

MOTUL **TECH**

HEAT TREATMENT







MOTUL

WHO IS MOTUL?

Universally recognised for more than 160 years for the quality of its products, its capacity for innovation, and its involvement in the field of competition, Motul is truly acknowledged as the specialist in synthetic lubricants.

Passion is what unites lovers of engineering with their machinery, the same passion that fuels Motul's drive for innovation.

Constantly striving to develop the next step in performance, Motul demands the same commitment to excellence from its suppliers as from its own Team, with the aim of delivering the highest level of Products and Services to its clients.

From Pennsylvania's first oil rig to the brand's latest laboratory, the unfolding desire for improvement fuels the Company day-by-day in its quest to deliver innovative solutions.

The connection between Motul and its community delivers ingenious ideas and enables them together to achieve the unachievable, to push performance beyond the normal boundaries, and to deliver the unexpected over the long term, time after time.

Supporting its customer's projects, and fighting side-by-side to deliver cost effectiveness inextricably linked to performance is the way that Motul commits to its business partners in a way in which no one else would.

Thanks to this commitment, Motul is now the only choice of many of the most renowned workshops in over 165 countries.

CHOOSE MOTULTECH FOR YOUR HEAT TREATMENT APPLICATIONS

In the light of extensive expertise and being a crucial member of the A3TS, French heat treatment association, MotulTech has a range, covering all applications from cold quenching with an aqueous quenching polymer to hot quenching at 180°C.

This range is the result of a long collaboration with heat treatment specialists. Listening to your requirements, our experts develop products that reconcile the search for high performance and productivity with the respect for users and the environment.

Experts who put at your service their knowledge of your applications and your area of activity.

MotulTech thus offers you an extensive set of solutions including products and services.



HEAT TREATMENT

Heat Treatment

6

Motul



Heat treatment consists in giving specific mechanical properties to metal alloys and to make them suitable for meeting the operating requirements.
Thermal cycles consist in heating at a given temperature greater than the transformation point or solution annealing point, followed by maintaining at this temperature and cooling in a specific fluid to obtain the required properties.

QUENCHING

This is a heat treatment that consists in heating the metal to a temperature greater than the austenitizing point, maintaining it at this temperature for a sufficiently long time so that all carbides pass into solution without austenite grain coarsening and then cooling it quickly and continuously.

