

From the world's biggest manufacturer of  
**Formula One™ championship wheels**



**Washi Beam**



**The Wheel of Wheels®**

## We're ready to reveal our inside knowledge

Welcome to Washi Beam. 'Washi' is Japanese for 'Eagle', a symbol of our strength and agility.

Washi Beam sports and racing wheels are chosen by the world's finest Formula One racing cars and premium car brands because they deliver superior strength and durability at incredibly light weights.

Our technical knowledge and manufacturing expertise is the envy of the automotive industry worldwide and, after three decades, we are now ready to explain the secrets of our success to you.

Washi Beam wheels are created using our bespoke method of forging, through a series of tightly controlled and continually refined procedures. We call this process 'Super Forging'.

*"...driving experience transformed when fitted with Washi Beam Forged wheels!"*

From the report of Prof. Oguchi Laboratory, Shibaura Institute of Technology, Tokyo

### The importance of unsprung weight

The weight of the wheel at the end of the axle – or unsprung weight – has a huge influence on drivability and the 'feel' the driver gets through the vibrations transmitted from tyres and wheels.

Roads are never perfectly flat, and increasing speed brings greater vibration. A car's suspension has to work much harder to absorb this vibration if the unsprung weight is heavy.

Experienced chassis engineers understand the benefits of our aluminium alloy forged wheels even though they are several times more expensive than aluminium cast wheels.

It is well understood that saving 1kg of unsprung weight corresponds to approximately 15kg reduction of the entire car weight for drivability.

For example, one of our forged aluminium 18" wheels weighs 25-30% less than a cast aluminium wheel of the same size and design. Typically, this means 3-4kg of weight saved per wheel, which equates to an effective weight reduction of around 200kg per car.

To help understand this, imagine if you add a 1lb weight to each foot. Although you notice it, you can still run. However, if you now add 1.5kg to each foot, you can hardly run at all.

In the past few years we have invested over \$110 million to produce just 15,000 **Washi Beam Super Forged wheels** a month. (This investment could have enabled us to produce 1.5 million aluminium cast wheels a month, by contrast). This low volume, high specification approach enables us to tailor our wheels to your precise needs, without any compromise.



We make more F1 wheels than any other manufacturer

## Washi Beam – The biggest wheel manufacturer for Formula One teams

We began forging aluminium road wheels in 1984 and magnesium racing wheels in 1992 at our factory in Takaoka, Japan.

Our Super Forging process combines light weight, strength, durability, stiffness and safety for the demands of Formula One racing, the most extreme and demanding driving environment.

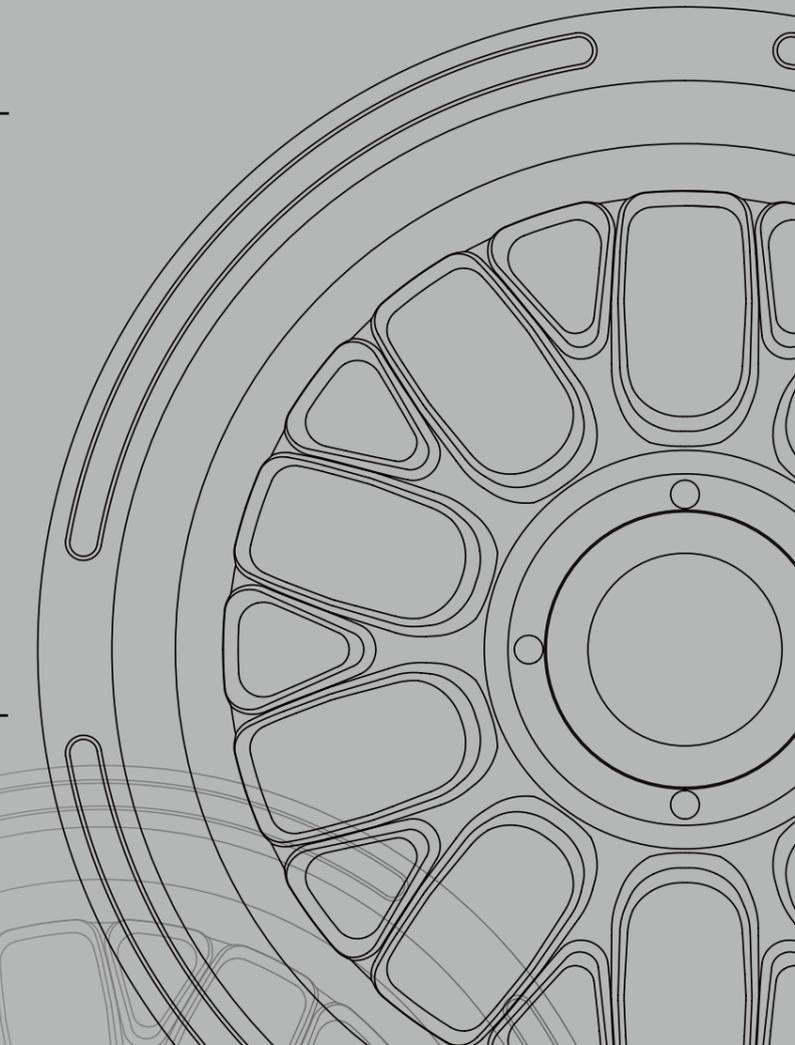
We have forged more than 24,000 wheels for F1 Championship racing teams in our Takaoka factory, and Ferrari have exclusively raced on wheels manufactured by Washi Beam since 1992.

