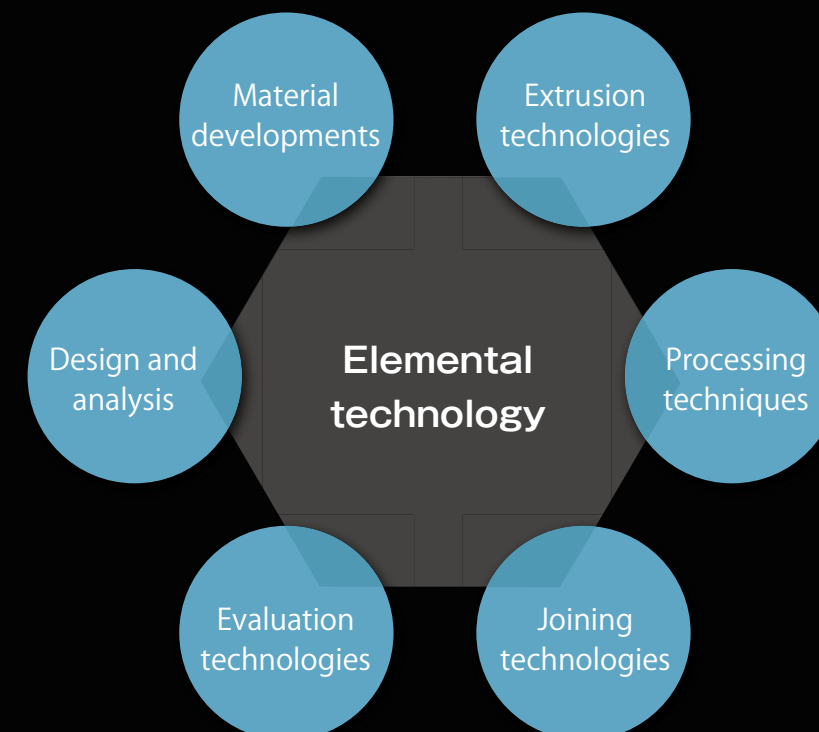
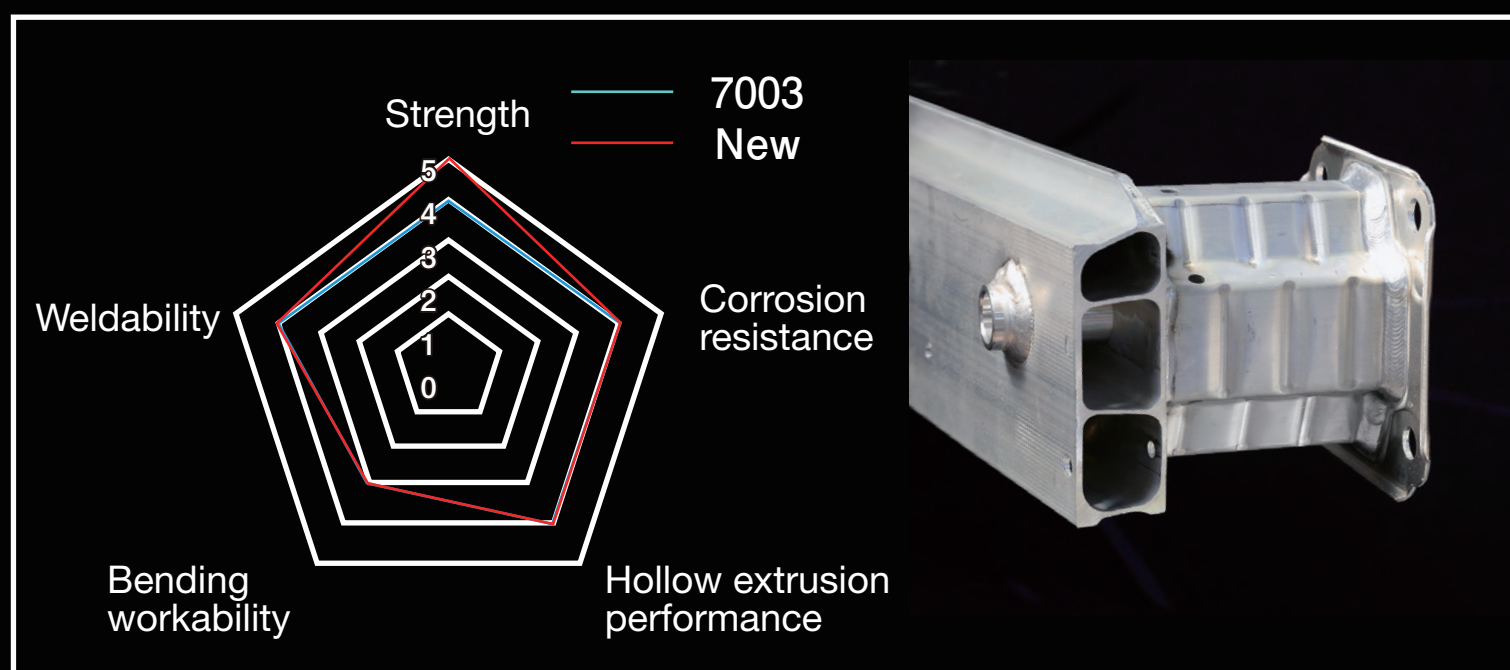