DRASTICITY CURVE



CALEFACTION

The shorter possible

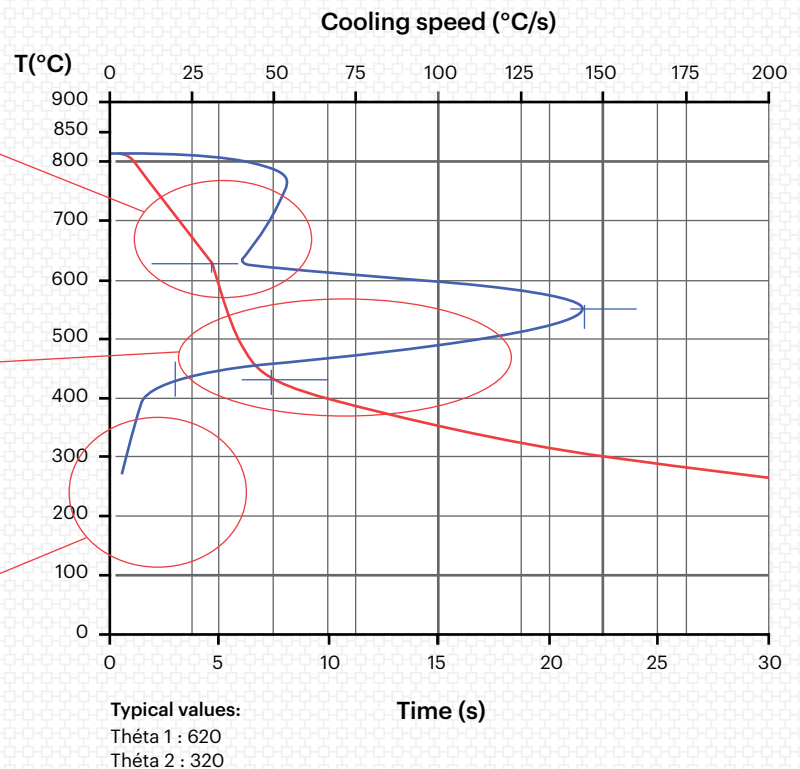


BOILING



CONVECTION

Below Point M_F



Heat Treatment

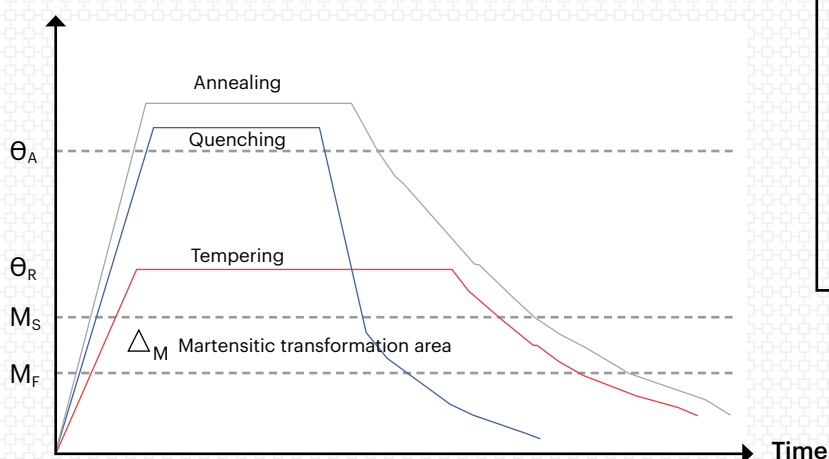
7

Motul

The main thermal cycles are:

- **Quenching:** process that provides hardness and brittleness. The quenched parts have specific metallurgical properties. The brittleness is partially eliminated by tempering.
- **Tempering:** continuous quenching process. The quenched parts are often too fragile (brittle). Tempering reduces the brittleness.
- **Annealing:** it eliminates the properties brought about by quenching and restores the initial properties of the metal.

Temperature



- θ_A Austenitisation temperature
- θ_R Reduction of residual austenite into martensite
- M_S Beginning of martensitic transformation
- M_F End of martensitic transformation

