Manufacturing agriculture vehicles for a sustainable future

Pressure on the agriculture industry to keep consumers fed is increasing faster than ever.

Rising populations combined with higher incomes in developing countries is expected to drive global food demand up by 58 – 98% by 2050.[1] Farmers need to invest in top-of-the-line harvesting equipment to distribute steady supplies of high-quality produce year-round.

As a result, manufacturers of components for agriculture vehicles, such as tractors and combines, need to consider several factors when selecting a material provider.

Safety and reliability – Systems in heavy-duty agriculture vehicles need to carry high mechanical loads. Individual component failures can cause vehicles to malfunction, requiring costly repairs that often result in production delays that can last hours or days. Manufacturers also need to select materials capable of ensuring all equipment complies with safety standards such as ISO 4254.

Cost-savings – Switching from metal materials to thermoplastic alternatives is one of the most effective ways to lower operational costs and scale business growth strategically. However, fully understanding each potential replacement material's price-to-performance ratio is essential to delivering high-quality products cost effectively.

Lightweighting – Reducing the weight of agriculture vehicles enhances equipment efficiency and can improve crop quality – as heavier machinery is more likely to damage soil.[2] Advanced thermoplastics, which are 50% lighter than aluminum and up to 6 times lighter than steel, allow manufacturers to systematically replace metal in the production of a wide range of vehicle parts.

Sustainability – As climate change threatens global food security, farm equipment manufacturers are reducing their carbon footprint by adopting materials made from renewable sources. Next-generation, bio-based, mass-balanced solutions enable suppliers to move toward circular economies and stay ahead of environmental regulations – without compromising end-part quality.

Supply chain issues – Manufacturers are increasingly concerned with supply chain risks. Late or cancelled material shipments can result in lengthy production delays that ultimately damage relationships with customers. Working with material suppliers with a reputation for delivering quality products on time is critical.

1. The Future of Food Demand: Understanding Differences in Global Economic Models
2. Soil Compaction Due to Increased Machinery Intensity in Agricultural Production: Its Main Causes, Effects and Management

Manufacturing reliable, eco-friendly agriculture vehicles

DSM Engineering Materials partners with agriculture industry leaders to develop advanced thermoplastics optimized for the manufacturing of heavy-duty farming vehicles. Our lightweight, high-strength thermoplastics are engineered to replace metal solutions used in the production of a broad range of tractor and combine parts – which substantially reduces total operating costs for suppliers.

With our track record of declaring zero force majeures during the COVID-19 pandemic, we ensure customers always have a reliable supply of materials. Currently, one third of our materials are recycled-based and bio-based, while our complete portfolio of sustainable polymers – engineered using low carbon production processes – is planned for launch in 2030.

Akulon® – Producing a broad range of top-quality parts

Our PA6 and PA66 materials provide an optimal balance between durability and design flexibility for producing lightweight and recyclable parts with varying performance requirements. Akulon's versatile range of grades allow suppliers to develop agriculture vehicle roofing, seating, crop ramps, dust and vent covers, and much more – using one market-proven solution.

Vehicle and outdoor equipment manufacturers worldwide leverage Akulon Fuel Lock to develop diesel efficiency fuel (DEF) tanks that exceed increasingly strict environmental regulations. Compared to fluorinated high-density polyurethane, the technology offers a superior barrier against evaporative emissions, doesn't require secondary processing, and enables tank walls as thin as 2mm.

Stanyl® – Balancing strict safety, weight and cost requirements

With its best-in-class mechanical strength, wear and friction behavior, and thermal resistance, Stanyl enables manufacturers to replace various metal components and lowers the overall weight of designs. The polyamide drives weight and cost savings of up to 40% in under-the-hood automotive and commercial vehicle systems, and is ideal for producing highly intricate or thin-walled parts due to its high flow and crystallinity. Agriculture vehicle suppliers currently use Stanyl to develop engine components such as chain guides, charging coil stators, and control housings.

Due to its outstanding electrical and thermal resistance, Stanyl is well suited for manufacturing engine components for electric tractors – a market expected to see a compound annual growth rate of 11.1% from 2020 to 2026.[1] DSM is also expanding our current portfolio of Stanyl bio mass-balanced (B-MB) solutions to enable customers to further reduce their environmental impact.

1. Electric Farm Tractor Market - A Global and Regional Analysis: Focus on Application, Product and Country-Wise Analysis - Analysis and Forecast, 2020-2026

Incorporating greater flexibility and comfort into vehicles

To keep up with tight crop delivery schedules during harvesting seasons, farm hands may operate agriculture vehicles all day – often in hot outdoor temperatures.

Our materials enable brands to fit vehicles with numerous applications that help drivers to operate equipment more efficiently and enjoy entertainment.

Stanyl's high stiffness and abrasion resistance make it ideal for producing dual tilt steering wheels, structural components for seating, and cab suspension systems to support smoother riding experiences. Akulon offers the high hydrolysis resistance, weldline strength, and oxygen barrier properties required to produce high-quality touch screen systems, USB and AC ports, and built-in speakers.

Differentiating designs with unidirectional (UD) tapes

Using less metal to produce boom and structural components substantially lowers the weight of harvesting vehicles. Yet monolithic thermoplastic solutions lack the strength required for these applications. DSM's UD tapes are designed to reinforce systems that need to withstand extreme mechanical stress. These specialized composites can achieve 70% weight savings compared to metal, offer low scrap rates and are recyclable.

A customer recently replaced metal components for center tunnels in the Porsche 718 Boxster and Cayman using a multi-material solution that leveraged our Akulon UDea™ UD Tape. This approach drove substantial weight savings, lowered overall tooling investment costs and was recognized at the JEC Innovation awards – winning the Automotive category.

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