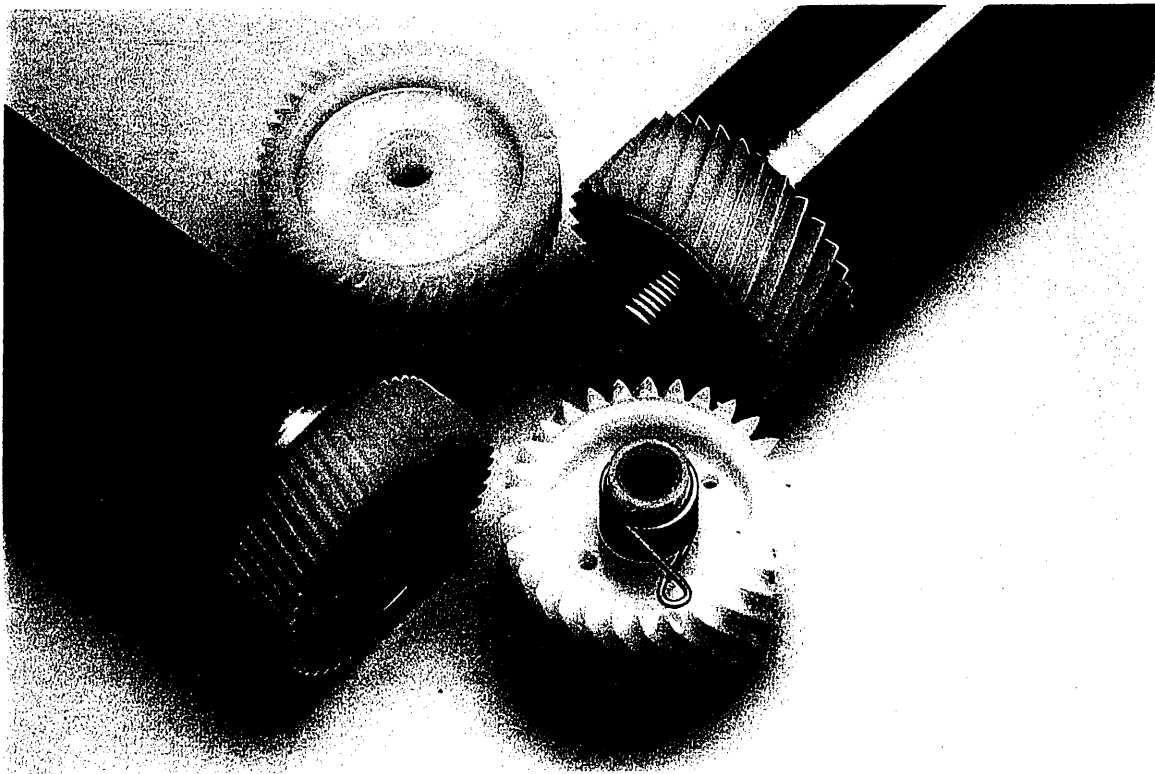




Shell Chemicals

## CARILON POLYMERS CASE HISTORY

### Lexmark Printer Gears



High performance and optimal cost consideration led Lexmark International to select CARILON™ Polymers for two 30-mm gears in its Optra™ S Series printers. These gears are an integral part of the toner cartridge assembly unit. The material's outstanding characteristics include toughness, low noise, wear resistance, creep resistance and dimensional stability. For more information about CARILON Polymers, call 1-888-CARILON (888-227-4566).



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## **PRESS INFORMATION**

### **CARILON Polymers Provide High Performance for Laser Printer Gears**

#### **Lexmark International Case History Update**

When Lexmark began manufacturing CARILON<sup>1</sup> Polymers gears several years ago for its Optra™ R series of printers, it was one of the first commercial applications for Shell Chemicals<sup>2</sup> aliphatic polyketones. On the strength of that success, Lexmark chose CARILON Polymers again for two 30 mm gears in their new Optra™ S laser printer. In both cases, the gears are an integral part of the toner cartridge assembly unit.

"We specified CARILON Polymers initially because of their wear resistance and natural lubricity," explains Lexmark Engineer Frank Carroll. "Our success in the Optra R series led us to design our new printer gears with CARILON Polymers in mind."

CARILON Polymers provide good tribological performance in a neat form, at a lower cost than lubricated polymers. The material's outstanding characteristics include toughness, low noise, wear resistance, creep resistance and dimensional stability.

"We have found CARILON Polymers to be ideal for precision gear applications," says Carroll. "It is essential that the gear functions smoothly, without wear against the mating gear. If the gear wears improperly, it causes 'jitter' in the machine, resulting in poor print quality."

"This issue of tribological characteristics – friction and wear – is basic to the function of engineering thermoplastics in a wide variety of machine applications," explains John Kelley, research engineer with Shell Chemicals. "The whole function of a gear is to transfer power and/or motion as smoothly as possible, and any wear on the teeth of the gear affects that smoothness. One plus with CARILON Polymers is that, compared to polyamides and polyacetals, they better resist wear against themselves."

In fact, CARILON Polymers provided high quality tribological performance in a neat form, needing no lubrication to do the job, unlike the higher-priced lubricated polymer.

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<sup>1</sup> CARILON is a Shell trademark.

<sup>2</sup> The expression 'Shell Chemicals' refers to the companies of the Royal Dutch/Shell Group which are engaged in the chemicals business. Each of the companies which make up the Royal Dutch/Shell Group of companies is an independent entity and has its own separate identity.

"We found that the neat version of CARILON Polymers performed as well as the lubricated version of the polyacetal we had been using," notes Stephen DeFosse, of Lexmark's Plastics Technology Center, who consulted on the evaluation of CARILON Polymers.

Carroll and DeFosse still needed one more attribute – processability. It was important that the anticipated cost savings of using CARILON Polymers not be absorbed by retooling expenses. With its broad processing window, CARILON Polymers successfully passed this test.

"With CARILON Polymers, we found we did not have the hydrolysis problems associated with many other engineering thermoplastics," DeFosse points out. The combination of high performance, ease of processing and lower cost made a clear business case for CARILON Polymers.

CARILON Polymers are engineering thermoplastics with a unique combination of physical properties compared to traditional materials such as polyamides and polyacetals. These properties include strength, stiffness, performance over a broad temperature range, toughness, superior wear and friction characteristics, low hydrocarbon permeability and resistance to a variety of aggressive chemicals.

CARILON Polymers are available in extrusion grades and a variety of injection molding grades, including glass reinforced, flame retardant, mineral filled and lubricated compounds. The polymers can be easily processed on conventional molding and extrusion equipment, and their fast set-up can lead to significantly reduced cycle times in injection molding applications.

For more information on CARILON Polymers, visit the Shell Chemicals Web site at [www.shellchemicals.com](http://www.shellchemicals.com). In the United States, customers can write to Shell Chemical Company, P.O. Box 2463, Houston, Texas 77252-2463 or call toll free at 1-888-CARILON (1-888-227-4566). In Europe, customers can write to Shell Chemicals Ltd., Shell Centre, SEI 7NA or call +44 171 934 3300.

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