THE MOTULTECH RANGE OF QUENCHING PRODUCTS

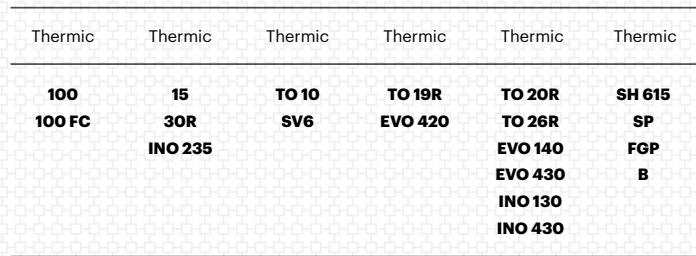
Heat Treatment

8

Motul

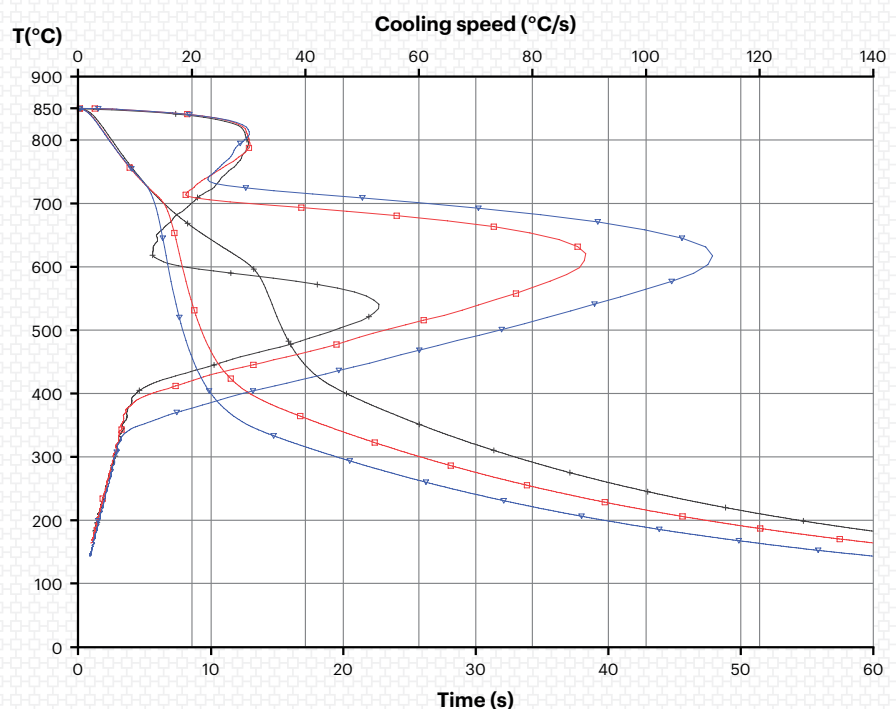
20

The high quality of the base oils used in our formulations and the optimization of the maintenance of fluids in service can also drastically reduce consumption and improve the profitability of heat treatment operations.



Thermic Range: The Benchmark

- ## THERMIC
- ### range cooling speed graph



THERMIC EVO RANGE: SAFETY & PEAK PERFORMANCE

MotulTech's **THERMIC EVO** range allows manufacturers to meet the most demanding regulatory and quality standards.

- The quality of the base oils in **THERMIC EVO** products improves their thermal stability and reduces maintenance operations and their associated costs.
- The low volatility of these quenching fluids reduces consumption and ensures a better working environment for operators.
- This range guarantees the greatest safety of its users thanks to high flash points, low mist level and users friendly formulas.
- The **THERMIC EVO** offer has been designed to guarantee excellent metallurgical properties, for a wide range of applications, using the latest technological developments in the market.

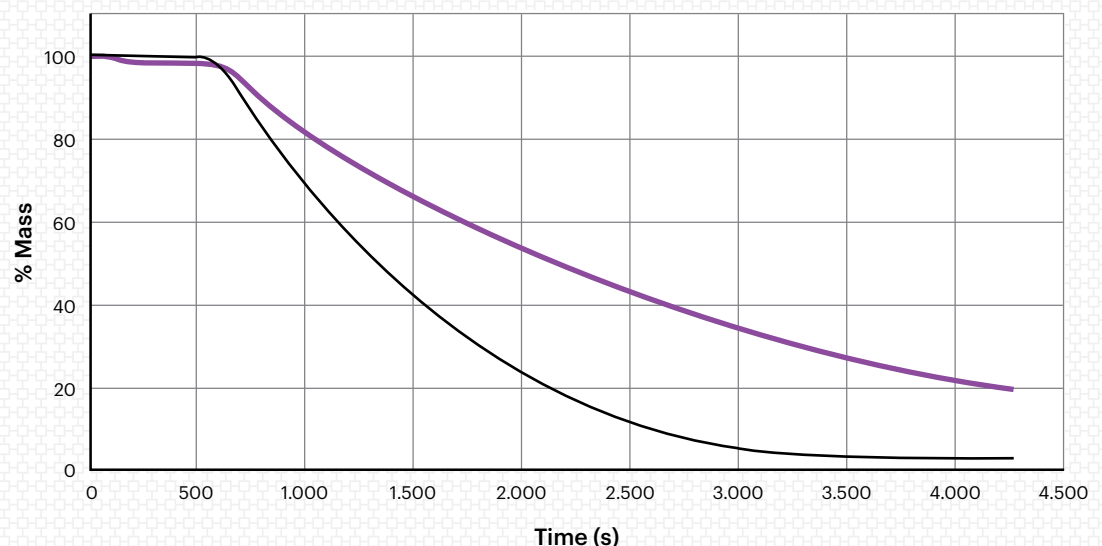
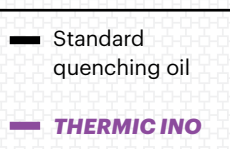
THERMIC INO RANGE: INNOVATION AT THE SERVICE OF INDUSTRY

In order to meet the changing needs of manufacturers, MotulTech has developed a new range of high-end quenching oils, **THERMIC INO**, based on high quality synthetic oils.

