

Making motorcycle  
helmets safer



**SHARK**

# SHARK integrates safety into its helmets in this sequential way:



## 1. SAFETY RESEARCH

- Cutting edge lab research
- Research in the application of new materials
- Motorcycle accidentology study with «CEESAR\*»
- Racing experience



## 2. SHARK HELMET DEVELOPMENT

- Shock absorption
- Optimum shapes and dynamic reactions
- Vision field & optical quality
- Development testing

\* Centre Européen d'Etudes de sécurité et d'analyse du risque (CEESAR)

«CEESAR is a Central European group working to reduce head injuries from road accidents. They study the biomechanics of accident shocks and the resulting impact forces on the head in order to provide scientific analysis for improved safety efforts.»



### 3. PRODUCTION

- Quality control
- Production testing



### 4. CHOOSING & USING

- Choose your helmet

# 1. SAFETY RESEARCH

-  **Crash and head injury dynamics**
-  **New materials performance**
-  **Racing experience**

Shark combines the knowledge from these three critical areas to focus on this one leading objective:

To minimize the potential injury to the brain, **the helmet must absorb the maximum amount of energy in the minimum amount of time during the first impact on one spot.**

**SHARK** HAS DEVELOPED  
BETTER WAYS  
TO OPTIMIZE  
ABSORPTION OF IMPACT  
ENERGY





Shark studies motorcycle accident and head injury data to develop an extensive understanding of helmet safety dynamics. Working with CEESAR, a leading European crash and injury analysis center, detailed statistics regarding motorcycle accidents and head impacts are used to understand variances in position and type of impact, ability of various materials to dissipate and manage impacts, and the resulting variance in injury results. Coupled with Shark's extensive racing experience and high-technology laboratory research, Shark is on the leading edge of helmet safety research.




# IMPACT ANALYSIS

Impact analysis dictates that the correct balance of managing these three factors will result in optimum safety:

 Speed at impact, together with mass, defines total energy

 Angle of impact defines potential reach of the energy to the head

 Surfaces giving and receiving impact will modify angle

A deep penetrating impact on one spot will deliver too many g forces resulting in a head injury.

An impact absorbed too slowly will result in brain deceleration duration being too long to protect from head injury.

Optimized rapid deceleration and impact absorption manage to minimize potential brain injury. This is Shark's choice.



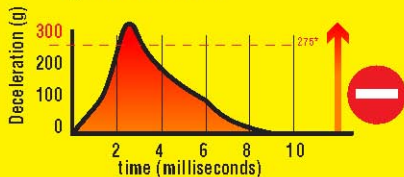
This notion is given by two datas:

- The deceleration in «g» ( $1g = \pm 9,8 \text{ m/s}^2$ )
- The H.I.C. (Head Injury Criteria) integrating deceleration and duration

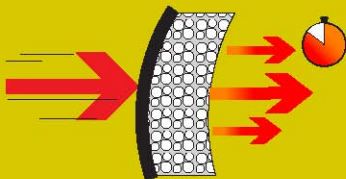
#### DECELERATION RECEIVED TOO HIGH



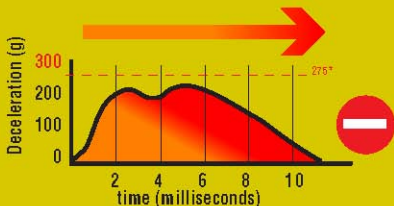
#### g LIMIT EXCEEDED



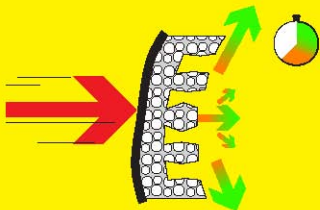
#### DURATION OF ABSORPTION TOO LONG



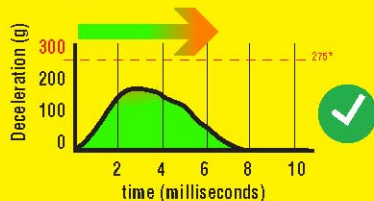
#### H.I.C. EXCEEDED



#### OPTIMISATION OF DECELERATION AND DURATION



#### OK








# 1. SAFETY RESEARCH

## Racing experience

**Our commitment toward racing is driven by our commitment to the satisfaction and safety of our customers.**

Racing is extremely demanding for performance and safety, and thus, is very instructive for our development efforts. Through our racing experience and testing, we are able to reach higher levels of quality and performance in our helmets and face shields.

