

Company Overview

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Senior Researcher



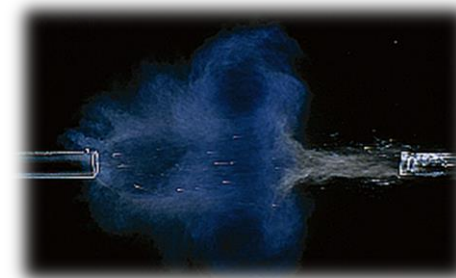
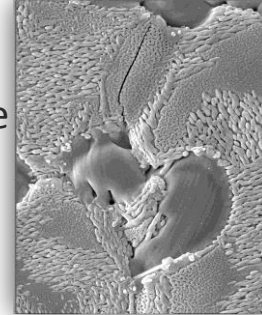
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Basic concepts and facts



Brief history

- **In 2003:** First spin-off company from the University of Milan
 - Apply modern petrology's instruments and methodology to materials science
 - Laboratory setup with analytical and technological equipment
- **In 2007:** Brembo invests in the company
 - Main focus on brake technology and materials
 - Production of materials and technology development
- **In 2008:** Quality Certification and MIUR Accreditation
- **In 2009:** Move at the Scientific Park Kilometro Rosso
 - Own R&D Projects - Diversification strategy
 - Ballistic materials
 - Bio-medicals materials
 - Composite materials for automotive and aerospace



PETROCERAMICS

Turn natural complexity into technology

Petroceramics: Team

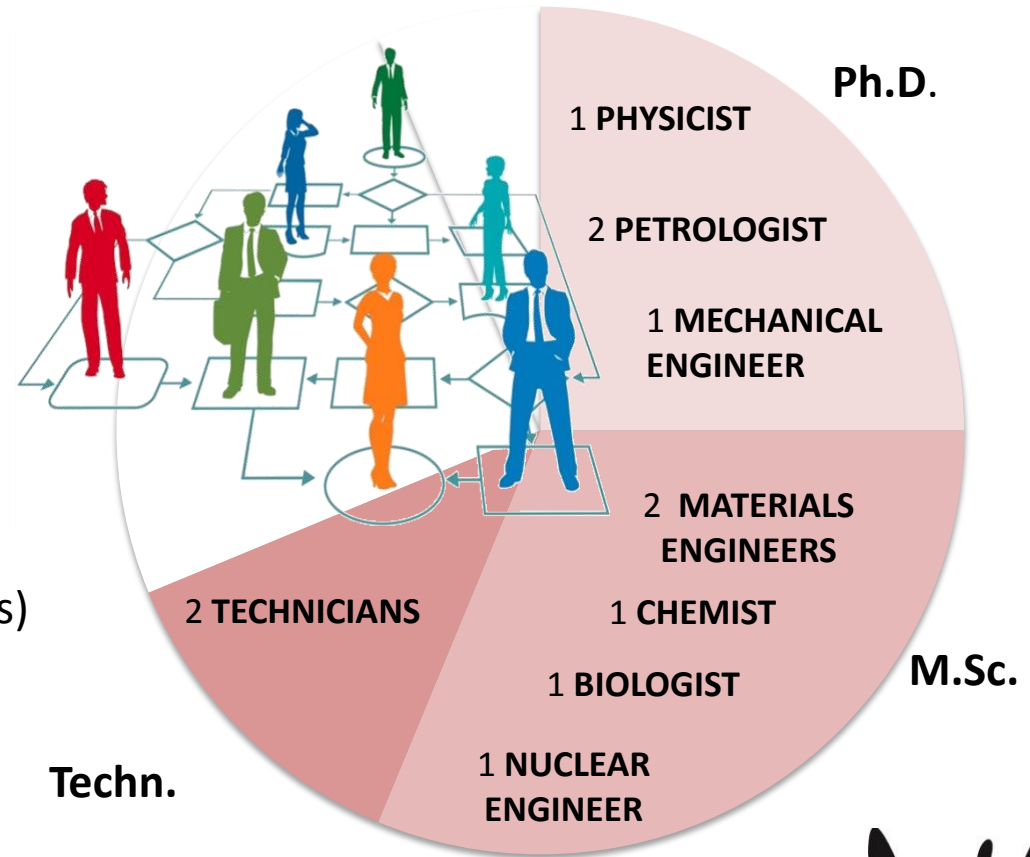
Team of 15 structured employees

10 highly specialized professionals
led by the CEO Ph.D. M. Valle

External resources / referees

Active founders (2 Full Professors)

University R&D (3 Ph.D. Researchers)