- Innovative **THERMIC INO** technology reduces oxidation and evaporation of the quench fluid in service, relative to the fluids based on standard mineral oils. This results in a reduced consumption of product.
- The high stability of **THERMIC INO** fluids, in service, reduces considerably consumption and maintenance costs.
- The high flash point, the low tendency to fog and the very low PAH content (Polycyclic Aromatic Hydrocarbons) guarantees high user safety.
- Formulated with a new generation of chlorine-free base oils without zinc and heavy metals, the **THERMIC INO** range has been designed to offer industrialists with excellent hardening performance, enabling them to obtain the desired metallurgical properties for their parts, while helping to improve their working conditions in their workshops.



BASE OILS INFLUENCE ON VOLATILITY AT 250°C



COLD QUENCHING

Cold quenching fluids are used in a process not exceeding 80 ° C for applications where parts are not sensitive to deformation during quenching.



THERMIC

THERMIC TO 10

Oil for heat treatment of steel parts with good hardenability, simple geometry such as small mechanical parts, forgings and bolts.

FEATURES

VISCOSITY AT 40°C (CST)

28

FLASH POINT (°C)

>190

VISCOSITY INDEX

100

OPTIMISE YOUR PROCESS



High flash point



Thermal shock resistant



Stable quenching potential



Low consumption



Low oxydation



THERMIC

THERMIC TO 19 R

Accelerated quenching oil, used for heat treatment of alloy and moderately alloy steels

FEATURES

VISCOSITY AT 40°C (CST)

29

FLASH POINT (°C)

>190

VISCOSITY INDEX

108

OPTIMISE YOUR PROCESS



High flash point



Thermal shock resistant



Stable quenching potential



Low consumption



Low oxydation

**THERMIC****— THERMIC TO 20R**

Highly accelerated quenching oil, used for heat treatment of alloy or not alloy steel parts with poor hardenability.

**FEATURES****VISCOSITY AT 40°C (CST)****22****FLASH POINT (°C)****>190****VISCOSITY INDEX****104****OPTIMISE YOUR PROCESS****High flash point****Thermal shock resistant****Stable quenching potential****Low consumption****Low oxydation****THERMIC****— THERMIC TO 26R**

Highly accelerated quenching oil, used for heat treatment of alloy or not alloy steel parts with poor hardenability.

**FEATURES****VISCOSITY AT 40°C (CST)****27****FLASH POINT (°C)****>190****VISCOSITY INDEX****103****OPTIMISE YOUR PROCESS****High flash point****Thermal shock resistant****Stable quenching potential****Low consumption****Low oxydation**



THERMIC INO

THERMIC INO 130

Very accelerated quenching oil on synthetic base from natural gas, used for the heat treatment of steel parts, alloyed or not, with poor hardenability.

FEATURES

VISCOSITY AT 40°C (CST)

22

FLASH POINT (°C)

>190

VISCOSITY INDEX

134

OPTIMISE YOUR PROCESS



High flash point



Low misting and evaporation



High viscosity index



Low consumption



Low oxydation



THERMIC EVO

THERMIC EVO 140

Extremely accelerated quenching oil on a highly refined base, used for heat treatment of steel parts, alloy or not, with poor hardenability. The high cooling speed of the THERMIC EVO 140 achieves a particularly high surface hardness as well as a good diffusion of hardness in depth.