-  Outstanding safety
-  Excellence in comfort and venting
-  Optimum optical performance across a range of conditions (night, rain, fog, etc.)
-  Best possible weight and balance
-  Aerodynamics and noise reduction

**These variables are essential criteria for success in racing. We also recognize that these are the same criteria that our customers use to choose a helmet. That is why Shark builds helmets to the highest standards and makes these helmets available to everyone. Our customers deserve the same level of performance safety and quality as any racer.**

**Miguel DUHAMEL**



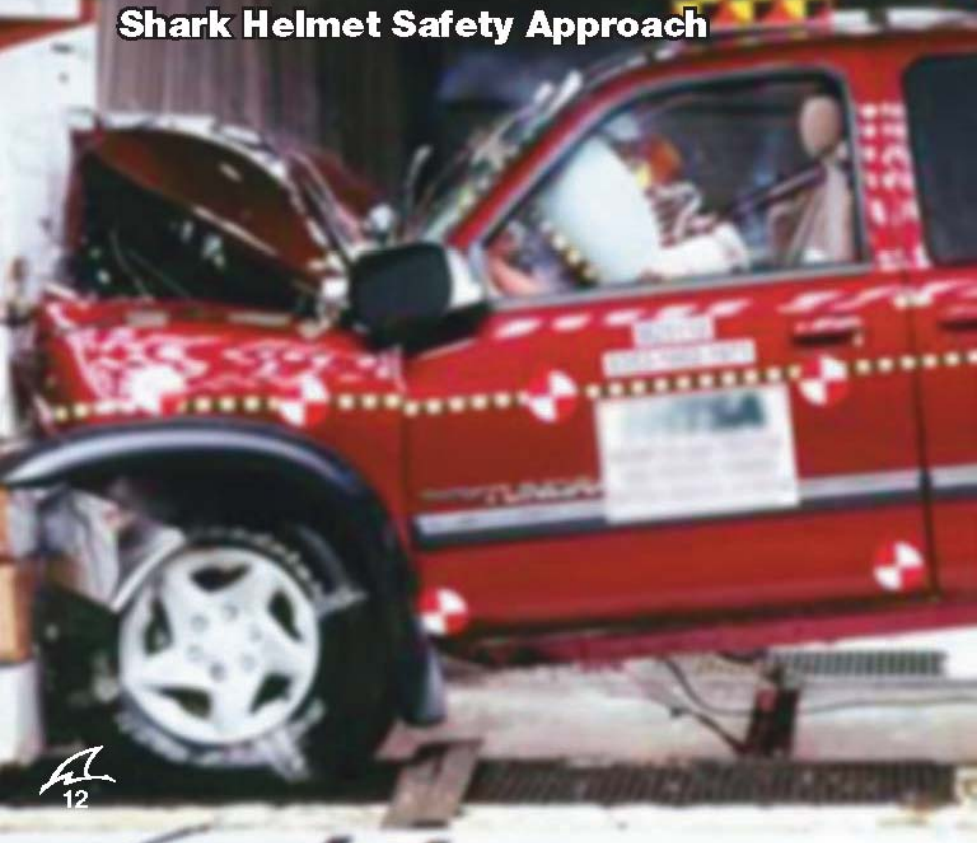
**Troy CORSER**



**Mike ALESSI**

## 2. HELMET DEVELOPMENT

### Shark Helmet Safety Approach



# VERY RIGID OR MORE FLEXIBLE STRUCTURES?



Impact management involves dissipation of impact over a larger area coupled with flexible absorption of energy.



Recent development in automotive safety incorporate crumple zones to dramatically improve crash management. Rather than a rigid structure, an effective design takes the energy into the structure to reduce the deceleration energy reaching the body. Helmet safety works by following the same principle.

