

# SHOEI PRODUCTION & QUALITY ASSURANCE

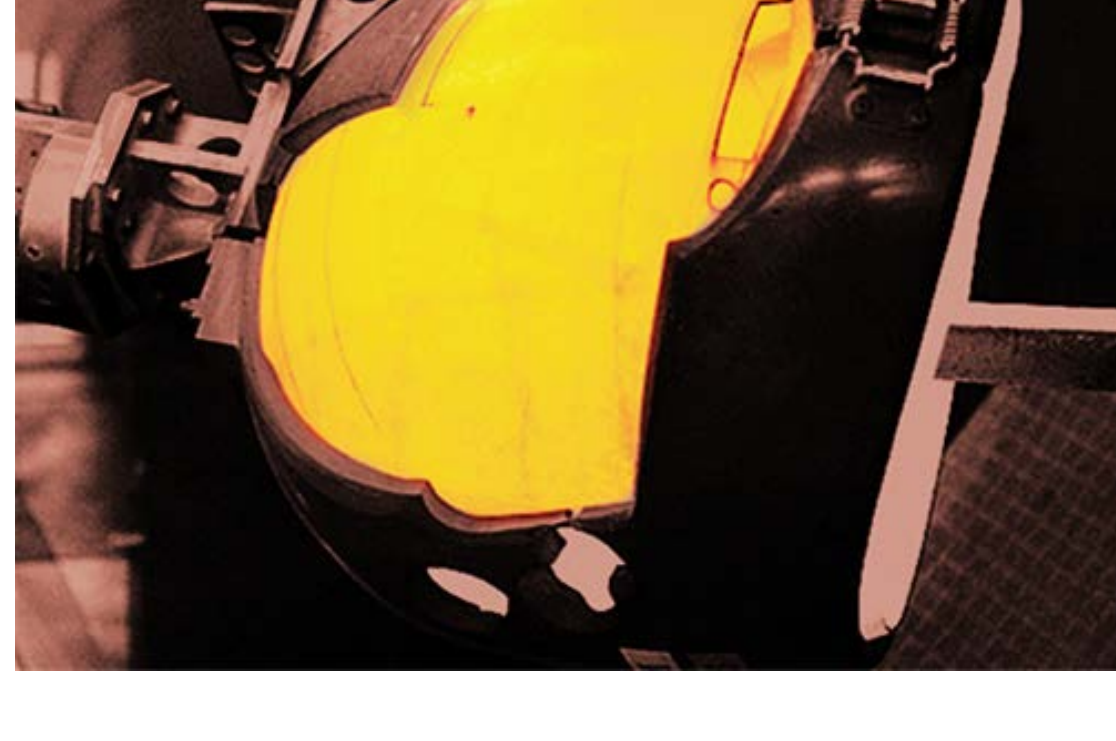
QUALITY MADE IN JAPAN. The name SHOEI has long been synonymous with "premium" in the motorcycle helmet market—a credential that hundreds of loyal men and women in our Japanese factories wear with great pride. The evolution and production of our world-class helmet line is a meticulous process that combines the very latest in technology with consumer feedback, modern testing practices, advanced materials, and nearly 60 years of helmet building experience. Just like the very first SHOEI helmet built by our founder back in 1959, every SHOEI today is still handmade in Japan utilizing a sophisticated process that involves over 50 people for each and every helmet.



## SHELL MOLDING

SHOEI's proprietary AIM (Advanced Integrated Matrix) and AIM+ shell molding technology integrates a multi-ply matrix of hand-laid interwoven layers of fiberglass with organic fibers and resin.

Together, these materials combine to maximize strength and elasticity in a strong yet lightweight shell, and each is personally marked by the technician responsible for it to further endorse the quality of every helmet.



## LASER CUTTING

Robotically controlled lasers give each helmet its final shape by cutting off protrusions created during the shell molding process, as well as creating the openings for eye and ventilation ports. Once this process is complete, all helmets are thoroughly inspected to ensure proper material thickness and weight before moving on to the next phase of manufacturing.