Petroceramics concept

- Apply modern experimental methodology to advanced materials
 - Innovative view on complex, multiphase materials
 - Attention to details, textures, structures, interfaces and surfaces characteristics
 - Capacity to measure what is important
- «Stay hungry» mentality
 - Unlimited curiosity, promoting creativity and hands-on attitude
 - Small, flat and efficient organization, limiting internal bureaucracy and focusing on final results
 - Cross-pollination, always trying to apply what learnt in new field of use
- «Stay Fit» (if not foolish)
 - Young team, open to new contributions
 - Cost control, especially on SG&A



Business idea

- Petroceramics provides a wide range of **R&D services** in Advanced Materials
 - Laboratory analysis and material characterization
 - Conceptualization, management and fulfillment of **ad-hoc R&D projects**
 - Under customer's leadership who will benefit all tangible/intangible project results
 - With Own project leadership with customer's supervision and regular up-date
 - Delivery of **directly marketable solutions** (Killer Product/Applications)
 - Prototyping and fine tuning of own or customers' materials
 - Small scale production
- **Self-initiated projects** which brought Petroceramics to develop and patent new materials and production process
 - Petroceramics offers the possibility to use own IP and develop new

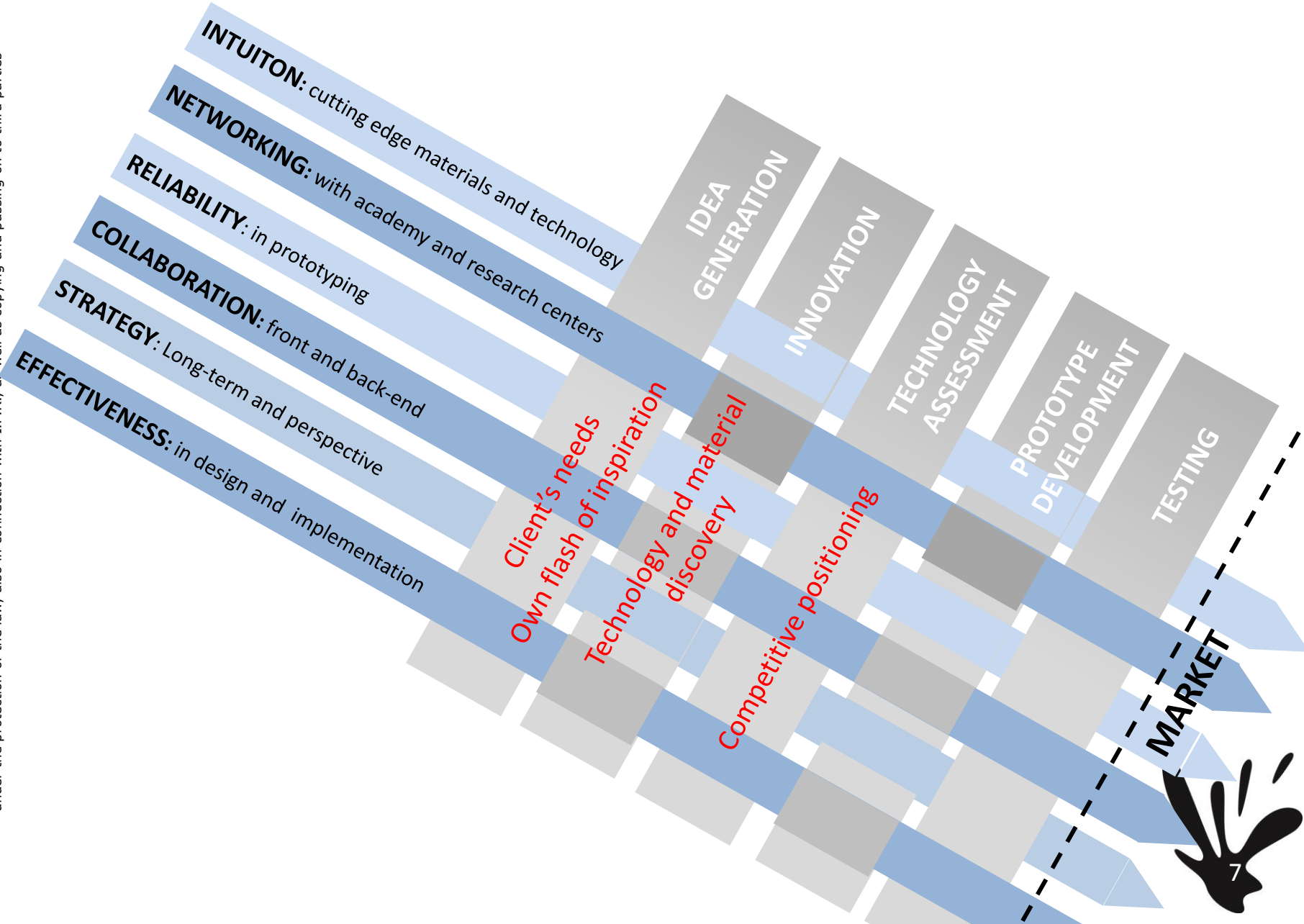


Petroceramics: Operative model

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Petroceramics: Laboratory



Scanning electronic microscope (SEM)