# SHARK HELMET CONCEPT

## TEC SHELL OUTSIDE + FIN-SHOCK INSIDE

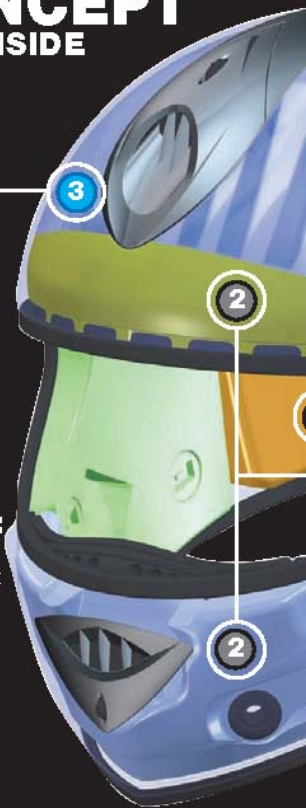
### SIMPLE OUTSIDE, COMPLEX INSIDE:

#### 3 TEC-SHELL

#### Different structure for different areas:

Shark is making a balance between outer and inner shell. Where the shape of the shell makes it harder, the inner shock absorber must be softer. Where the shape makes the shell more flexible (i.e visor aperture), the inner shock absorber must be more rigid.

Shark uses the right structure & combination to achieve this balance, choosing between glass, carbon, aramid fibers, (Hi-Tec line) and thermoplastic resins (Performance line). Shark develops also new shapes of shock absorber to optimize their efficiency.







## **1 SHARK FIN-SHOCKS, a SHARK development**

As opposed to a solid liner of EPS (Expanded Poly Styrene) foam, or even one with variable densities, **SHARK's** research has led to the development of the Fin-Shock structure EPS liner.

These innovative «FIN-SHOCKS» that differ from other helmets, collapse, compress and flex during impact, absorbing more energy with more progressivity, and more precision than a solid piece.

## **2 Multi-piece internal shock absorbing structure**

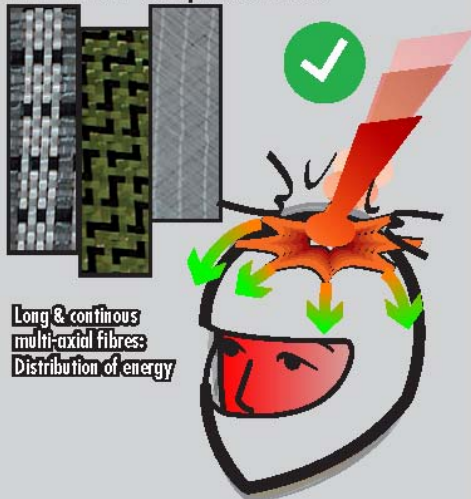
**SHARK** chooses not to make the foam internal shell in one multi- density piece, but in separate parts of different densities in order to be able to control by weight their «hardness» individually. Each area requires different density parts according to each position.

## 2. SHARK HELMET DEVELOPMENT

**USING THE RIGHT  
MATERIALS  
IN THE RIGHT WAY**



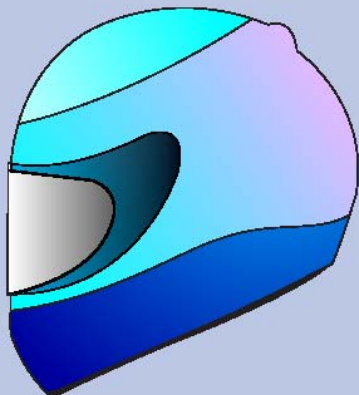
## HI-TEC: composite fibers



Long & continuous  
multi-axial fibres:  
Distribution of energy

**Fibres that hold and  
distribute impact energy:**

## PERFORMANCE: injection molding



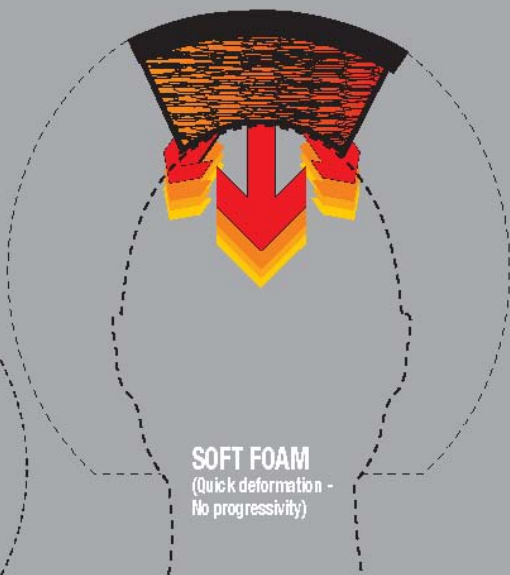
**Varied thickness  
improve performance:**

