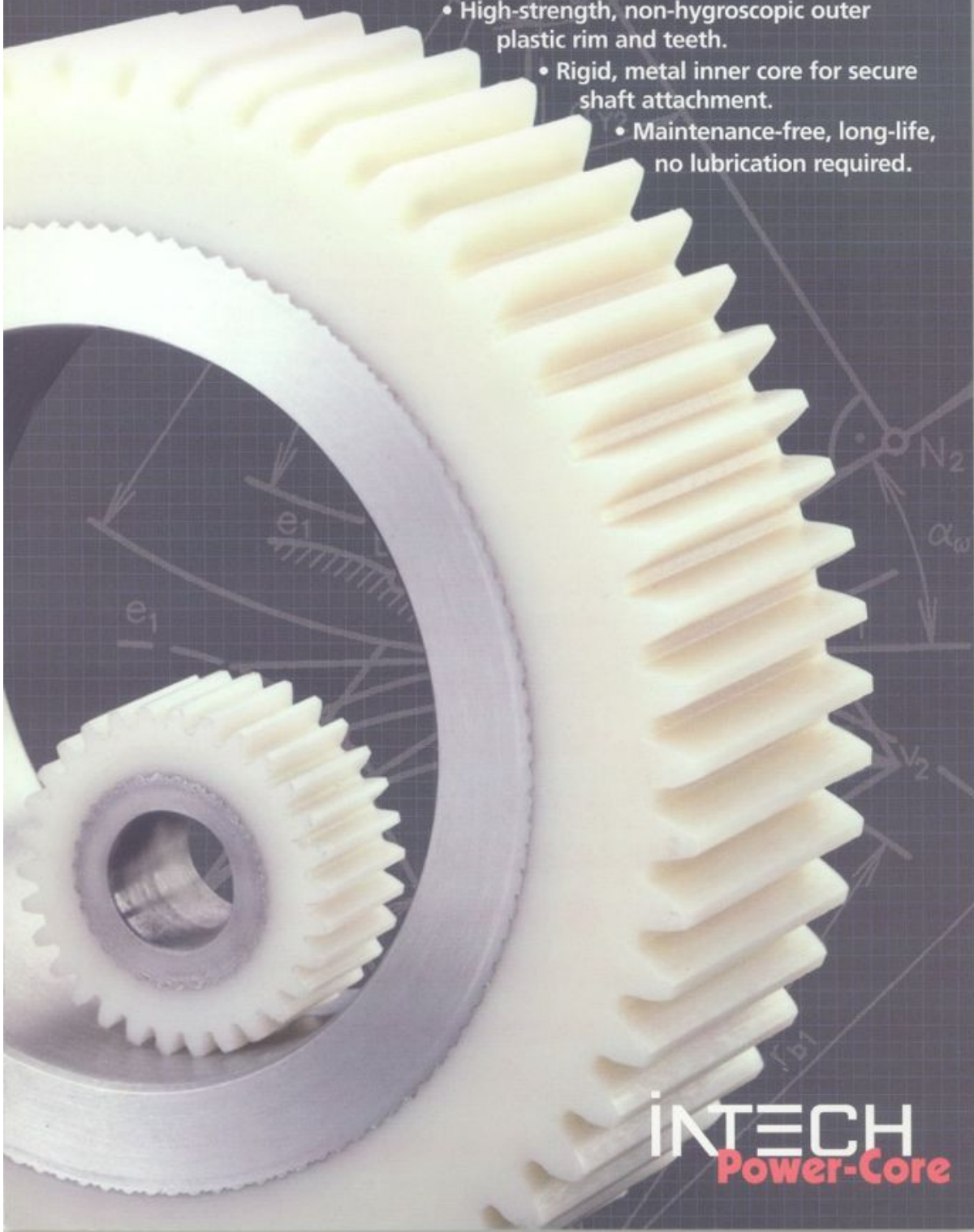


New from the world leader in plastic-on-metal gear technology

# Engineer's Guide to Plastic and Metal Gear Selection

Featuring Intech's Revolutionary Power-Core™ Plastic-on-Metal

- High-strength, non-hygroscopic outer plastic rim and teeth.
- Rigid, metal inner core for secure shaft attachment.
- Maintenance-free, long-life, no lubrication required.

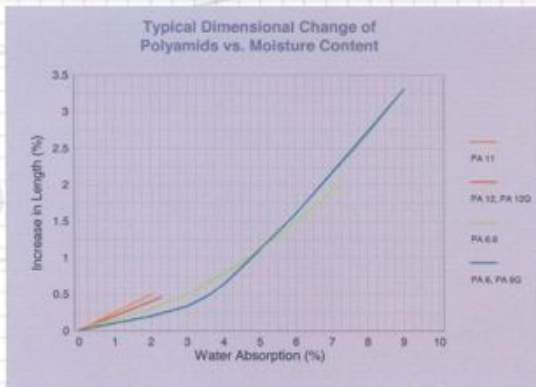


**INTECH**  
Power-Core

# 10 advantages of Power-Core™ gears over ordinary metal and plastic gears...

## 1. Superior dimensional stability prevents teeth from breaking.

Ordinary plastic gears expand when they absorb moisture. Internal stresses are relaxed, and the tensile strength drops by 50% or more when fully saturated.



Changes in internal stress can also cause plastic gears to lose their shape. When that happens, the weakened gears don't mesh smoothly, and teeth wear out prematurely, chip, or break.

The plastic composite outer layer of the Power-Core gear does not absorb moisture. It loses less than 10% of its tensile strength — and grows less than 0.2% (a negligible amount in gear design) — even when immersed in fluid.