JEOL JSM-5910LV with microanalysis system iXRF EDS-2000
JEOL JSM-IT300LA with microanalysis system EDS/SSD)

X-Ray diffractometer

BRUKER D5000

Optical dilatometer

Expert System Solution Misura 3 ODLT

Thermal conductivity and diffusivity

NETZSCH GERAETEBAU MICROFLASH LFA 457/2/G

Dynamometers

CONTROLS 65-L13G2/C; NETZSCH BST 401/3

Laser granulometer

Malvern Mastersizer 2000



Petroceramics: Small scale production

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MACHINERY FOR RAW MATERIALS PREPARATION

Atomizer

PROJECTA ENGINEERING 300

High-energy mill

NETZSCH LMK 4

Granulator

TRIA 32-20 JM

MACHINERY FOR MOLDING

Vertical molding machine

GIFER VPS 80 M2

Vertical molding machine

GIFER VPS 175 R

Horizontal injection molding machine

ARBURG 270 S 400 70



Petroceramics: Small scale production

OVENS FOR THERMAL TREATMENTS
High pressure oven, 2200°C, 100bar TAV GPS 448
Vacuum oven, 2400°C TAV 329
Vacuum oven, 1600°C ARCHER HT2031
Oven, 1750°C NABARTHERM HT160/17
Debinding oven TEKNO KILNS FC80-PC
Debinding oven PADEL THERM KHR 50X50X100 ES/K+TNV
Debinding oven TERMALCONCEPT KU 540/07 DB
Induction heater AMIND EKOHEAT 45



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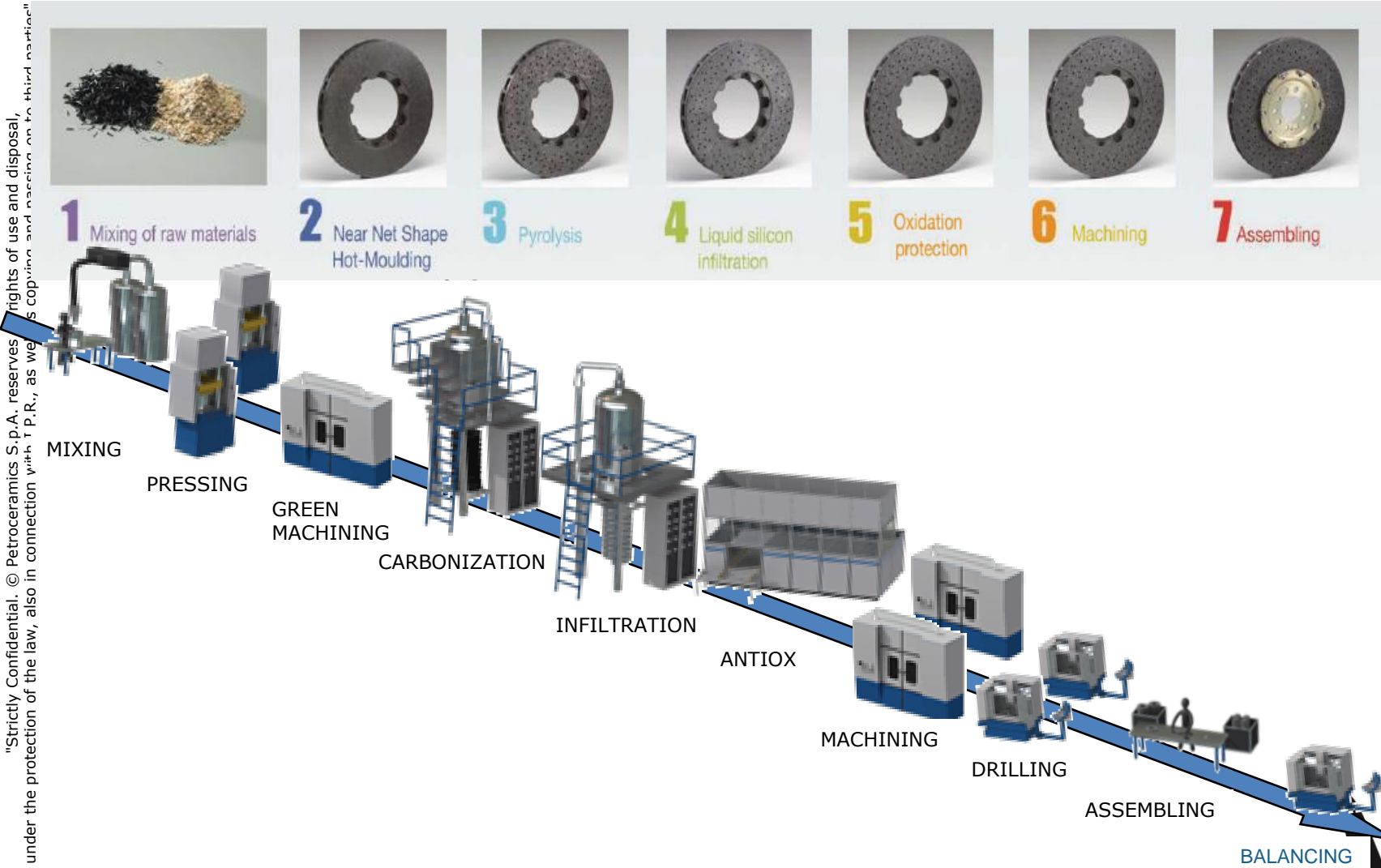
Projects