## PAINTING & GRAPHICS APPLICATION

SHOEI's intricate painting and graphics application procedures are second to none. Combining handwork with state-of-the-art automation processes to ensure optimal quality, each helmet boasts a premium painted finish and hand-applied decals before being sealed and protected with several quality layers of clearcoat. Each and every SHOEI helmet receives up to five layers of paint before final assembly.



## FIT & COMFORT

SHOEI knows that one size does not fit all, which is why we offer an industry-leading number of shell sizes, as well as various liner sizes and cheek pad thicknesses to ensure a customizable fit for each and every rider. Along with extensive research on head shapes and sizes, SHOEI incorporates a mix of exclusive comfort and performance features into the construction of every helmet.

Groundbreaking components like our 3D Max-Dry Interior Systems, 3D-shaped center pads to match the contours of a rider's head, fully removable, washable and replaceable liner systems, multi-layer cheek pads, eyeglass channels, and integrated neck pads accentuate the impeccable comfort packages exclusive only to SHOEI helmets.



## FINAL ASSEMBLY

A critical step in the manufacturing process, final helmet assembly is done with care and precision, including the installation of ventilation sliders, shield seals, impact absorbing EPS liners, and comfort interiors. Each helmet passes a detailed final inspection before being passed on to the consumer. This strict compliance with the production processes and associated quality control standards guarantee the consistently high quality of a SHOEI helmet.

## CRAFTSMANSHIP MAKES THE DIFFERENCE

Craftsmanship plays a significant role in the manufacturing of every SHOEI helmet, and that's made especially clear during the painting process.

### PRIMING

1. After the helmet has been taken from the mold and all protruding parts and openings have been removed by laser, the helmet is given its first priming. Next, each helmet is cleaned, sanded and polished by hand and machine, producing a flawless surface for the subsequent painting operations. Working on the various helmet shells with their own peculiarities requires a high degree of experience and expertise.



### CHECKING THE PRIMING

2. The helmet priming is carefully checked by multiple technicians for any small blemishes and then passed on for further painting - but only if the surface is absolutely perfect.



### PAINTING

3. The quality of a painting operation depends on the quality of its individual painters. It is virtually impossible to apply a high-quality coat of paint by machine, even with the very latest technology and polyurethane paints. For that reason, only specially qualified technicians are used in this process.



### CHECKING THE PAINTING

4. The paintwork is subjected to close inspection for drips, inclusions, and unevenness before a helmet shell proceeds in the production process.



### APPLYING THE DESIGN

5. Elaborate, extremely detailed and spectacular graphics are part of the brand image of a SHOEI helmet. In a very complicated work step, water decals are applied by hand by specially trained technicians to the finished painted helmet.



### PROTECTIVE CLEARCOAT

6. The last step in the painting process is the application of multiple coats of a high-quality clear varnish to the shell to protect the graphics and give the helmet its unmistakable SHOEI brilliance.



### THE FINAL APPLICATION

7. Before a painted helmet shell is passed on for final assembly, the finished paintwork is given one last meticulous inspection. Perfection, even in areas that are unnoticeable by the untrained eye, is a must.



## NO COMPROMISE, EVEN FOR INVISIBLE PARTS



## QUALITY CONTROL

For all the energy and passion invested into the design and development of a product, the same level of care and due diligence must be achieved during the production process. A number of unique, state-of-the-art processes combine to yield the unrivaled quality that only SHOEI helmets are known for, and each helmet must pass several rigorous inspections throughout production before being awarded with the famous SHOEI hexagon.

### QUALITY CONTROL IN THE DEVELOPMENT STAGE

The Snell and DOT safety standards play a major role during the development of a helmet. The helmet shell and the shock-absorbing EPS liner are continuously tested for hardness and elasticity and modified as required. This results in a helmet that meets or exceeds the strict standards that are applied, and still includes all the advantages of the original design.



