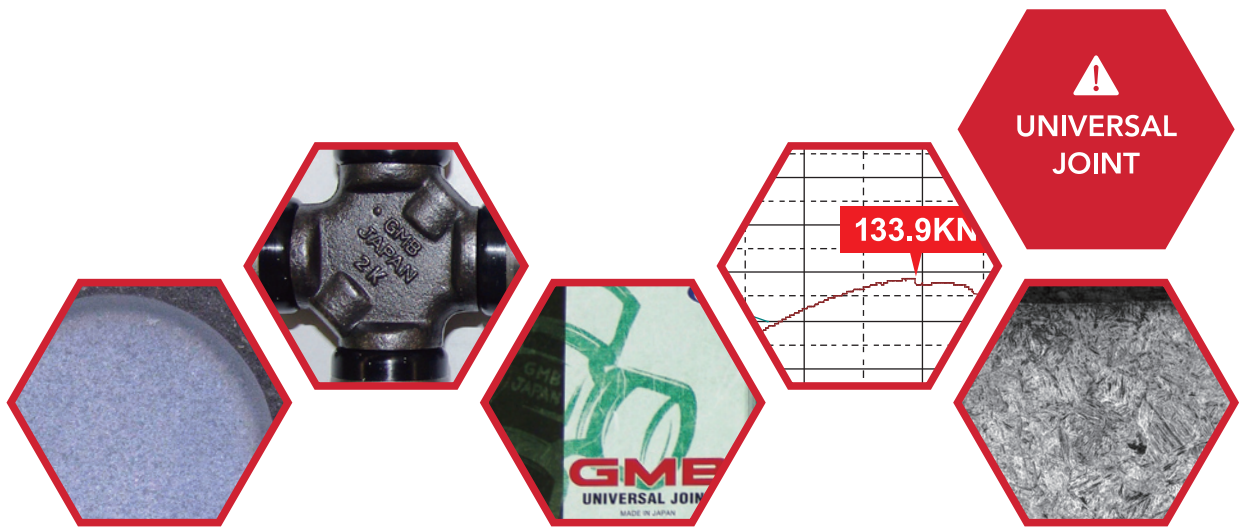


GMB

T E C H N I C A L R E P O R T

COUNTERFEIT PRODUCT

Universal Joint



Counterfeit Product**A CERTAIN QUALITY THE WORLD HAS RECOGNIZED. BRAND GMB.**

GMB is expanding the brand with our motto of high quality and strong support and the great cooperation of our customers.

However, counterfeit product is increasing in the market hand in hand with expanding the brand and they are violating the GMB brand, which we built with our customers.

We have carried out an in-depth quality investigation into these counterfeit products.

GMB investigated all aspects from appearance shape, breaking strength, processing to metallurgical condition in great detail and the results have clearly indicated the quality and strength of the counterfeit products were extremely low, putting users in danger.

We disclose the investigation analysis findings in this report and please review the contents. We really would like you to cooperate with the destruction of any counterfeit product since these obstruct sales of genuine product and put users in danger.

GMB CORPORATION

Counterfeit Package investigation

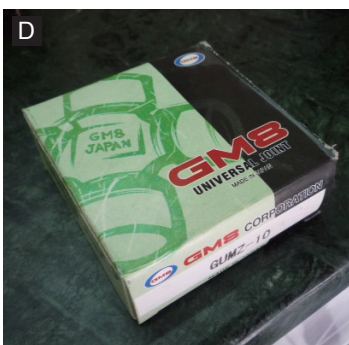
Trademark imitation and trademark similar package

There are two kinds of the packages of counterfeit product within the larger group. One is "trademark imitation package", which reproduces a trademark of GMB illegally and is used without permission. Another is "trademark resemblance package", which transforms a trademark of GMB without permission for use. Above all, the trademark imitation package reproducing a trademark illegally is particularly serious, and it is difficult to distinguish such logo and pattern by the appearance.

