47:32

Size	Counts cum.:	diff.
2µm	454548	317369
5µm	137179	127506
10µm	9673	8177
15µm	1496	1020
20µm	476	276
25µm	200	187
50µm	13	11
100µm	2	2

Volume : 10.0ml

ISO:23/21/14

NAS:13(13,9,8,7,7)

ГОСТ 17216:14

GJB\_420A:>12(>12,>12,9,8,7)







## HEADQUARTER - COR-FILTERS

Via Alcide de Gasperi, 50  
16030 Casarza Ligure (GE)

## Plant: ABCOR

41 City View Drive  
Toronto, ON, M9W 5A5 - Canada



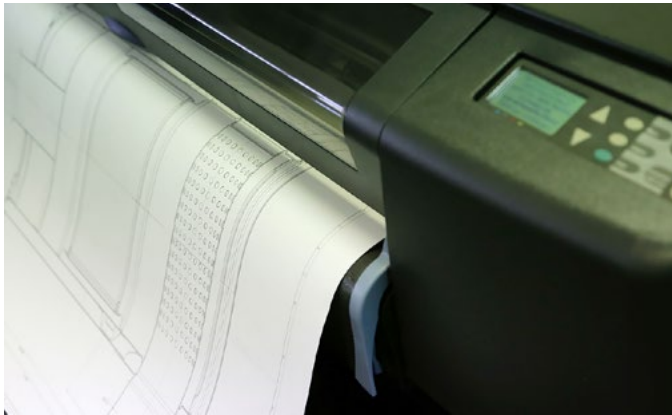


# **BUSINESS UNIT**

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FILTRATION  
**R&D CENTRE**

The **RESEARCH & DEVELOPMENT CENTRE**, recognized by the Ministry of Education, University and Research is a modern structure that extends over an area of 5,000 square meters in Brassicarda, near Villanova d'Asti. About 50 highly specialized people work there, employed in research and development, prototyping and experimental verification.



## Project management

Cornaglia's product development process is ISO-TS certified and includes:

- *analysis of customer needs*
- *system design and preliminary verification with the aid of CAE (Computer-Aided Engineering) tools*
- *in-House prototypes manufacturing*
- *system validation through engine and laboratory testing*

The entire process is managed by APQP tool to assure it meets the requirements of demanding automotive customers.



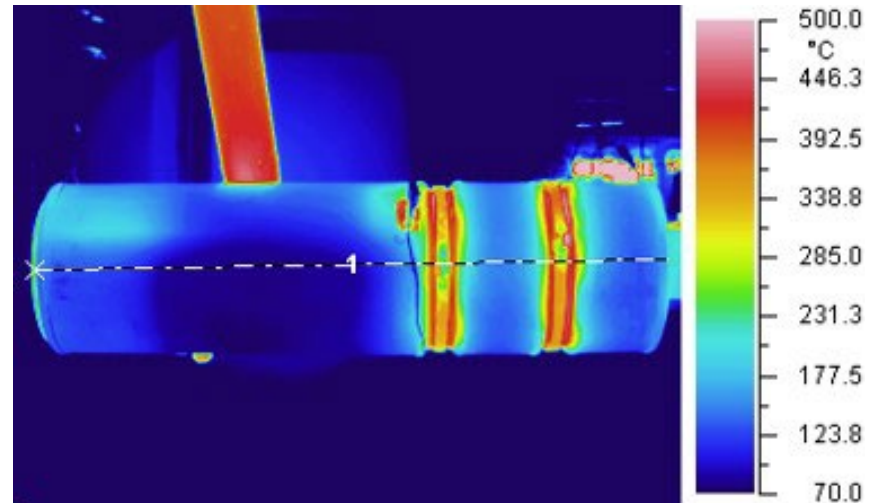
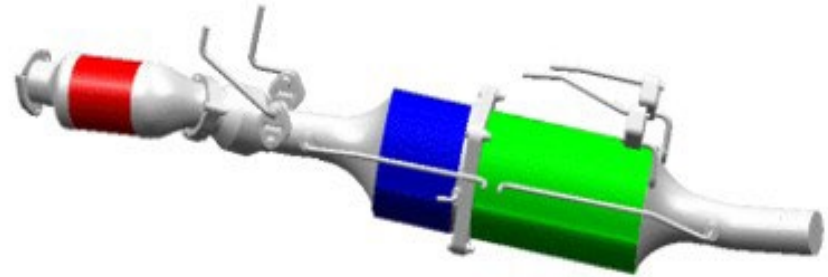
## Engineering

Cornaglia designs and develops complete systems and components for passenger cars, light commercial vehicle, medium and heavy duty trucks, buses as well as agriculture and construction machinery.

The following CAD systems are used:

- CATIA V5 R24
- NX 9,03

Design for manufacturing is assured by simultaneous engineering of production processes.