### QUALITY CONTROL DURING PRODUCTION

Strict quality control guidelines at SHOEI are in place during all phases of production, from manufacturing of the outer shell to the point of final assembly. In addition, samples are regularly taken from



normal production and tested at SHOEI's own testing facilities. Every year, more than 3,000 helmets are tested to ensure safety, and destroyed in doing so. These test helmets make a major contribution to the overall safety of our products.



# SHOEI ACTIVE SAFETY



As opposed to “passive safety” that is ensured by compliance with Snell and DOT safety standards, “active safety” defines the further improvements made by SHOEI to ensure that maximum comfort is achieved, allowing the rider to devote all of his or her focus to riding. Advanced helmet features such as our anatomically-shaped comfort liner for optimum helmet fitment, lowest possible weight to reduce stress on the neck muscles, and effective ventilation system for temperature regulation and reduction in wind noises all serve to further improve the safety of the rider. Further development and continued improvement in the areas of safety and comfort technology are SHOEI’s primary goals.

## INTERIOR SYSTEM

### THE INTERACTION BETWEEN COMFORT AND PROPER FIT

The material and shape of SHOEI’s interior systems are critical factors for the overall wearing comfort and proper fit of the helmet. The wearing comfort covers the effect of the material properties on the skin of the rider. The fit defines how well the helmet sits on the head and stays in place, which is especially noticeable at high speeds. In the past, these two criteria often worked against one another. Very thick, soft padding provided good wearing comfort, but it did not hold well at high speeds, leading to helmet buffeting and instability. SHOEI’s multi-layer, multi-density liner components are utilized to find the perfect balance between comfort and helmet stabilization. Variable thickness cheek pads are available for custom fitting most helmet models.



### OPTIMIZATION OF LINER COVER MATERIALS

The development of new high-performance fabrics allows for greater sweat absorption and dissipation, yielding a proprietary sweat absorbing material that greatly improves rider comfort. These materials (first researched and developed in motocross and road racing where the amount of physical exertion and hence the production of sweat is extremely high) are now production features in the majority of SHOEI’s helmet models.



## LIGHTWEIGHT, HIGH-STRENGTH SHELLS

### IMPROVED SAFETY THROUGH LIGHTER HELMETS

Three factors are crucial for the weight of the helmet as perceived by the rider. The actual weight that is felt by wearing the helmet, the felt weight, and the dynamic weight, which is produced by the wind resistance and inertia. The actual weight has a direct influence on the acceleration forces and directly stresses the neck muscles in the event of an accident.

The heaviest part of a helmet is the shell, which is of special importance when making a light overall helmet. Since the shell is also the part of the helmet that is the most stressed in the event of an impact, the requirements concerning the manufacturing of a lightweight helmet shell are correspondingly high. Through our extensive experience in the processing of fiber compound materials, SHOEI has succeeded in developing the extremely resistant, lightweight and elastic AIM and AIM+ helmet shells.



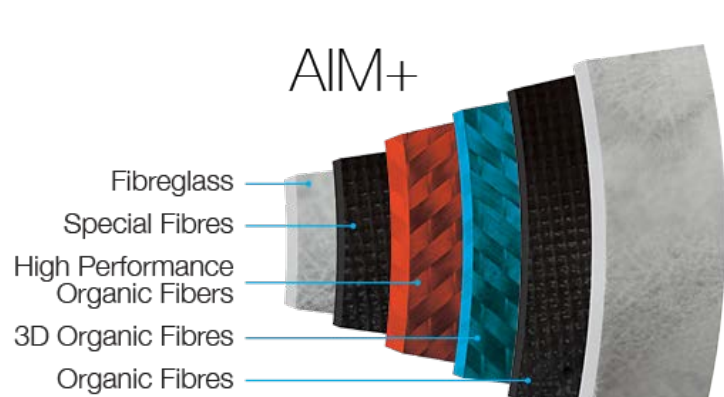
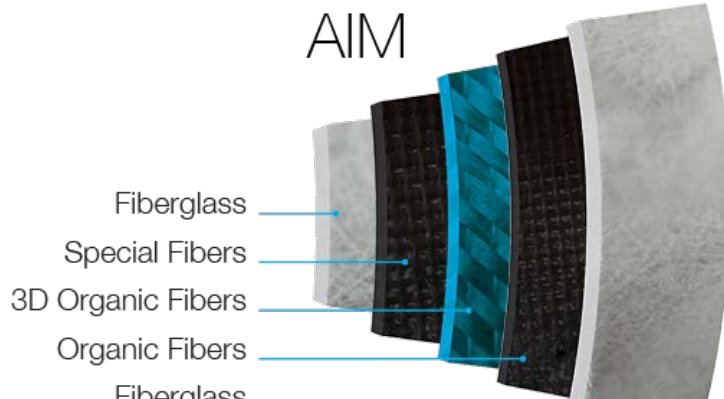
### SHOEI’S ADVANCED INTEGRATED MATRIX (AIM & AIM+)