Shark uses a combination of long, short, and multi-axial fibers (for the Shark Hi-Tec range) to optimally spread energy over a larger surface area. Through greater flexibility of the entire shell, energy absorption is improved.

As a helmet shell does not react the same in all places (due to shape variation), SHARK uses variable thickness of shell material in different part of the shell.

# HARD HELMET

## STIFF SHELL + SOFT FOAM



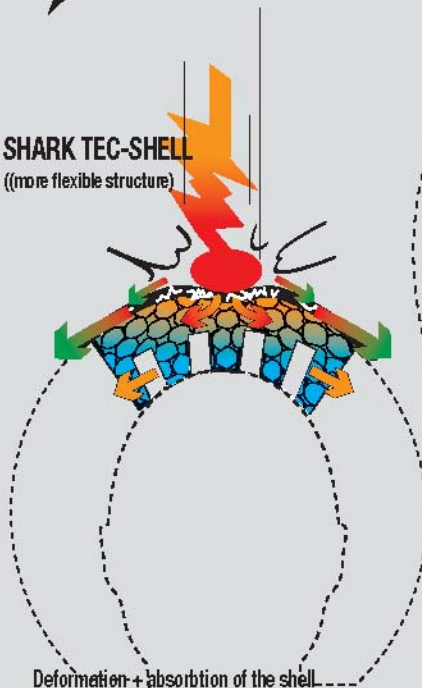
A hard helmet although appears to sustain less damage does not allow the energy to be absorbed or distributed away from the head and in fact directs a lot of energy directly to the brain.



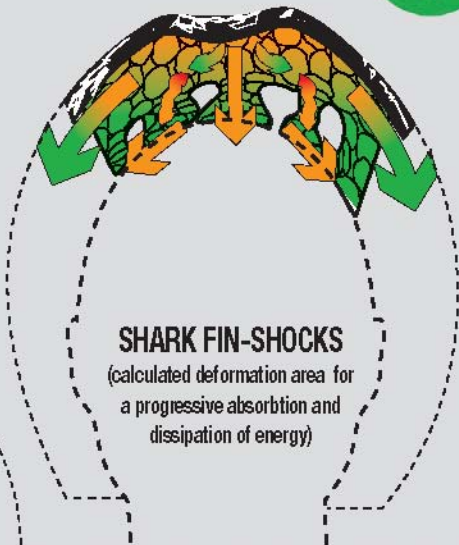
TEC-SHELL outside  
& FIN-SHOCKS® inside



### SHARK TEC-SHELL (more flexible structure)



Deformation + absorption of the shell comes through partial destruction (remember the car crumple zone concept)



### SHARK FIN-SHOCKS

(calculated deformation area for a progressive absorption and dissipation of energy)

The Shark Tec-Shell and Fin-Shocks, working like the crumple zones in automotive construction, absorb and distribute the impact energy through their controlled deformation and thus minimize the amount of impact energy reaching the brain.

### 3.PRODUCTION QUALITY

**Through demanding quality control, Shark insures that each helmet delivers the effective safety and comfort desired.**

*A fiber craftsman  
signs each helmet shell*



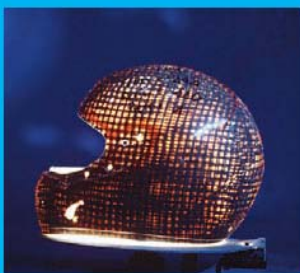
*Hi-tec composite fibers for top performances*

*Highly skilled production staff  
check each step of the process  
for specification*



*All production and assembly is  
done in Shark factories where  
quality can be controlled*

*Desired fiber distribution is measured  
and approved for each shell*



*15% of Shark's total staff is  
dedicated to Quality Control!*

# SIGN,WEIGH,OBSERVE

*High technology production tools  
cutting high pressure water jet robots*



*Technical industrial equipment ensuring precision and quality.*

*Routine post-production testing  
is done to monitor final products*



*More than 5000 helmets tested each year  
for quality control.*

## 4. CHOOSING YOUR SHARK HELMET

### safety and comfort content

Select and use the correct model helmet for your riding style, and be sure the helmet fits properly.

