

## Dimensional Stability

Steel is dimensionally stable while plastic has a tendency to change shape or creep over time, especially at higher temperatures. This change in shape can be permanent and is most likely to be noticed as increased roll TIR. Some conditions known to cause creep are:

- Sitting in one position under heavy belt or material load
- Packaging or banding loads created by freight carriers
- High temperature exposure

## Temperature Sensitivity

Steel is more temperature stable than plastic. Plastic rolls get longer than the steel shaft when hot and shorter when cold. At the extremes of temperature and belt width this can cause seals to tighten with heat and gap when cold which can reduce performance.

## Shell Deflection

Steel is much more rigid than plastic. Longer rolls can have visible tube deflection, especially with wider belt widths.

## Load Capacity

Steel is a higher strength material, and in general the bearing sets the load capacity of these rolls. A polymer's lower strength tends to make the shell set the roll's capacity. PPI has designed rolls and idler sets to carry the maximum load typically seen for a material type and belt width, while meeting all dimensional standards for the CEMA rating series given. This is defined as CEMA capable. CEMA load ratings are based on the capability of steel rolls and not the actual load possible for a given material type and belt width using typical conveyor design assumptions. (i.e. 4ft/10ft spacing and <800fpm)

## Shell Wear

Polymer roll wear can vary significantly and at times compare exceptionally or poorly to steel. Experimentation in actual situations is recommended.

## Nylon Properties

Nylon is one of the stronger reasonably priced polymer materials and it is used in higher capacity roll sizes to add strength and reduce deflection. Abrasion resistance and the ability to shed carryback is somewhat less than HDPE. Nylon is sensitive to moisture absorption and dimensional stability is reduced with changes in humidity and water contact. Although not as sensitive as PVC, Nylon can be challenged by impacts, especially at lower temperatures.

## HDPE Properties

HDPE is a reasonably strong, resilient and economical polymer commonly used for idler rolls. It has excellent wear, impact, and material shedding properties. Lower strength and less dimensional stability create challenges in wider belt widths, higher loads, and extreme environments.

## Fire and Explosive Environments

Polymers by nature are insulators and increase the amount of consumables on the conveyor. In general these aren't things desired to be designed into hazardous locations and it is recommended they not be used.

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