Note the comparison between GMB package and imitation packages which have duplicated the trademark and pattern illegally and used without permission



- There are differences noticeable in the trademark imitation package such as color, inside print or existence or nonexistence of "JAPAN" letter.



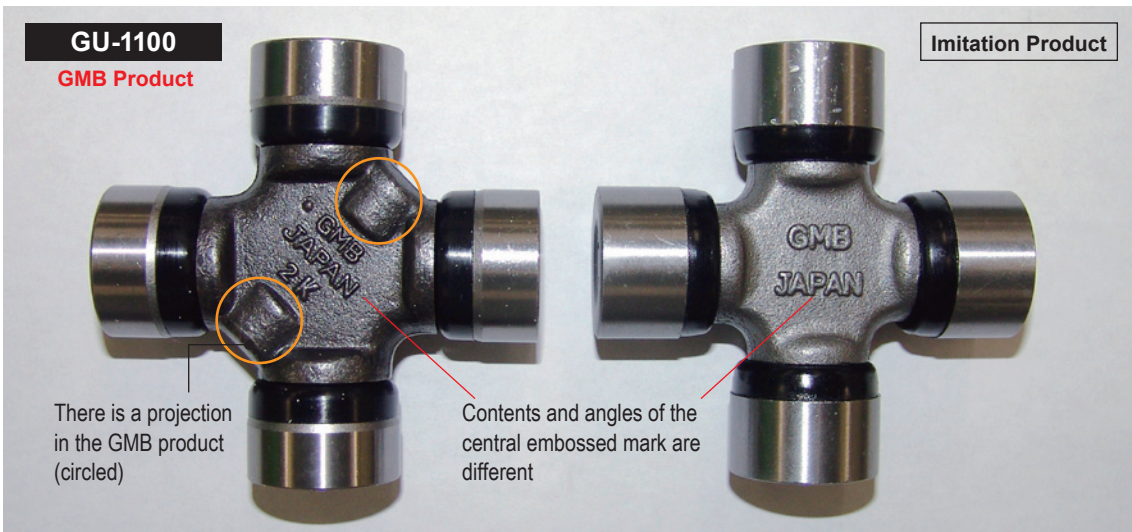
Note the examples of the trademark similar package which have changed the character string of the trademark of GMB and transformed **A B C D**

- A letter in the logo mark and the letter of the pattern center change into equivalence, too.
- In example **C** the country of origin was written as MADE IN CHINA.
- In example **B** there is a WEB site address printed that does not exist.

Investigation of appearance of counterfeit product

Appearance comparison between GMB product and imitation product

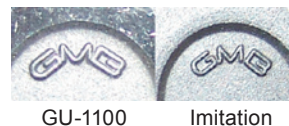
As for the imitation product, not only the package but also the product itself is similar and the shape is imitated precisely. This time, we compare the appearance shape with the imitation product thought to be the article equal to our product **GU-1100**.



Appearance comparison from the other angle

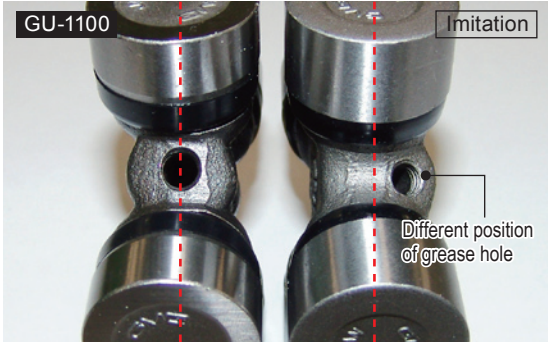
A B C

- The shape and the external form dimensions are very similar in appearance.
- An embossed marking is processed into bearing cases like the GMB product, but form and the size of the letters are delicately different. **C**



Product treatment comparison between GMB and imitation product

Various differences are seen in GMB and imitation product in the product treatment processing. Essential processing is not considered important to the imitation product. The precision is low and quality is uneven. Therefore, imitation products have problems such as loose fitting bearings (easy to fall out) or rotational roughness of bearings. Because of low quality processing imitation product are likely to seize under use resulting in the defective units shown in pictures.