# Aluminum alloy bumper reinforcement

Satisfy the required performances with UACJ aluminum extruded shapes

Material properties required for bumper reinforcement



In order to meet the increasingly strict collision safety standards, the performance required for front bumpers is becoming very high. Reducing the weight of the components which are the furthest from the vehicle's center of gravity is effective not only for improving fuel efficiency but also for increasing maneuverability.

MAZDA took the measure of using 7000 series high-strength aluminum alloy extruded shapes newly developed by UACJ.

## Aluminum alloy bumper reinforcement

The bumper reinforcements using extruded shapes were made thicker where necessary and made to appropriate a cross-sectional shape where extra strength is not required, resulting in a drastic weight reduction. The MX-5 also secured weld properties so that components could be combined by welding, thereby increasing the level of their strength.

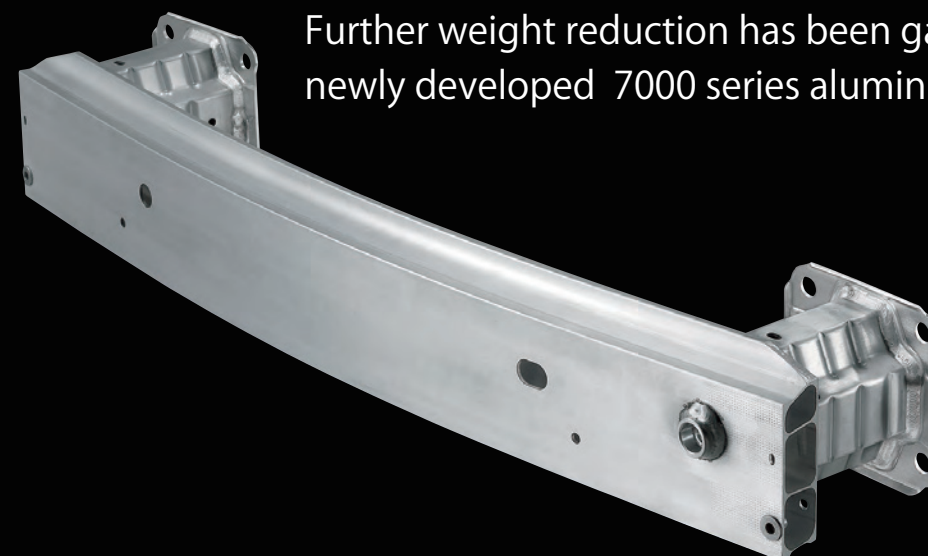
### ■ Mazda MX-5(NC) steel front bumper reinforcement: 5.8kg (crash boxes included )

The previous MX-5 models with a compact body used ultra-high tensile steel.



