



KI-generiertes Bild

2026

State of the Art - Sealing solution for automatic transmissions

From PTFE seal ring to GAPI's injection-molded *PAI GLon™ solution

Customer application

As engine power and torque outputs increased, so did the demands placed on the hydraulic shift systems of modern automatic transmissions. In particular, the seals within the rotary oil unions of the transmission shafts and the torque converter had to ensure rapid and precise pressure build-up.



Slow shift times

Delayed pressure build-up impairs shift performance.



Complex assembly

Calibration and settling processes complicate production.



Risk of damage

Sensitive seals lead to scrap and rework.



High manufacturing costs

PTFE seals are significantly more expensive than injection-molded parts.



A sealing solution was therefore sought that would simultaneously improve switch performance, process reliability, and cost-efficiency, and be suitable for large-scale production.

GAPI Solution

GAPI developed a new generation of high-precision, injection-molded seals made of polyamide-imide *PAI GLon™ T42 and T43.

- ✓ High-performance material *PAI GLon™ T42 and T43
- ✓ Injection-molded precision for reproducible quality
- ✓ Outstanding dimensional stability and compressive strength
- ✓ Consistent sealing across a wide temperature range
- ✓ Improved performance with reduced manufacturing effort and significant cost advantages for customers!



GAPI solution in detail

The modern seals were designed for both the oil rotary unions on the transmission shafts and the torque converter, replacing the PTFE seals previously used in these applications.

Thanks to the exceptional mechanical properties of *PAI GLon™, dimensional stability, compressive strength, and wear resistance were significantly improved. At the same time, the injection molding process enabled highly precise, reproducible component geometries; this was the key to achieving consistent sealing performance across a wide temperature range.



Better performance with less manufacturing effort, resulting in a significant cost advantage for customers!

The added value for our customers



Significantly shorter
shift times



Significantly easier
installation



Greater process reliability
in transmission assembly



Higher performance
capability



Cost savings



Security for our
customers

Result

The use of injection-molded *PAI GLon™ seals enabled simultaneous improvements in shifting performance, assembly processes, and cost-efficiency. Switching the material from PTFE to *PAI GLon™ enhanced the performance of modern automatic transmissions while reducing manufacturing effort and production costs.



25 Mio.+
sealing rings
per year



25+ Years
Serial
production



**Supplying
leading**
OEMs & Tier 1



**Automated
assembly possible**
(pick & place)

A Look into the Future

GAPI is continuously advancing this technology. Its material solutions already contain less than 2% PTFE to specifically optimize tribological properties.

The next step is the development of a completely PFAS-free *PAI GLon™ seal that maintains proven performance while meeting future regulatory requirements.



In this way, GAPI will continue to set benchmarks for **high-performance, sustainable, and cost-effective sealing** solutions for the mobility of tomorrow.