#### AIM and AIM+ Shells Are Made Up of Three Main Features:

1. Fiber-Reinforced Matrix: An outer shell that is made primarily of fiberglass (FRP) is given its shape by a heat-setting plastic resin. The SHOEI helmet shell owes its ideal function to the integration of organic fibers, as well as a three-dimensional shaping process in a layered structure. The result is an outer shell with high strength, but very low weight as compared to shells that are produced in a conventional way.

2. The Compound Structure: The AIM and AIM+ shells consist of various layers of reinforcing organic fibers and glass fibers. Compared to an outer shell that is made only of glass fibers, the AIM and AIM+ outer shells are both lighter and more elastic, yet have the same strength and are more resistant to penetration due to the additional use of special fibers.

3. The Synthetic Resin: A specially modified, unsaturated polyester resin (a so-called heat-setting plastic) is used for the AIM and AIM+ outer shells. This resin acquires the desired strength and elasticity during the heat hardening process. This synthetic resin is also extremely resistant to corrosion. With these constituent parts, we produce outer shells that convincingly produce ideal dampening of impacts, good elasticity, lightweight, and enormously high strength and resistance to penetration.



### THE ADVANTAGE OF THE AIM AND AIM+ OUTER SHELLS

In addition to their significant weight advantages, the AIM and AIM+ outer shells from SHOEI offer the best possible impact protection, as well. Through the interaction of the strength and the elasticity of the various materials, the AIM and AIM+ shells have been designed in such a way that the effect of an impact is absorbed and distributed over the largest possible area so that it may be more easily absorbed by the EPS liner. Thus, the shell and the EPS liner may show damage from deformation after an impact, but the head of the rider is given the maximum amount of protection as a result. Heavy, hard helmet shells do not have this ability and direct the energy from an impact without any reduction into the inside of the helmet. In many cases, the shell may be undamaged, but head injuries are much more likely.