Grease Hole

- Grease hole of GMB product is placed in the center of the side body, but the imitation product has slipped from the centerline.



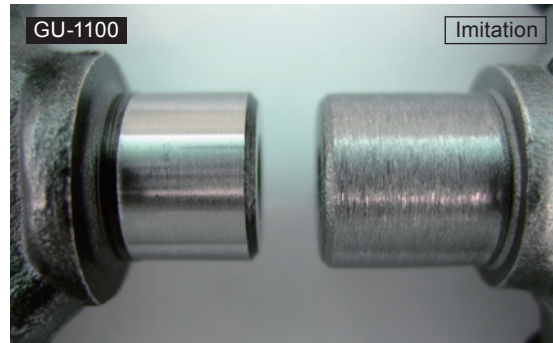
Bearing Case

- The imitation product has no chamfering and grinding processing of the bearings.



Cross

- Imitation product does not use grinding process on the trunnion end face.



Trunnion

- The finish of the trunnion on the imitation product is extremely rough so the rotation of the bearing is not smooth.

⚠ Where the correct processing on the imitation product has not been made, there is the risk of overheating the bearings leading to collapse.



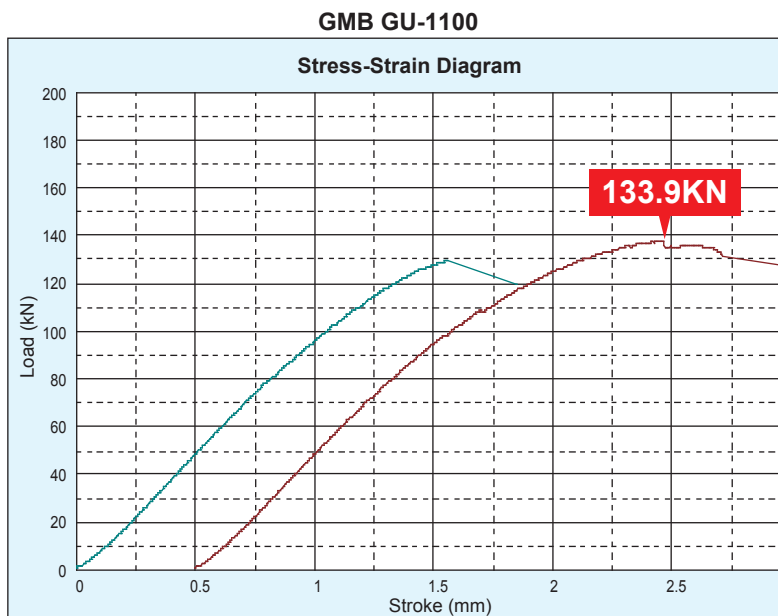
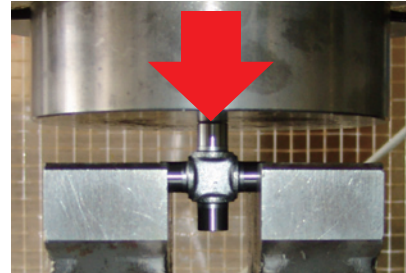
Investigation of strength in counterfeit product

Rupture strength comparison between GMB product and imitation product

We performed the competitive examination of the breaking strength with GMB GU-1100 and imitation product for investigating the strength of the main body.