## Hybrid cars: study of refrigeration of battery pack containers

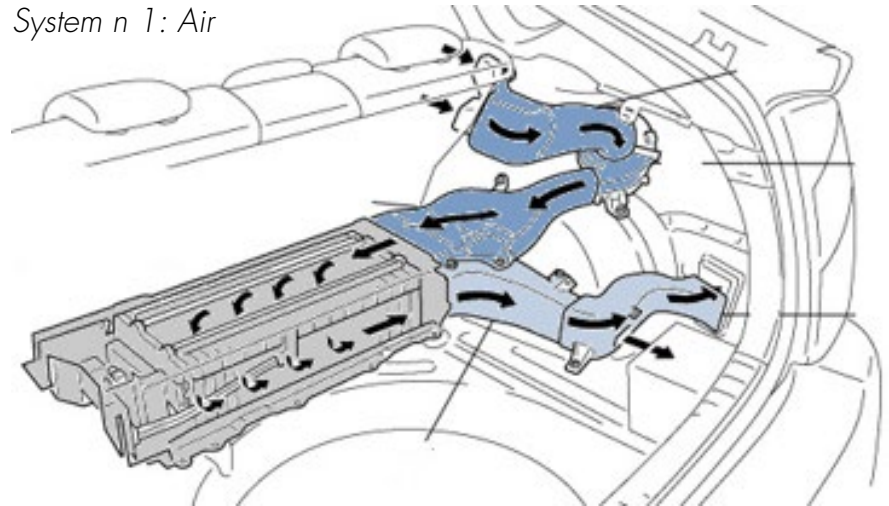
On Hybrid cars the batteries must be used in a certain temperature range.

The innovation center is developing new alternatives to the currently used cooling systems

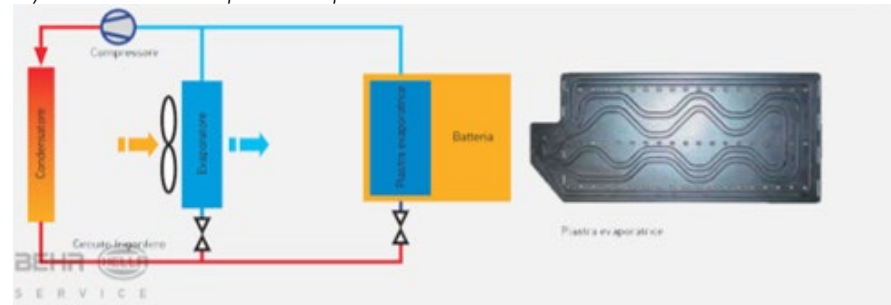
### Current systems

- System n 1: Air is drawn in from the vehicle's airconditioned cabin and used to cool the battery.
- System n 2: A special evaporator plate, included in the battery cell, is connected to the vehicle's air conditioning system.
- System n 3: A cooling plate mounted in the battery pack is traversed by the cooling liquid consisting of water and glycol (green circuit).

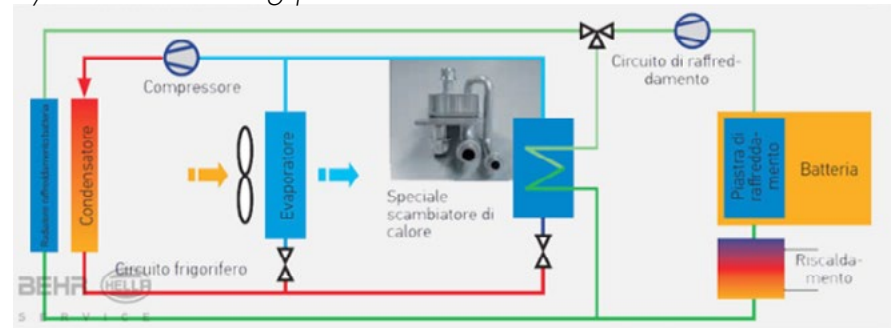
System n 1: Air



System n 2: Evaporator plate



System n 3: Cooling plate



## Prototypes

Cornaglia's prototype shop is located inside our R&D Centre and is equipped with all the basic tooling and machines that are needed to support first protos manufacturing.

A metrological room is used to check parts are dimensionally conform to the drawing before shipping.

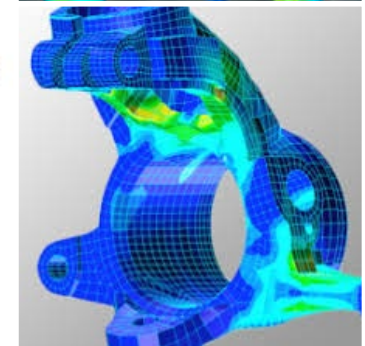
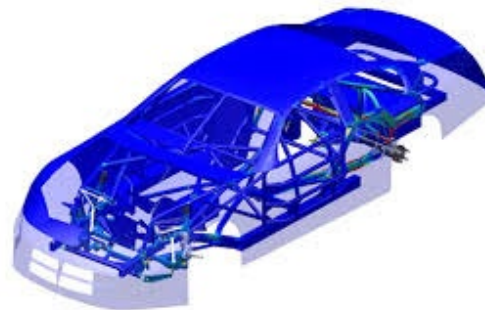
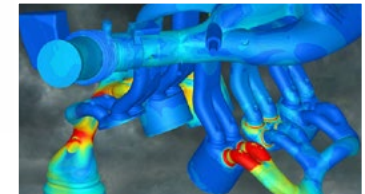
## Virtual simulation

Cornaglia's product development process is highly accelerated by using Computer-Aided Engineering tools in the early development phase.