### ■ Mazda MX-5(ND)

Front bumper reinforcement: 4.2kg (crash boxes included )



Further weight reduction has been gained by using newly developed 7000 series aluminum alloy.

### ■ Mazda MX-5 (NB) steel front bumper reinforcement: 2.86kg (without crash boxes)

The 2nd MX-5 (NB) was a simple structure made of steel with a resin cover, but it met the collision safety standards of the day.

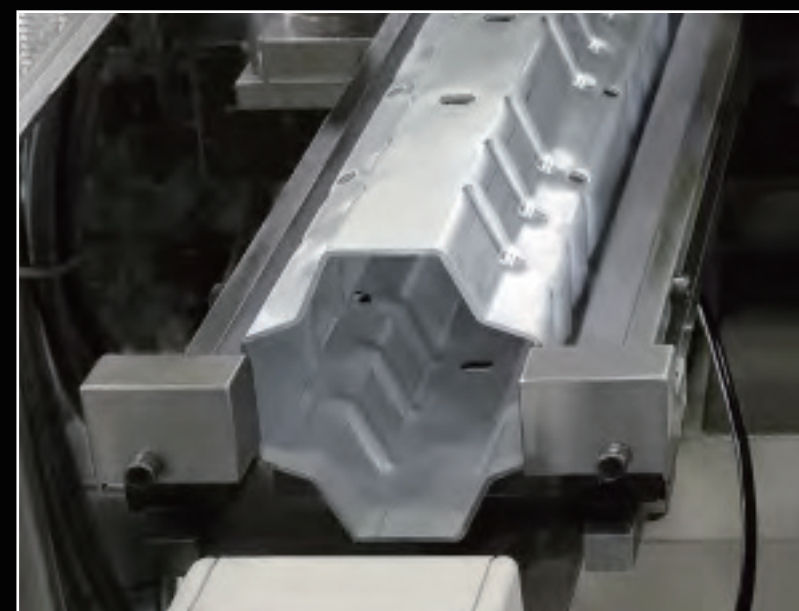


## Aluminum alloy bumper reinforcement

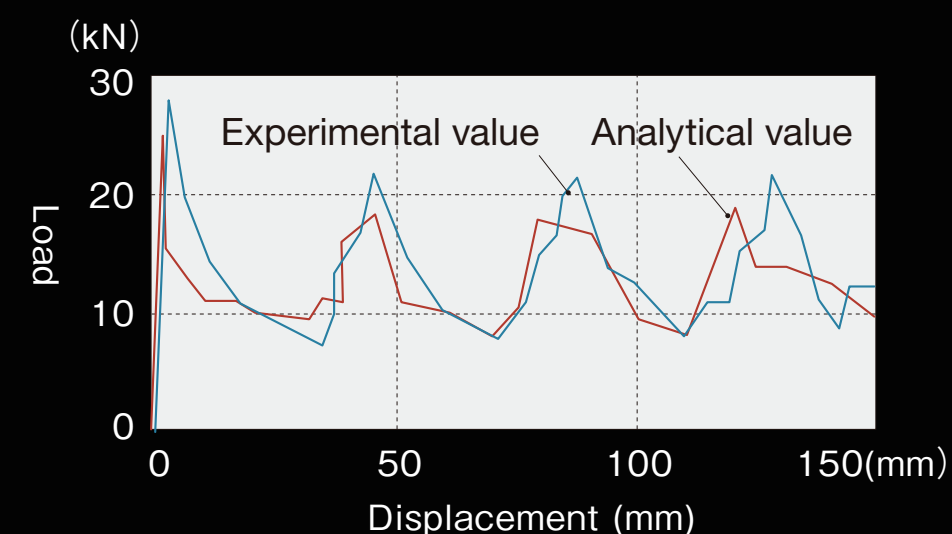
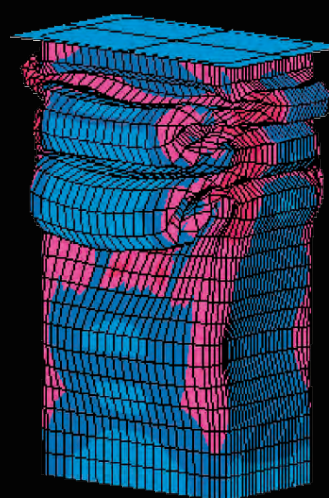
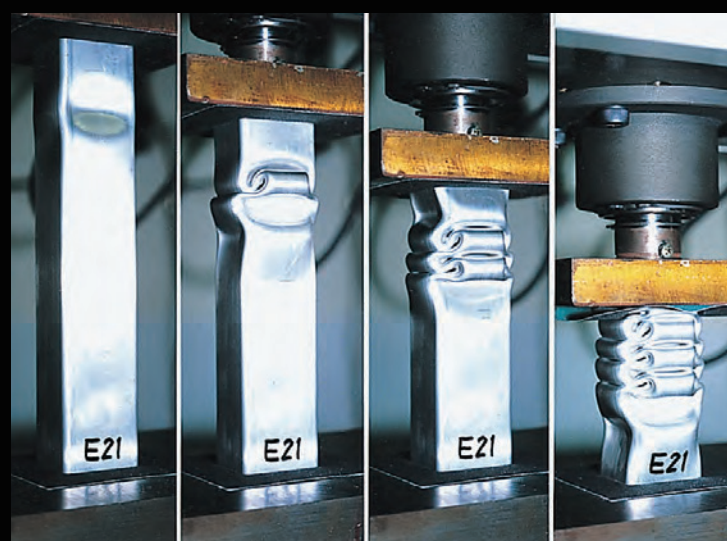
The crash box, a part made of aluminum alloy with a cruciform cross-section that is joined to the bumper itself, gets crushed like a bellows to absorb impact energy. To realize an optimal design and processing of these shapes, knowhow integrating simulation technology, materials and processing technologies, and other technologies was introduced.

