



# Functions to Turn Images into Shapes

**S**ANYO  
**P**RODUCT  
**T**OPICS

During the processes of manufacturing all types of industrial products from automobiles to electric appliances to lunch boxes sold at convenience stores, design images are rendered as 3D models so that form, fit and function can be evaluated.

This article introduces the techniques used to make models.

## Manufacture of models necessary for product design

Various types of models are required in the product design process in order to check for form, fit and function. This modeling is found in all sorts of industries, from automobiles and electric appliances whose designs have considerable effects on sales, to lunch boxes and dishware sold at convenience stores which require regular seasonal design updates.

For example, with automobiles, the design is first determined using small-scale models. Models are then made for each part in actual size, such as steering wheel and bumpers, to verify form, fit and function, after finishing and painting of the models, if necessary.

One characteristic of dishware sold at supermarkets and lunch boxes sold at convenience stores is that the design lifecycle for such products is short, as new designs are constantly being introduced. Prototypes are first made by thermoform, and a later an injection mold is made for mass production once a design is determined. The product is made using a resin-based mold during the prototyping stage to evaluate the design.

## Machinability and fineness of texture required in synthetic wood

The material for the model is typically cut with a CNC based on the design file. Simple



corrections are sometimes done manually with a chisel or planer. Machinability is therefore required in a model material.

Models have been manufactured using natural wood since antiquity. However, wood suffers from some drawbacks. One problem is that wood undergoes dimensional changes, twisting, or warping, mainly due to moisture. Also, wood has grain and the occasional knot. Synthetic wood, which is generally a rigid urethane foam, has come to be used as a material for models since about 30 years ago, as it is lighter and better suited to machining than natural wood. Urethane resins, which allow richly varied designs, have become mainstream.

Machinability, fine texture, dimensional stability, etc., are considered the important characteristics of synthetic wood for models. While low-density, softer synthetic wood has excellent machinability, its drawback is its rougher texture and mechanical weakness due to larger bubbles.

## Lining up diverse types of synthetic wood to meet the needs of our customers

Using our proprietary technology, Sanyo Chemical successfully achieved both machinability and fine texture at the same time through the uniform dispersion of extremely small bubbles of 20 to 30 micrometers in diameter through the urethane resin. This feature of the “SANMODUR” Series, the urethane resin synthetic wood by Sanyo Chemical, is that it has very fine surface texture while maintaining low density and excellent machinability. It therefore reduces the number of coats of paint required to seal the surface, thus reducing preparation time.

Furthermore, the fine texture leads to a smooth surface with a beautiful finish when containers for convenience store lunch boxes are prototyped, and it can also be used in the prototyping of clear containers and lids.

Container production can start immediately for small lots of some types because they also

excel in strength and dimensional stability. “SANMODUR” Series has a wide lineup of products from low-density to high-density types to suit the needs of our customers. We have also developed products with various added functions, including static prevention and improved heat resistance. The proprietary continuous molding

■ Main synthetic wood products for design models by our company

Product name	Applications	Features
SANMODUR TW-E Series	Casting model Master model Inspection jig Resin dies for vacuum forming (there are also types* that are suited to resin dies for food containers)	General-purpose grade. It has static prevention properties. It is dense and strong among the general-purpose grades. Favorable dimensional stability.
SANMODUR NO7K-E Series	Casting model Master model Resin dies for vacuum forming	General-purpose grade. It has static prevention properties, and well-balanced performance.
SANMODUR LC-M Series	Mock-up model Odd side	Light-weight. Excels in dimensional stability and heat resistance.
SANMODUR MH-E Series	Styling model Design model	Light-weight. It has static prevention properties. It has fine texture for low density, and can simplify the painting process.
SANMODUR SX Series	Styling model Design model	Extremely light-weight. It has fine texture and high strength for low density.

\* It has been confirmed that it complies with the standards after conducting testing (by a registered institute by the Ministry of Health, Labor and Welfare) according to “Conditions of elution for apparatus or containers and packaging made of synthetic resins that are not specified in individual standards (final revision: 2016 Notification No. 245 of the Ministry of Health, Labor and Welfare): Ones with working temperatures 100°C or lower,” Standards and criteria for food and food additives, etc. (1959 Notification No. 370 of the Ministry of Health and Welfare), Food Sanitation Act.

Casting model: A model for preparation of sand mold for casting

Master model: A model that becomes the standard for dies, etc.

Mock-up model: A dummy (small-scale to full-scale model for automobiles, electric appliances, aircrafts, etc.)

Styling model: A model to visualize the idea sketch and roughly determine the design

Design model: An appearance model

Odd side: A die that is used only once for casting or FRP molding

Inspection jig: For confirmation of finished shape or precision

Please contact our sales office if you wish to use our products. In addition, please be sure to read the “Safety data sheet” (SDS) before using the product. Suitability and safety in the application for which the product is to be used must be the responsibility of the user.

method Sanyo Chemical developed enables efficient and continuous production of diverse products.

## For the era when simulation techniques and synthetic wood are used in combination

The means to turn images into shapes have changed owing to the development of 3D printers and virtual reality (VR). However, synthetic wood remains an essential material for models of complex shape and large size as it is strong and durable and offers room for adjustments such as additional processing.

As materials for models, Sanyo Chemical also offers epoxy-based buildup resin in addition to synthetic wood. It excels in integrity as there is no bonding, and corrections can be made easily by additional application.

Sanyo Chemical will continue to devote our efforts to developing products that meet the global needs of model materials.



Synthetic wood