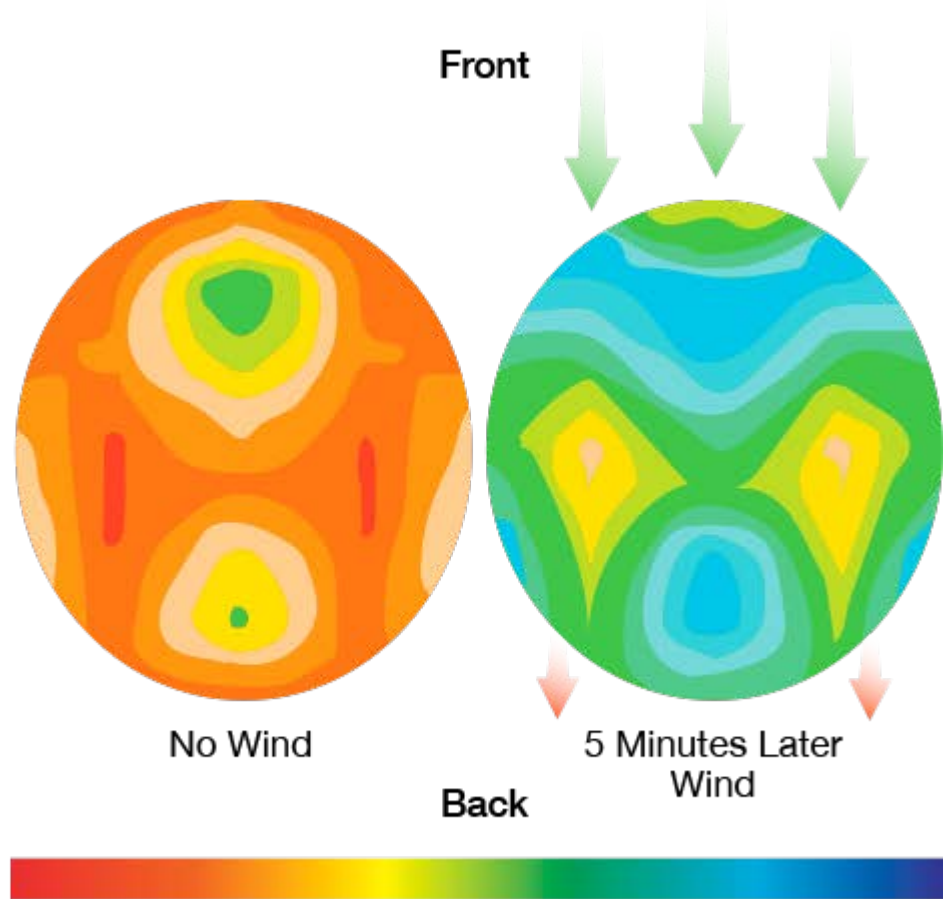
## AERODYNAMICS PERFORMANCE

The stress applied to the neck muscles when riding a motorcycle comes not only from the weight of the helmet itself, but also from wind resistance. For that reason, improving the aerodynamics of a helmet is an extremely important factor in preventing the onset of fatigue. SHOEI’s expert product development team regularly perform tests in our state-of-the-art wind tunnel throughout the entire development process of each and every helmet model to improve shell design and optimize aerodynamic properties.



## VENTILATION

Back in the early 1980s, SHOEI developed a ventilation system that passed air through holes in the helmet shell without sacrificing high-speed stability. The idea that good ventilation is crucial for the safety of a helmet caused a fundamental change in the design of motorcycle helmets. With the importance of safety concepts and the spirit of innovation always front of mind at SHOEI, we invested in a state-of-the-art wind tunnel at our Ibaraki factory to continually carry out intensive studies in the development of effective, high-performance ventilation systems. In the process, SHOEI has developed a dual-layer EPS liner that allows cooling air to travel unrestricted through tunnels created between layers, further enhancing the optimum exchange of warm, humid air with incoming cold, fresh air. Utilizing SHOEI’s in-house wind tunnel to progress ventilation performance, SHOEI is constantly improving the optimal balance between airflow and silence.



## NOISE REDUCTION

Noise imposes unnecessary stress on the rider and can disturb his or her concentration. There are two ways to reduce noise in the helmet. Wind noise can be reduced by optimizing the aerodynamics. Additionally, the acoustic damping properties of the helmet can be optimized through careful design of the helmet shell and the interior padding. The decisive factor for a comfortable and quiet helmet is the balanced utilization of these two approaches. Utilizing a thicker helmet shell, eliminating ventilation, or using padding that is too tight may reduce the amount of noise experienced, but this is achieved at the expense of safety and comfort. This is not an option for SHOEI. Optimizing shell aerodynamics and liner components allow SHOEI to prevent unwanted road and wind noises without blocking the road’s “informative sounds”.



## THE SHOEI SHIELD SYSTEM



SHOEI shields protect the rider against wind, dirt, insects and 99% of the sun’s damaging UV rays. Additionally, SHOEI’s 3D injection-molding process ensures a distortion-free view throughout the entire field of vision. Furthermore, the coating on SHOEI shields resists scratches and allows water to bead off the surface more easily. Coupled with SHOEI’s innovative quick release, self-adjusting base plate systems found on most full-face models, shield changes are made quicker and easier than ever before. Once a shield is installed, the strengthened spring-loaded base plates pull the shield back against the window beading to ensure a wind and waterproof seal with each and every closure. The smooth surface of a SHOEI shield base plate system eliminates the irritating shield cover that some of our competitors utilize, which helps prevent unnecessary wind noise.