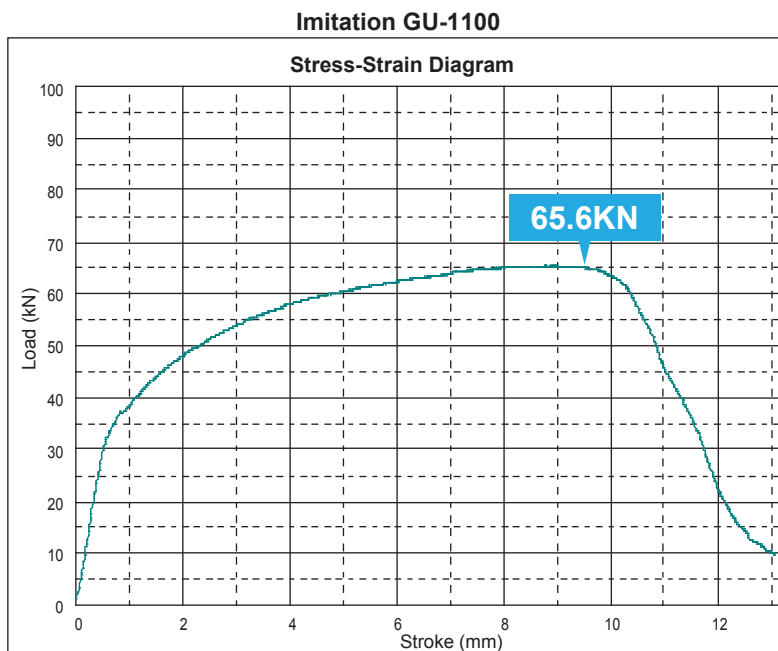
[Test method]

1. Fix the cross of the universal joint as per right picture.
2. Add load from the top and measure maximum load until the cross is destroyed.



The left-hand figure is data expressing the result of the breaking strength examination of GMB GU-1100.

You can see that load of 133.9kN is necessary before destruction happens in the case of GMB GU-1100.



On the other hand, the breaking strength of the imitation GU-1100 was remarkably low and has been easily destroyed by load of 65.6kN less than half of GMB GU-1100.



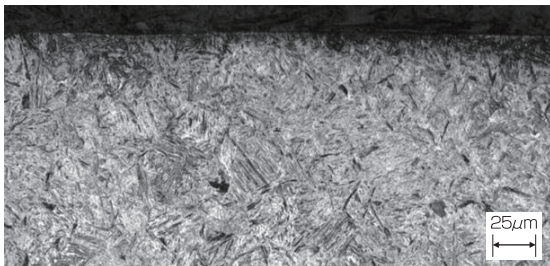
Picture of Imitation GU-1100, which was transformed and destroyed by only 65.6kN.

Metallurgical structure investigation into counterfeit product

Metallurgical structure comparison between GMB product and imitation product

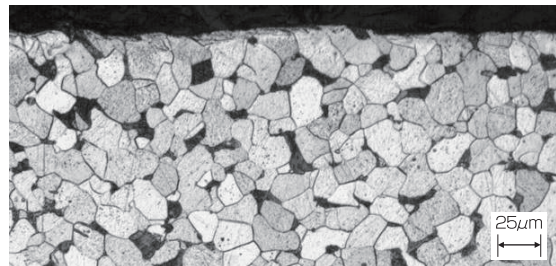
It was revealed that the strength of the imitation product was remarkably low in the the breaking strength test result. Furthermore, we found that heat-treatment, which is an important process to greatly affect product life and strength, was not applied to the imitation product when the metallurgical structure of the main spider body was investigated in detail.