Many different layouts and designs can be evaluated in the concept phase and checked by means of simulation, even before the first prototype is built.

The following state-of-the art simulation codes are used:

- Gamma Technologies gt-potenza
- ANSYS Fluent
- CD-adapco StarCD
- MSC Nastran
- Abaqus



## 3D Printer

### Stratasys Fortus 900M

#### Technology

FDM (overlapping layers from bottom to top by heating and extruding the thermoplastic filament)

#### Tank dimensions

914.4 x 609.6 x 914.4 mm

#### Materials employable

- ASA (simile ABS)
- Nylon 12
- Policarbonato
- ULTEM1010
- ULTEM9085

Example of prototype made of Polycarbonate (Air filter body for off-road application)

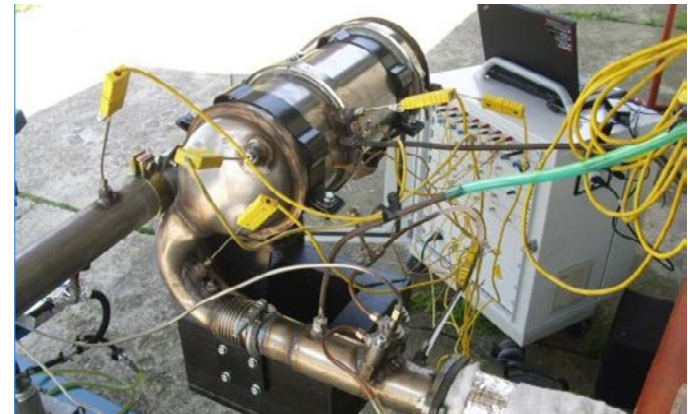




Cornaglia R&D Centre is equipped with a complete set of testing rooms, benches and instruments to fully support prototypes physical validation:

### Testing

- flow test benches
- engine test benches
- emissions analyzers
- semi-anechoic chamber with roller bench
- acoustic chamber
- electrodynamic shaker
- fatigue bench
- climatic chambers
- salt spray cell
- pressure test bench
- tanks test bench
- oven chamber
- leakage test unit
- high temperature oven
- dynamometer



## Innovation

Cornaglia heavily invests on innovation as a vital part of the advanced process development, to assure our solutions meet and anticipate customers needs. Examples of Cornaglia's innovations are:

- static urea mixer for exhaust aftertreatment SCR system
- urea sender unit with integrated quality sensor

## Partnership

Cornaglia cooperates with the main Italian and European technical universities and research institutes. Consolidated partnerships with selected suppliers allows us to access the latest product innovation and solutions even before they reach the market.



POLITECNICO  
DI TORINO

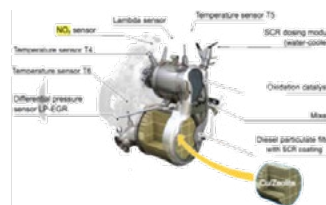


UNIVERSITÀ  
DEGLI STUDI  
DI PERUGIA

## Partnership with the Politecnico of Turin

The current framework agreement, signed on 27 February 2013, is divided into:

- Thesis support, internships / internships and doctorates also targeted for recruitment: since 2013 8 engineers have been hired at the R&D staff
- Partnership contracts for research projects
- Participation of Cornaglia as Industrial Partner of the Politecnico to calls for funded research projects
- Cornaglia is present with its own Office within the Politecnico Campus



### Filtri ai carboni attivi

I filtri abbinati combinati con carboni attivi hanno le stesse caratteristiche e funzionalità dei filtri particolari ma in più sono dotati di uno strato di carboni attivi in grado di ridurre cattivi odori e gas pericolosi per la salute del conducente e dei passeggeri.





**HEADQUARTER - CORNAGLIA of BRASSICARDA**

Borgo Brassicarda, 18  
14019 Brassicarda (AT)

*since 1916*  
**passion, determination, innovation from Italy to the world**



BENASCO (TO) - Italy



COR-TUBI - VALFENERA (AT) - Italy



VILLARBASSE (TO) - Italy



BRASSICARDA (AT) - Italy



AIRCILA (BN) - Italy



TORONTO - Canada



COR-FILTER - CASARZA (GE) - Italy



CORTUBI SUD - ALESSIO (CH) - Italy



BIELSKO BIALA - Poland



PITESTI - Romania



BURSA - Turkey



PUNE - India



CURITIBA - Brazil

The CORNAGLIA company, with over 100 years of history, has always been committed to reducing the environmental impacts associated with its activities and the risks to the health and safety of its workers.

### Environmental and safety performance

- Installation of a photovoltaic system on the roofs of the plants
- Replacement in all Group plants of old burners with “LOW NOX” heat generators with high efficiency and low emissions of Nitrogen Oxides
- Treatment of industrial waste water with water purification plant
- Replacing the old lighting system with LED lighting to reduce consumption and improve visibility in the departments



## **Officine Metallurgiche Cornaglia S.p.A.**

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