### ■ Front crash box

A cruciform cross-sectional shape is used for the front frame crash box.



## Evaluation and analysis technologies



Crash boxes



# Aluminum alloy bumper reinforcement

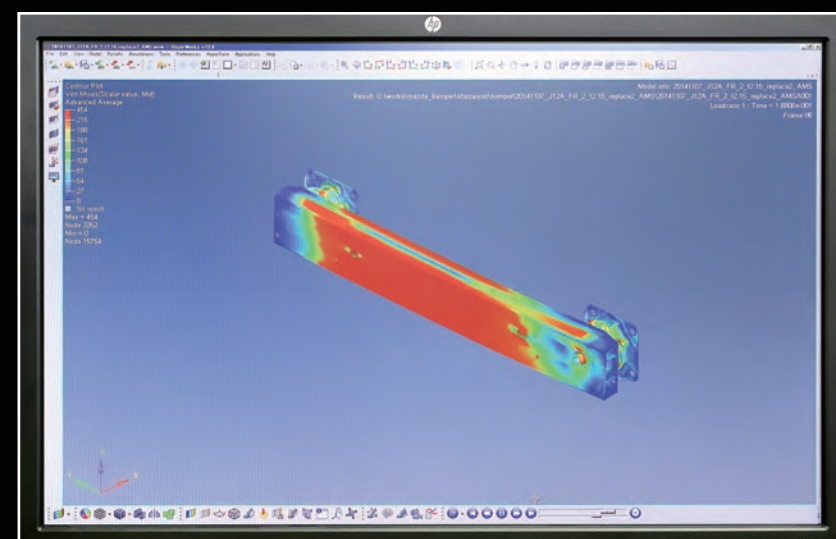
## Evaluation and analysis technologies

The mechanism of distortion has been analyzed using CAE to determine the best cross-sectional shape for aluminum extruded shapes that are excellent in terms of both strength and absorption of impact energy.

### ■ Performance evaluation tests



### ■ CAE for bumper beam



### ■ Integrated manufacturing system

The UACJ' s forte is its integrated system, all the way through from the development of aluminum alloys to shape design and processing techniques.