GU-1100



Metallurgical structure of heat-treated GMB GU-1100

Imitation Product

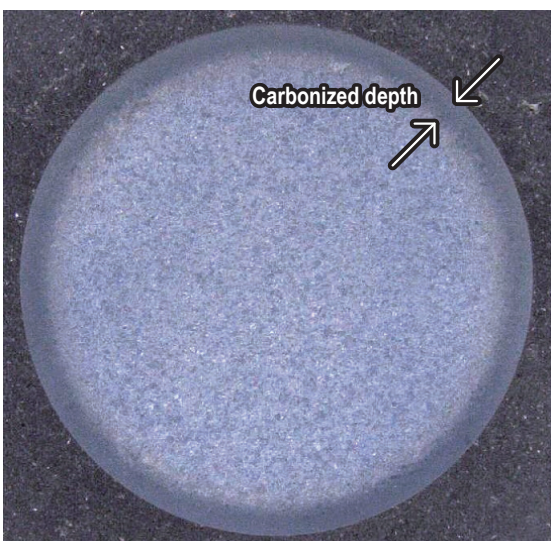


Metallurgical structure of the imitation product that is not heat-treated

Generally, in the trunnion of the cross, a heat-treatment process is applied for the purpose of abrasion resistance, strength and life improvement. The ideal design is to have a hard surface area with the core becoming softer at greater depth to give hard wearing surface but with a tough, flexible core. You can see that heat-treatment is applied with the section photograph of GMB GU-1100 from the following comparison section pictures between GMB and imitation product. The darker section at outside edge of the circle is called carburizing and works from the surface over the inside letting carbon soak by heat-treatment and caseharden intentionally. On the other hand, the imitation product does not have the heat-treated trace, and metallurgical structure is constant from the surface to the inside.

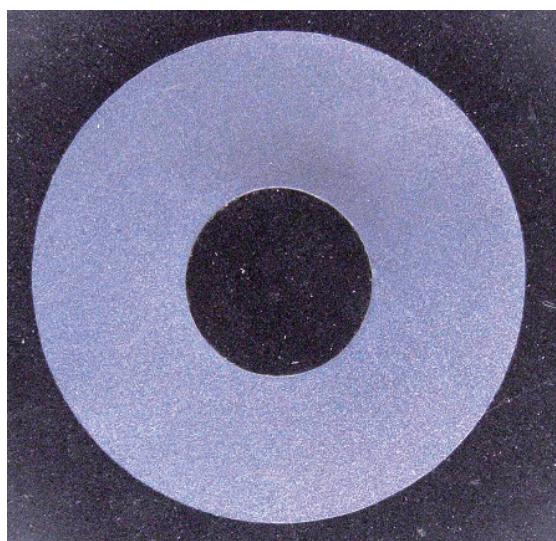
Comparison of the section picture of the cross trunnion

GU-1100



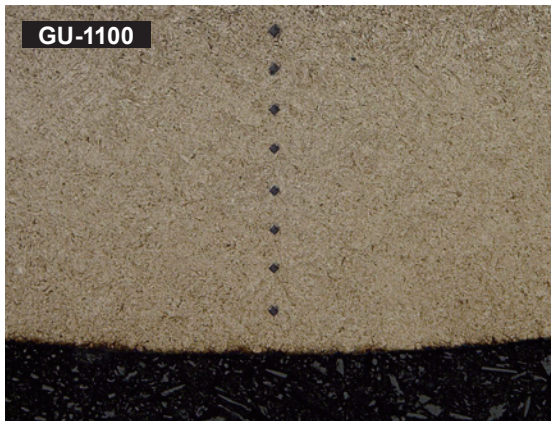
GMB GU-1100 is properly carburized from surface and casehardened by heat-treatment.

Imitation Product



The imitation product is not heat-treated and casehardened because metallurgical structure is homogeneous.