PETROCERAMICS

Turn natural complexity into technology



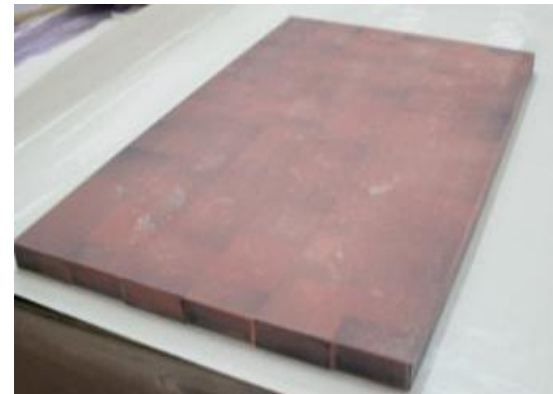
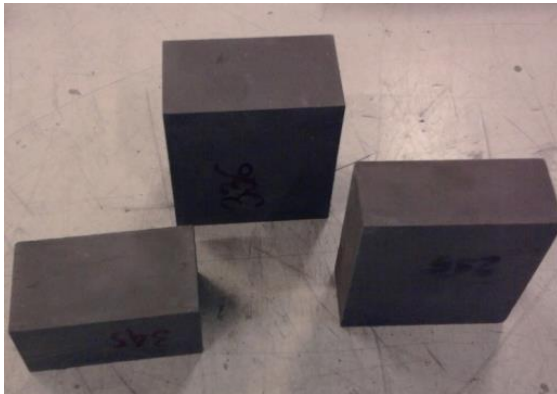
CCM Process Flow



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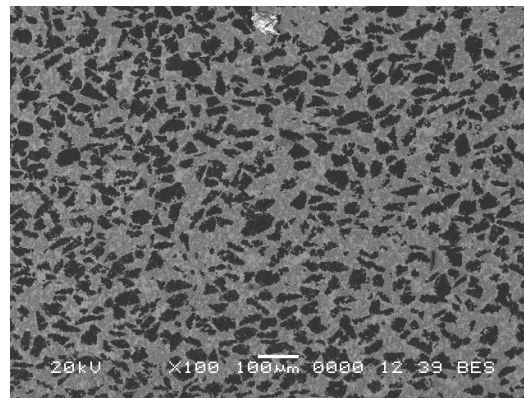
Petroceramics approaches for antiballistic applications

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Petroceramics silicon infiltrated materials

	PETRO-SiC	PETRO-B ₄ C SiC	PETRO-B ₄ C
Protection level (NatoStanag)	4	4	4
SiC content	80%	40%	-
B ₄ C content	-	40%	80%
Si content	20%	20%	20%
Density (g/cm ³)	2.95-3.05	2.7-2.8	2.5-2.6
Young Modulus (GPa)	>210	>210	>250
Flexural Strength (MPa)	>300	>300	>300
Hardness (Vickers HV 500 g)	24	27	30



Petroceramics material shows a homogeneous structure.

Other materials can be done (e.g. change of granulometry or phase ratio)



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Gracias!