FEATURES

VISCOSITY AT 40°C (CST)

13

FLASH POINT (°C)

>190

VISCOSITY INDEX

125

OPTIMISE YOUR PROCESS



High flash point



Highly accelerated cooling



Low evaporation



High viscosity index



Low consumption



Low oxydation



THERMIC

THERMIC FGP

Synthetic quench fluid used in solution in water for mass quenching, allowing to obtain cooling speeds between water and the most accelerated oil according to the dilution rate.



FEATURES

VISCOSITY AT 40°C (CST)

247

PH

9.6 at 18%

REFRACTOMETRIC INDEX

6.2

CONCENTRATION IN USE (%)

10-25

OPTIMISE YOUR PROCESS



Parts cleanliness



Adjustable cooling speed



Low consumption



Bio-stability



Corrosion protection

SEMI-HOT QUENCHING

Semi hot quenching oils are dedicated to be used between 60 and 120°C for martensitic quenching of steel mechanical parts of delicate geometry.



THERMIC

THERMIC 15

Oil for martensitic hardening of steel mechanical parts with complex geometry.

FEATURES

VISCOSITY AT 40°C (CST)

40

FLASH POINT (°C)

>230

VISCOSITY INDEX

99

OPTIMISE YOUR PROCESS



High flash point



Thermal shock resistant



Stable quenching potential



Large temperature range



Low consumption



Low oxydation

Heat Treatment

15

Motul



THERMIC

THERMIC 30 R

Extremely drastic quenching oil intended only for steel parts with **very poor hardenability**.

FEATURES

VISCOSITY AT 40°C (CST)

28

FLASH POINT (°C)

>210

VISCOSITY INDEX

115

OPTIMISE YOUR PROCESS



High flash point



Thermal shock resistant



Stable quenching potential



Low consumption



Low oxydation



Reduced risks of deformation and cracks



THERMIC INO

THERMIC INO 235

Very fast quenching oil formulated with synthetic base oils from natural gas. For the quenching of **alloyed or not steel parts with poor hardenability**.



FEATURES

VISCOSITY AT 40°C (CST)

25

FLASH POINT (°C)

>220

VISCOSITY INDEX

138

OPTIMISE YOUR PROCESS



High flash point



Low misting and evaporation



High viscosity index



Low consumption



Low oxydation

HOT QUENCHING

Hot quenching oils are intended for use at elevated temperatures up to 180 °C to control deformations during quenching, a process known as marquenching.



THERMIC

THERMIC 100

Cementation of low and medium alloyed steels, nitrocarburizing of low alloy steels. Hot quenching of carbon steels in continuous process.

FEATURES

VISCOSITY AT 40°C (CST)
123

FLASH POINT (°C)
>280

VISCOSITY INDEX
100

OPTIMISE YOUR PROCESS



High flash point



Stable viscosity



Stable quenching potential



Low consumption



Low oxydation



Reduced risks of deformation and cracks

Heat Treatment

17

Motul



THERMIC

THERMIC 100FC

Highly accelerated quenching oil intended for heat treatment of parts in alloyed and relatively alloyed steels parts with complex forms.

FEATURES

VISCOSITY AT 40°C (CST)
111

FLASH POINT (°C)
>260

VISCOSITY INDEX
102

OPTIMISE YOUR PROCESS



High flash point



Stable viscosity



Stable quenching potential



Large temperature range



Good filterability



Low oxydation

VACUUM QUENCHING

These quenching oils are used in a process which aims to avoid any interaction between the treated parts and the surrounding atmosphere. They are mainly used for the thermochemical treatment of steels.

THERMIC

— THERMIC SV6

Bainitic or martensitic heat treatment fluid for mechanical parts of complex geometry sensitive to deformation.

FEATURES

VISCOSITY AT 40°C (CST)

35

FLASH POINT (°C)

>240

VISCOSITY INDEX

120

OPTIMISE YOUR PROCESS



High flash point



Suitable for vacuum quenching



Low evaporation



Low consumption



Low oxydation

THERMIC EVO

— THERMIC EVO 420

Accelerated quenching oil formulated from **highly refined base oils** for the heat treatment of carbon and alloyed steels.