### TECHNOLOGY

#### SHOEI Ventilation:

Ventilation is more effective if the air has a way out. That is why SHOEI helmets do not only have effective intakes, but also devices through which hot air can leave the helmet. In the case of our top models, these are the Aero-Vortex-Ventilations. With their characteristic V-shape, they create negative pressure making use of the riding windstream. Warm air from the rider’s head is actively drawn out of the helmet.

#### The Hyper Dual Liner Ventilation:

On our top range helmets, the shock absorbing liner is made of two parts. Between them, there is a system of ventilation channels which can very effectively carry fresh air to the rider’s head, and vent out warm humid air.

#### The Sightlotion System:

All SHOEI full face helmets use a sophisticated ventilation intake below the shield window, which serves a double function: It supplies fresh breathing air to the rider, but also steers an airflow along the inside of the shield. This helps to keep the shields dry and clear of fog.

#### Advanced Interior Padding:

SHOEI helmets are comfortable, even at extreme speeds: This means that the padding must fit snugly around your head, without ever feeling unpleasant. At the same time, the bottom of our interiors have no rims and no overlapping parts. This prevents turbulence and noise. For our top class models, we took perfection one step further and designed the entire interior to be detachable. You can replace it in seconds, and you can choose between 7 different cheek pad sizes - what you get is a tailor-fit helmet, taking comfort to the maximum!



# INSIDE A SHOEI HELMET



## 1. HELMET SHELL

Few characteristics of a motorcycle helmet are as critical as its first-layer defense. A helmet's shell absorbs the impact energy in the event of a fall, and distributes that energy over the largest possible area. Combining hand-laid interwoven layers of fiberglass with organic fibers and resin, SHOEI's proprietary Multi-Ply Matrix AIM & AIM+ shells are not only incredibly strong, they are lightweight, elastic, and come in an industry-leading number of shell sizes to ensure a custom fit for all heads sizes.



## 2. VENTILATION

SHOEI's ventilation systems directs cooling, drying air into the helmet, and use areas of low air pressure to the rear of the helmet to draw warm, damp air through the exhaust outlets and into the outside environment. A high priority feature/function during the R&D and testing phases of new helmet development, SHOEI utilizes its state-of-the-art wind tunnel to maximize ventilation performance. The perfect placement and shaping of the inlets and outlets, along with air channels created within the EPS liner, are the basis for optimum ventilation, and is part of what separates SHOEI from our competition.

## 3. SHIELD

SHOEI shields protect the rider against wind, dirt, insects and 99% of the sun's damaging UV rays. Additionally, SHOEI's 3D injection-molding process ensures a distortion-free view throughout the entire field of vision. All Shoei shields are tested to ensure compliance with the DOT and SNELL certification standards.



## 4. EPS LINER

The EPS liner of a helmet is designed to absorb the energies of an impact. SHOEI's innovative Dual-Layer, Multi-Density EPS liner systems not only provide enhanced impact absorption by utilizing varying densities of foam in key areas around the rider's head, they are designed to allow cooling air to travel unrestricted through tunnels created in the EPS, further enhancing our superior ventilation characteristics.

## 5. INTERIOR SYSTEM

SHOEI's interior systems are carefully thought out to provide maximum comfort and hold during all forms of riding. Most SHOEI helmets come equipped with fully or partially removable, washable, adjustable, and replaceable interior components, and are three-dimensionally shaped to match the contours of a rider's head for an extremely comfortable fit while maintaining the firm hold necessary for distraction-free, high-speed riding.



## 6. CHIN STRAP

The task of the chinstrap is to hold the helmet firmly on the head. This is done by using a chinstrap with proper tensile strength and extensibility. The chinstrap is firmly attached to the helmet shell with metal rivets.