We are proud that we have never had a single failure in all of this time and are trusted to be the best by the greatest F1 teams in the world, including 2009 world champions Jenson Button and Brawn.

If you magnify a wheel section 100 times, you'll see the superior density and inner strength of **Washi Beam Super Forged wheels** compared to other premium racing and sports wheels.

This is why **Washi Beam Super Forged wheels** won the following F1 Driver and Constructor Championships:

Year	Driver	Constructor
1994	M. Schumacher	
1995	M. Schumacher	Benetton
1999	M. Hakkinen	Ferrari
2000	M. Schumacher	Ferrari
2001	M. Schumacher	Ferrari
2002	M. Schumacher	Ferrari
2003	M. Schumacher	Ferrari
2004	M. Schumacher	Ferrari
2007	K. Raikkonen	Ferrari
2008		Ferrari
2009	J. Button	Brawn



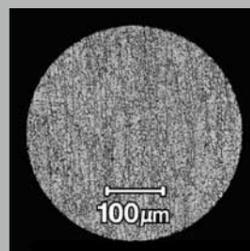
## Super Forging produces the world's best wheels

Super Forging is essential when producing wheels that are to operate under high continual stresses, as it regulates the flow and location of grains within the metal, leading to outstanding wheel strength and resistance to fatigue.

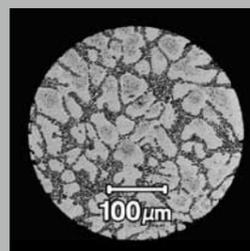
Yet the market is saturated by inferior quality wheels. Over 90% of aftermarket sports wheels are cast, using a process where aluminium alloy is melted and poured into moulds.

Developed through motorsport at the highest levels, the Washi Beam Super Forge philosophy is to place the highest priorities on engineering excellence and continual process improvement.

Our master craftsmen maintain the highest production standards in the world and aluminium **Washi Beam Super Forged wheels** are approximately 25% lighter in weight than original equipment cast aluminium wheels.



**Die forged wheel cross section**  
The internal structure of a Washi Beam die forged wheel shows the regular flow and formation of metal grains within the wheel



**Cast wheel cross section**  
The metal grains within a cast wheel or a 'plate forged' wheel are clearly uneven, with a rougher texture



The starting point is a billet of highest grade aluminium



After third stage forging, the wheel is ready for machining



Our 9,000 tonne hydraulic forging press



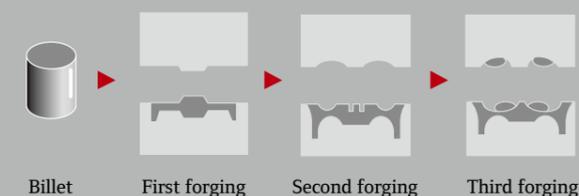
Close-up of forging press

## The Super Forging process

Our Super Forging process involves multiple sets of forging to produce a stronger and more durable structure than conventionally achievable.

We only use the finest raw materials and the aluminium we select is the highest quality aircraft grade. It is more difficult to forge, yet delivers the very best mechanical properties.

### An example of the Washi Beam Super Forging process



Washi Beam have developed a safe and consistent way to forge with pressures of more than 4 tonnes per square centimetre – approximately 57,000lbs per square inch.

We apply these extreme pressures through several controlled phases in order to ensure that we optimise the material flow, and produce the desired characteristics. Typically, wheels undergo a minimum of three separate forging stages before the final form is achieved.

Our manufacturing capability also allows us to produce wheels which are first forged and then CNC milled to create the styling face. This approach enables us to produce relatively low quantities and also minimises the tooling investment that is required.

All of our rims are created via a patented spinning process. This allows us to easily vary the rim width of each wheel. As a result, our rims are also extremely strong yet lightweight.

### Every Washi Beam wheel is hand finished

After forging and machining, every wheel passes through our hand finishing department. Our highly skilled craftsmen and women check every facet of every wheel by hand to ensure that it has a perfect surface before painting.



CNC controlled milling process



Wheel undergoing hand finishing

## The only manufacturer of The Wheel of Wheels®

Now you have seen our achievement in motorsport and understand our advanced technologies, you can see why **Washi Beam Super Forged wheels** are widely recognised as the best in the world.

We are proud to supply **Original Equipment** to:

- **Aston Martin**
- **Bentley**
- **Bugatti**
- **Ferrari**
- **Ford**
- **Honda**
- **Lexus**
- **Mazda**
- **Mitsubishi**
- **Nissan**
- **Porsche**
- **Subaru**
- **Toyota**

We are accredited to the highest international quality standards of TS16949 and ISO14001.

We would be pleased to talk to you about every aspect of manufacturing your premium car brand wheels. It's the only way to guarantee that your customers are driving on the best wheels that can be made anywhere in the world.

There is no other company like Washi Beam, because of our uniquely developed manufacturing methods and strictest quality controls, so come to us first and you know you will be working with the very best.

## COMPANY PROFILE

Name	Washi Beam Co. Ltd.
Ownership	Ono Group (self capitalised total of 37.2 billion Japan Yen)
Established	July 29, 1971
Capital	JPY 1,001 million (self capital JPY 10,780 million)
Headquarters	3-1, Hoei 4-Chome, Fukui-City, Fukui 910-0004, Japan Tel: +81 (0)776 248500 Fax: +81 (0)776 263333
Main Factory	525 Fukuta-Rokke, Takaoka-City, Toyama 933-0313, Japan Tel: +81 (0)766 310021 Fax: +81 (0)766 311403
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