FEATURES

VISCOSITY AT 40°C (CST)

29

FLASH POINT (°C)

>220

VISCOSITY INDEX

135

OPTIMISE YOUR PROCESS



High flash point



Suitable for vacuum quenching



Low evaporation



High viscosity index



Low consumption



Low oxydation



THERMIC EVO

THERMIC EVO 430

Highly accelerated quenching oil formulated with **highly refined base oils** for the heat treatment of steel parts with poor hardenability.

FEATURES

VISCOSITY AT 40°C (CST)

29

FLASH POINT (°C)

>220

VISCOSITY INDEX

132

OPTIMISE YOUR PROCESS



High flash point



Suitable for vacuum quenching



Wide range of temperature in use



Low evaporation



High viscosity index



Faible consommation



Low oxydation



THERMIC INO

THERMIC INO 430

Highly accelerated quenching oil formulated with synthetic base oils from natural gas, dedicated to heat treatment of **steel parts with poor hardenability**.

FEATURES

VISCOSITY AT 40°C (CST)

28.5

FLASH POINT (°C)

>240

VISCOSITY INDEX

135

OPTIMISE YOUR PROCESS



High flash point



Low misting and evaporation



Suitable for vacuum quenching



High viscosity index



Low consumption



Low oxydation

INDUCTION QUENCHING

This hardening process is used to increase wear resistance, surface hardness and endurance through the creation of a hardened surface layer, without affecting the core microstructure. Induction hardening is used to increase the mechanical properties of ferrous components in a specific area.

THERMIC

— THERMIC SH 615

Soluble quench polymer, allowing to obtain different cooling rates according to the dilution percentages, in order to cover a broad spectrum of use.

FEATURES

VISCOSITY AT 40°C (CST)

62

PH

9.3 at 10%

REFRACTOMETRIC INDEX

2.5

CONCENTRATION IN USE (%)

6-15

OPTIMISE YOUR PROCESS



High flash point



Adjustable cooling speed



Low consumption



Bio-stability



Corrosion protection



Good filterability

THERMIC

— THERMIC SP

Water-soluble synthetic liquid, used in solution in water for tempering operations, providing protection against corrosion of the treated parts and machines.

FEATURES

VISCOSITY AT 40°C (CST)

50.5

PH

9.4 at 6%

REFRACTOMETRIC INDEX

3.3

CONCENTRATION IN USE (%)

5

OPTIMISE YOUR PROCESS



Parts cleanliness



Corrosion protection



Low concentration



Bio-stability



Good filterability



THERMIC

THERMIC B

Tempering and blackening fluid specially intended for steel parts blackening and protection.

FEATURES

VISCOSITY AT 40°C (CST)

40

PH

10.5 at 5%

REFRACTOMETRIC INDEX

1.07

CONCENTRATION IN USE (%)

5-8%

OPTIMISE YOUR PROCESS



Corrosion protection



Low concentration



Bio-stability



Non foaming



Without boron



Odorless

POST TREATMENT

THERMIC

— THERMIC BOOST

THERMIC BOOST is a quench performance improver for heat treatment applications. It is compatible with all the neat quenching lubricants from the THERMIC range.



Heat Treatment

22

Motul

FEATURES	UNIT	STANDARDS	THERMIC BOOST
Color	-	ASTM D1500	Brown
Density at 20°C	-	ISO 12.185	0.874
Viscosity at 40°C	cSt	ASTM D445	176
Viscosity index	-	ASTM D2270	138
Flash Point	°C	ASTM D92	200
Concentration in use	%	-	0.5-3

ADVANTAGES



Compatible with all the neat products of the THERMIC range



Allows to reduce consumption



High thermal shocks resistance



No safety labelling

SERVICE



All along its use, a quenching fluid is subjected to high temperature constraints and numerous pollution. To meet the ever-increasing demands of the product and the growing demands of processes, MotulTech has set up a suitable service offer to check that the characteristics and performance of the fluid are always in line with the established standards and the desired performance.