**See the owners manual for further instructions on selecting the proper size helmet.**

#### Safety features

Shark crumple zone absorption system  
performance line / injected resin  
2,2 mm polycarbonate visor  
3 mm polycarbonate visor  
Hi-tec / Multi axial fibre glass / shark resin  
Hi-tec/Multi axial fibre composite carbon aramide/shark resin  
light composite shell  
safe visor lock (4 anchor points) / quick release

#### Comfort features

*not all listed here, consult product brochures for full comfort features*

hypoallergenic material  
quick release visor system  
total vision visor (fog resistant/scratch resistant)  
removable/changeable cheek pads  
removable/changeable lining

#### Accessories

rear exhausts  
side ventilation exhausts  
stabiliser vent  
chin cover  
removable chin cover  
nose mask  
removable nose mask  
tear-offs  
adaptable density paddings (cheeks & lining)



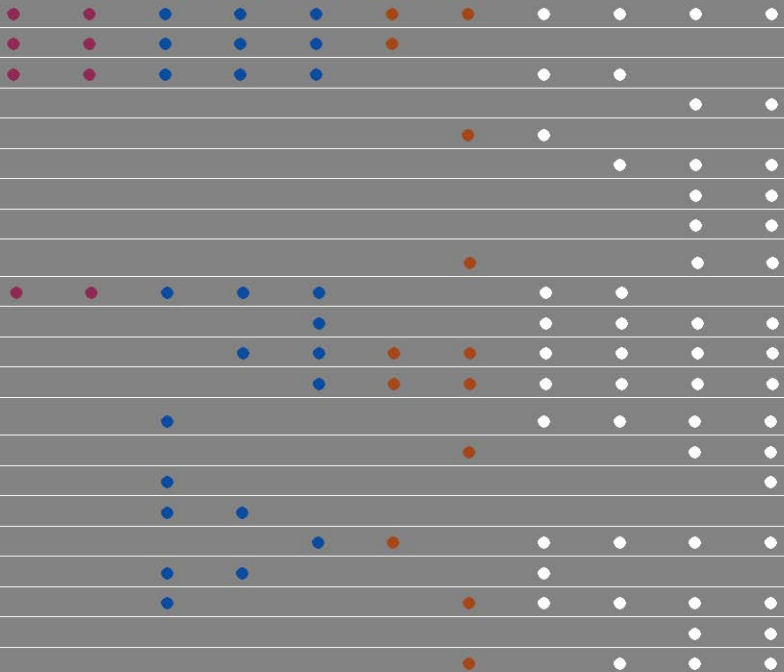


Helmet materials can be severely damaged by chemicals and sunlight, and certainly by any impacts. Never put your helmet in a situation where it can be bumped or dropped. Never use solvents or chemical cleaners, stain removers, or paints on the shell. Never let the shell or liner be exposed to chemical fumes

(including gasoline!). And know that nature's sunlight (UV rays) will deteriorate the materials as well, so use your helmet bag for storage and protection. **See the owners manual for further instructions regarding the use of your helmet.**

## URBAN RANGE PERFORMANCE OFF ROAD HI-TEC

SK1 SK4 S300Air S650 S800 MX200 MXR RSF2/Pro RSI RSX RSR2



# THIS SYMBOL REPRESENTS SHARK'S SAFETY COMMITMENT



Through extensive research and development, **Shark helmets** integrate new **safety technology** into all Shark helmets.

We encourage you to understand helmet safety technology and evaluate and choose your motorcycle helmet from an informed perspective.  
**Safety is the first priority at Shark.**

**[www.shark-helmets.com](http://www.shark-helmets.com)**