

# Research and Development

Material Development



Production Technology



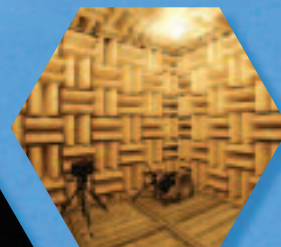
Material Analysis



Design Technology



Evaluation and Analysis Technologies



# From Basic Technology to Production Engineering and Environmental Protection, a Broad-Based Approach

## In support of comprehensive manufacturing

Continuing advances in technology fortify production engineering at Toyoda Gosei, starting in product planning and materials development and continuing throughout the manufacturing sequence. Technological advances also continue to bolster value-added in the company's product portfolio. Improvements achieved through molecular analysis, for example, support progress in reducing product weight, in lowering costs, in increasing functionality, and in eliminating reliance on environmentally deleterious substances.

## Digital engineering for evaluation and analysis

Shortening lead times in product development is a pressing issue in creating products today to meet the needs of tomorrow. Toyoda Gosei has speeded development and improved product quality by using digital engineering to integrate the entire sequence from product planning to mass production. The development engineers can use virtual prototypes for most of the evaluation and analysis work and can modify specifications immediately as necessary. Largely eliminating physical prototypes has lowered costs while streamlining work in product design and in preparations for mass production.

## Environmental technologies for social sustainability

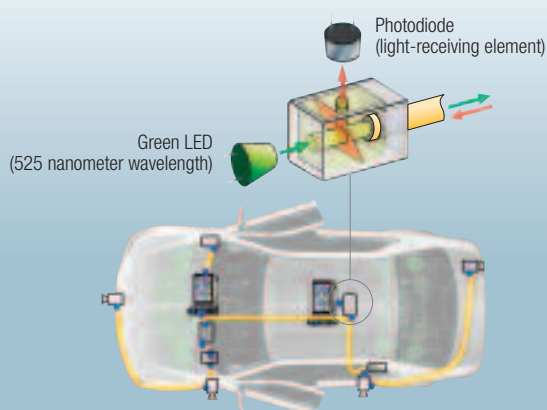
Protecting the environment ranks alongside improving product performance as a top priority in research and development at Toyoda Gosei. Fuel-saving weight reductions in automotive components reduce the output of carbon dioxide and thus help forestall global warming. In recycling, Toyoda Gosei, together with Toyota Motor Corporation and Toyota Central R&D Labs, developed the world's first commercial technology for recovering and reusing rubber in a continuous-vulcanization system, and it has employed that technology in mass production for a decade. The company continues to improve energy efficiency in its recycling activities. And it has also promoted recycling by developing single-resin construction for automotive components and for airbag materials.

## Long-range work on new technological possibilities

Toyoda Gosei continues to explore long-term technological prospects, as it did in pioneering blue LEDs and as it has done repeatedly in enhancing the aesthetic and ergonomic appeal of products. The company is asserting its capabilities in LEDs and polymers, for example, in work on transceivers for optical local area networks (LANs). Demand is surging for optical LAN transceivers that can handle massive amounts of data at high speed and in two directions simultaneously. Toyoda Gosei is also developing hydrogen tanks for fuel-cell vehicles. It has completed prototype tanks and is working on commercial versions.

### Examples of Toyoda Gosei Products for Future-Generation Automotive Systems

#### Optical transceiver for an onboard local area network



#### Hydrogen gas tank for fuel-cell vehicles

Double-layer tank of resin and fiber-reinforced plastic as strong as metal tanks and only one-half as heavy