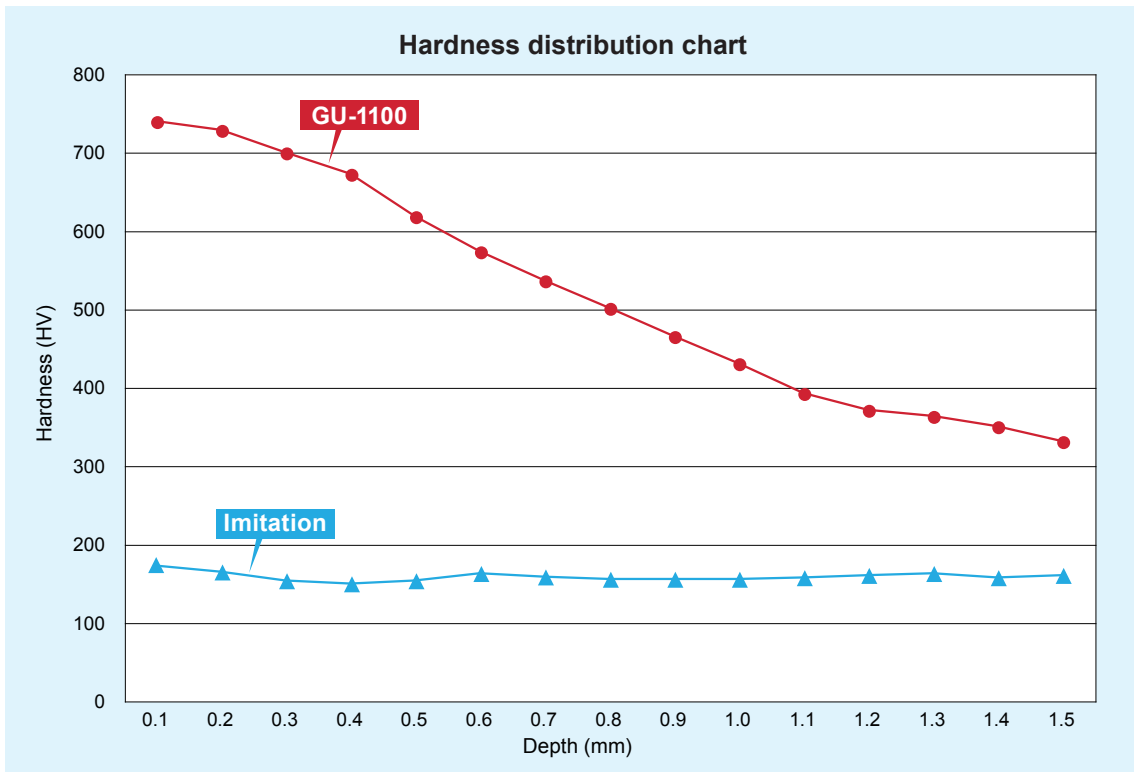
Vickers hardness comparison between GMB product and counterfeit product



Enlarge carburizing part to 200 times

Generally, metal is very fragile and easy to break under high power loading when there is a high hardness homogeneity from the surface to the inside. Conversely, metal transforms easily under high power loads in the case of low hardness homogeneity. The following graph is the data which measured the hardness of the metallurgical structure of the cross trunnion.

In genuine GMB GU-1100, we can see that the hardness is high around the surface and lower to the inside.



Heat-treatment was not applied to the imitation product that we investigated this time and has easily transformed at a load less than half of GMB GU-1100 in the breaking strength examination due to the extremely low hardness as confirmed from the hardness distribution chart.

We can say that the abrasion resistance property is virtually nil with such low hardness.



Imitation GU-1100, which was transformed and destroyed.

Investigation results of counterfeit product

Investigation results and measures for imitation product

Regarding imitation products, we investigated in detail from appearance shape, processing, rupture strength, metallurgical structure to hardness. Even if seemingly the appearance and shape are similar, there is a total difference between GMB and imitation product. Our test data and measurement data prove the quality and precision of imitation products are extremely low, with strength also half that of the GMB product.

Investigation results of counterfeit product



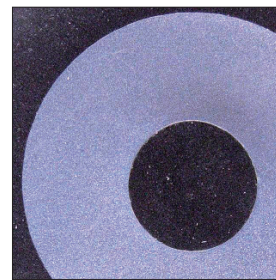
Instances of the transforming the trademark and reproduction trademark illegally



Instances of high-risk due to precision and processing being extremely low.



Instances of transforming / collapsing easily because breaking strength is extremely low



Instances of the hardness being extremely low due to non heat-treatment.

Use of counterfeit products can be dangerous due to failures caused by seizures of bearings or collapse of journals through the poor quality processes. In addition, we would strongly recommend that you do not use counterfeit products because it might lead to accidents and harm to users.

GMB considers the security of the users of our product first and foremost and will make every effort to take counter measures with the goal of the destruction of imitation and similar products where quality is extremely low and accidents are high-risk. We strongly wish these counterfeit products are not easily available and ask for your co-operation to eliminate them throughout the world

