



KAYSUN

INJECTION MOLDING & ENGINEERING SOLUTIONS

Metal-to-Plastic Conversion Cuts Costs,
MAINTAINS PERFORMANCE
STANDARDS FOR BELT
TENSIONING PULLEY
ASSEMBLY



About Gates Corporation



Gates Corporation is a leading manufacturer of application-specific fluid power and power transmission solutions. By continually pushing the boundaries of materials science to build original equipment or maintain products in the aftermarket, Gates enables companies in every industry to efficiently tackle projects in even the harshest of environments.

The Challenge



Gates determined that a belt tensioning pulley assembly originally constructed from metal with a pressed-in bearing was a candidate for metal-to-plastic conversion in order to:

- Lower vehicle weight
- Reduce production costs
- Maintain stringent low-noise-level standards and tight tolerances

Kaysun was called in to develop a complex injection-molded plastic belt tensioning pulley that addressed these issues.

The Solution: Metal-to-Plastic Conversion



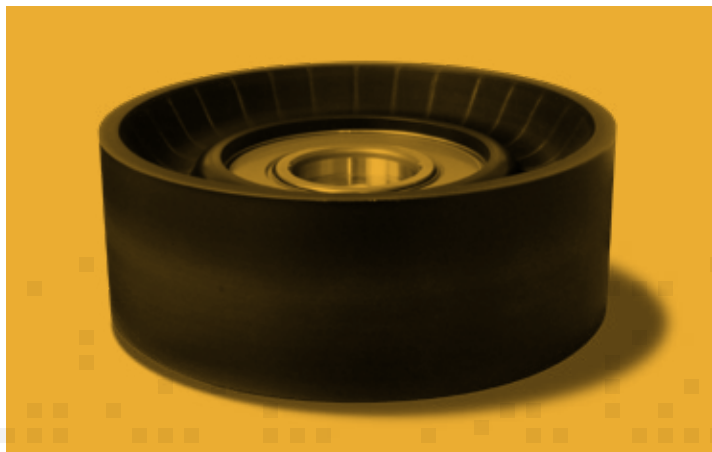
Partnering with the Gates team early in the project design phase proved instrumental in helping Kaysun engineers develop a comprehensive five-step metal-to-plastic conversion solution:

STEP 1: CONCEPT PRINT REVIEW

Kaysun engineers were able to gather key design insights about the belt tensioning pulley assembly from the concept print provided by Gates.

STEP 2: FEASIBILITY STUDY AND FEEDBACK

Kaysun's Design for Manufacturability (DfM) and scientific molding expertise provided the framework of analysis, data collection, and modeling of the design and production processes necessary to determine the feasibility of converting the belt tensioning pulley assembly from metal to plastic. This thorough evaluation, combined with insights Kaysun gleaned from previous experience with similar projects, verified that the project could move forward.



STEP 3: PART DESIGN PROCESS FINALIZATION AND MATERIAL SELECTION SUPPORT

The Kaysun and Gates engineering teams worked collaboratively to develop and finalize the part design. In conjunction with this step, Kaysun led discussions and research into plastic selection in order to narrow options — and accurately choose — materials that aligned with project performance requirements and pricing needs.

STEP 4: PROTOTYPING

With the part design and materials in place, prototyping was undertaken. A modifiable single-cavity tool with complex gating configurations was developed for prototyping in order to cost-effectively replicate the final product's manufacturing method and functionality.

STEP 5: TOOL DESIGN

Having successfully addressed the critical roundness specifications and gating requirements during prototyping, a tool was designed for use in an initial production run. Production was limited in order to analyze results and make any adjustments prior to full-scale manufacturing.

Analysis and Adjustments



Engineers from Gates and Kaysun worked together to examine the first run of belt tensioning pulley assemblies and detail imperfections. Based on their findings, a series of adjustments to the product concept were made, including:

- Compensating for imperfections via laser scanning, and creating a model based on the scanned data
- Adjusting the tool steel to ensure manufacture of an “essentially perfect” plastic pulley right out of the tool

“Kaysun’s performance during program development helped create a pulley that has been well-received by our customers ... we look forward to taking the injection-molded plastic pulley to the next level!”

- LEAD OF GLOBAL COMMODITY PURCHASING, GATES

Results and Impact



By establishing a working relationship with the Gates team during the design phase, Kaysun engineers were able to help OEM designers and engineers re-strategize their overall approach to the project.

Converting the belt tensioning pulley assembly from metal to plastic enabled Gates to significantly lower production costs while maintaining stringent part durability, noise, and performance standards for this essential component within a vehicle’s serpentine belt system.

[Contact Kaysun to learn more.](#)

KAYSUN
INJECTION MOLDING & ENGINEERING SOLUTIONS

www.kaysun.com
920-686-5800