THE MOTULTECH SERVICE OFFER FOR QUENCHING FLUIDS THUS HAS SEVERAL OBJECTIVES:

- **DETECT** any pollution of the quenching oil by water or other fluids used in the workshop
- **GUARANTEE** that the characteristics of the product are in accordance with the specifications and in adequacy with the process.
- **PREVENT** the appearance of problems with tapings, water hardness, foaming, deposits on parts, corrosion, smell issues.
- **DEFINE AND IMPLEMENT** any corrective actions to return to optimal conditions of use.

Several analysis sequences are offered in line with the customer's requirements to enable him to manage the better use of quench fluids. Each analysis sequence covers a wide range of essential parameters for monitoring water-soluble and non-water-soluble heat treatment products.

A team dedicated to the management of in-service products is engaged to meet the needs of manufacturers who require a quick, precise and proactive response. MotulTech support team accompanies each customer from the start to implement the product on site in order to optimize its efficiency and profitability.

With decades of expertise, MotulTech now supports many heat treatment specialists around the world.





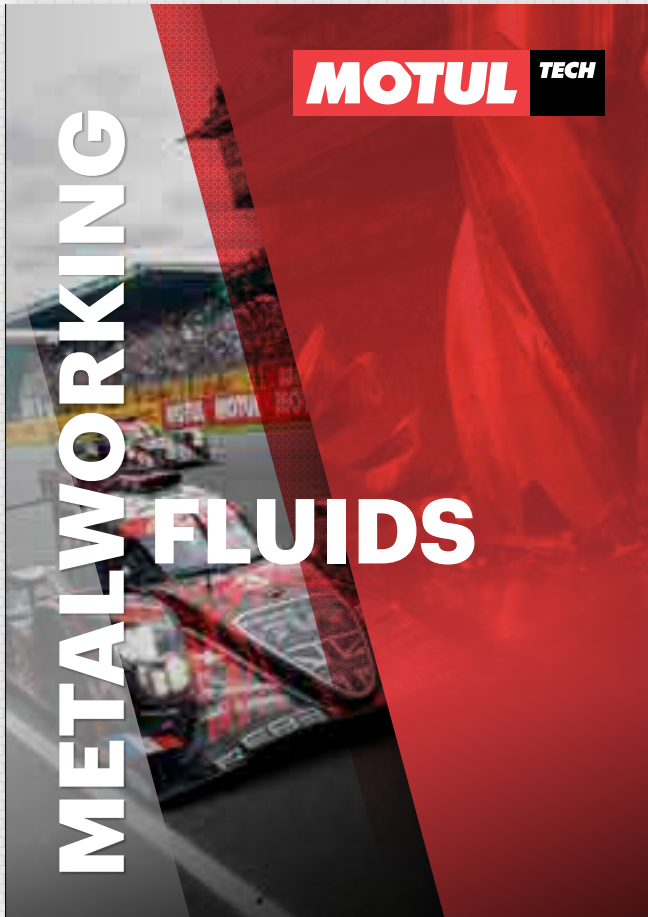
THE MOTULTECH OFFER

Heat Treatment

26

Motul

LO



HIGH PRESSURE ALUMINIUM DIE CASTING

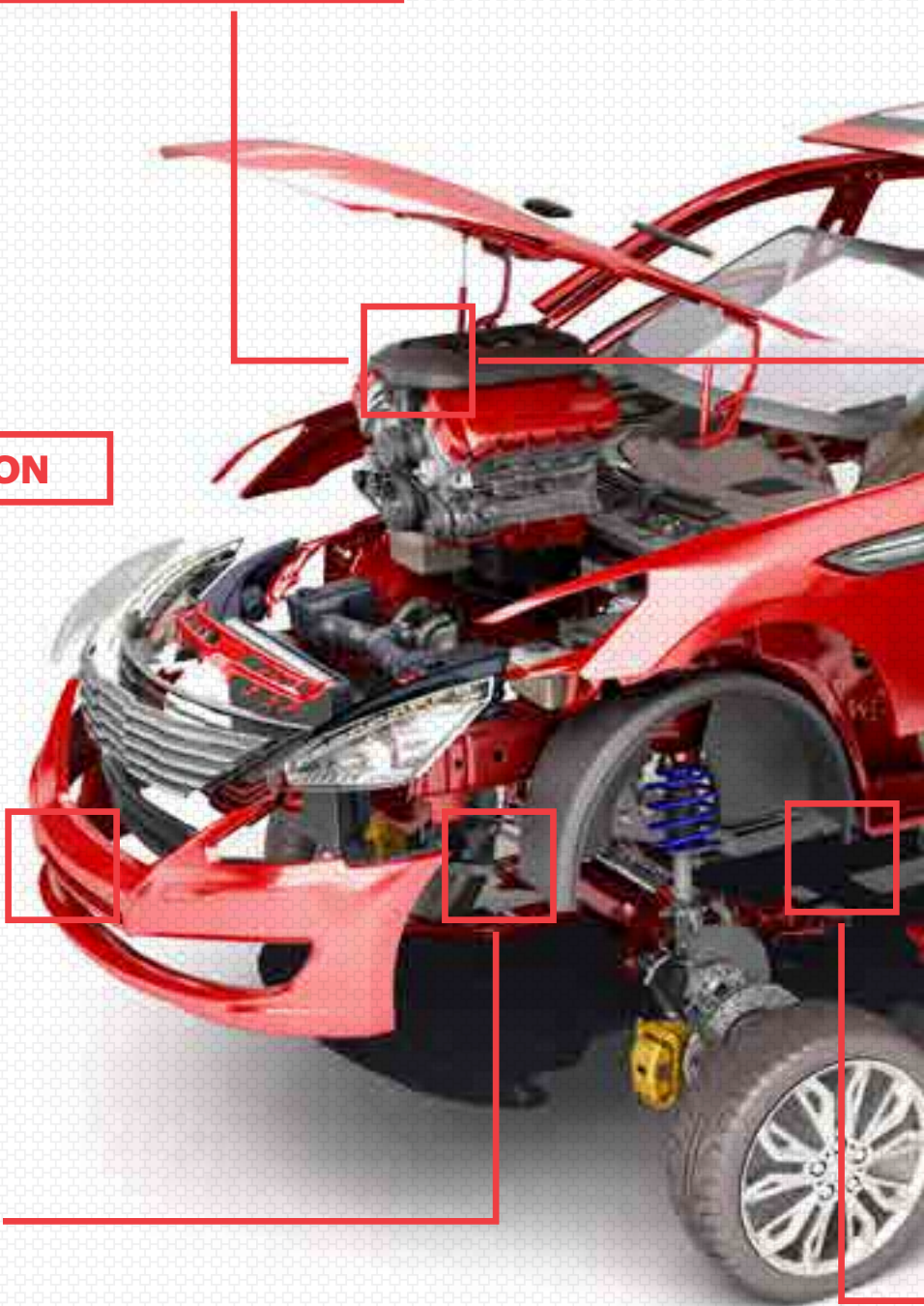
- ENGINE BODY
- CASTED PARTS

ALUMINIUM EXTRUSION

- LIGHTWEIGHT
EXTRUDED
PROFILES

OEM LUBRICATION

- STIRRING COLUMN
- OPENING PARTS





METAL MACHINING

- FASTENERS
- ENGINE BODY
- CYLINDERS

FORMING

- FASTENERS
- EMBOSSSED PARTS

HEAT TREATMENT

- GEARS
- TRANSMISSION
- FASTENERS

PARTS CLEANING

- CLEANING OF ALL TYPES OF METALLIC PARTS







PARIS HEADQUARTER

FOLLOW US ON
motul.com



Motul - 119 boulevard Félix Faure - 93300 Aubervilliers - FRANCE
Tel. +33 (0)1 48 11 70 00 (trade only) - Fax. +33 (0)1 48 33 28 79
Contact: support.MotulTech@fr.motul.com