Adding to Power-Core's extreme dimensional stability is the rigid metal core, which absorbs and evenly distributes stresses when transmitting torque. It is firmly bonded to the outer composite, reducing thermal expansion of the gear by up to 50%.

## 2. No backlash compensation for swelling in moisture.

When plastic gears don't retain dimensional stability, the spacing between the gears — backlash — also changes.

"Backlash" is the minimum clearance in the teeth mesh to allow gears to turn freely. To compensate for swelling caused by moisture, the backlash in plastic gears has to be increased, typically about double that of metal gears. Additional spacing is required to compensate for thermal expansion, and so the total backlash can be sizable.

Because Power-Core gears have minimal thermal expansion and are dimensionally stable in moisture, backlash compensation is reducing backlash to a minimum. Large backlash increases gear noise, affects shaft timing, and causes shock load on gear teeth during speed variations. In plastic gears that swell, the pitch diameter changes also, leading to increased wear. Changes in backlash will lower the gear's AGMA class.



## 3. Low noise, light weight.

Metal gears can be noisy. But with their self-lubricating composite outer ring, Power-Core gears run quietly, reducing noise levels by 6 dB or more vs. metal gears. And when compared to other plastic gears, Power-Core gears run about 3 dB quieter because of the smaller backlash.



As for weight, Power-Core gears are 4 to 7 times lighter than equivalent steel gears. Lighter weight reduces drive power requirements and inertia. So Power-Core gears can accelerate, stop, and reverse direction more easily than steel gears.

## 4. No lubrication required.

Metal gears, enclosed in gear boxes or as open gearing, must be regularly lubricated to maintain smooth operation and to prevent wear. Oil leakage from housings and seals and loose grease can contaminate and ruin paper, pharmaceuticals, and other products.



With teeth made of a smooth plastic composite, Power-Core gears require no gear box or lubrication, eliminating oil leaks and reducing maintenance costs.

## 5. Precision machining.

The Power-Core metal hub allows one-piece concentric machining. Pitch-line tolerance can be held to AGMA Class 10 or higher, a standard for gear tooth quality specified by the American Gear Manufacturers Association.

The gear blank is clamped onto the metal hub during machining, eliminating clamping stress that can cause pitch line distortion in all plastic gears. The pitch line is referenced from the precision bore in the metal.

The homogenous crystalline structure of the cast-on plastic ring provides uniform resistance to the cutting tool. This uniformity minimizes variations of the tooth surface, decreases pitch line runout, and enables narrow backlash tolerance.

Unlike other plastic gears, injection molded or machined, Power-Core's lack of internal stresses and greater dimensional stability allows the gears to retain the high AGMA class when installed.

## 6. Rugged and durable.

The unique Power-Core technology enables our gears to perform under adverse conditions including harsh chemicals, mois-

ture, shock loading, and extreme temperatures.

In corrosive or wash-down applications, the hub can be fabricated from stainless steel. When inertia must be kept to a minimum, an aluminum hub is used.

A unique combination of tensile and flexural properties allows Power-Core gears to absorb vibration and shock. The Power-Core gear retains strength over a wide temperature range from -50°F to +200°F. Test show that the gear teeth become stronger at about 150°F to 180 °F long after other plastics failed.

## 7. Long life.

Power-Core gears last up to 12 times longer than non-lubricated steel gears. The durable, long-wearing Power-Core technology eliminates problems of excessive wear, premature failure, and costly, unplanned down-time.

The non-hydroscopic, crystalline structure of the plastic composite reduces stress and increases the gear's wear life.

Intech's engineers perform special state-of-the-art engineering calculations for each gear design and application to ensure lasting performance where other gears break down.

## 8. High torque.

Power-Core gears exhibit a high load sharing factor, an important quality

when handling e-stops or shock loads. The load shearing factor, a measure of multiplying the load-bearing capacity of an individual tooth, is optimized for each application. Because the keyway is cut into the metal hub and not the plastic, Power-Core eliminates the weak spot inherent in conventional plastic gears.





The metal hub absorbs all keyway stresses, transferring maximum torque to the composite gear teeth. The teeth are made of a lightweight plastic composite, weighing just 0.037 pounds per cubic inch.

Torque of Power-Core gear approximates that of cast iron, but without the brittleness, weight, lubrication, and teeth breakage. As a result, Power-Core gears can reach higher speeds, increasing the throughput of your equipment.



We can precisely calculate torque capacity, allowing Power-Core gears to replace metal gears in many applications.

Power-Core gears can operate without lubrication at pitch line speeds up to 15 feet per second. Add our special friction-reducing coating, and you can double gear speed to 30 feet per second.

## 9. Gravity casting.

The outer plastic composite ring is gravity-cast onto the inner metal hub, creating a secure and permanent attachment. The metal hub permits more durable shaft attachment.

This eliminates the need for bolted metal flanges, a common design in conventional plastic gears. Bolts can stress and distort the plastic, causing dimensional instability and even breakage.

## 10. Custom-engineered for your specific application.

Power-Core gears available include spur, helical, bevel, spiral bevel, worm, rack, ring, and metric. Gears can be manufactured with outer diameters ranging from 0.5 inch to 36 inches or greater. Hubs are available in aluminum, carbon steel, and stainless steel.

### Only Power-Core™ gears give you all these advantages....

Benefit	Power-Core	Metal	Delrin®	Nylon 6	Phenolic fiber
Low noise	*		*	*	*
Maximum shock absorption	*		*	*	
Maximum vibration damping	*		*	*	
Corrosion resistance	*	SS only	*	*	*
Non-hygroscopic (no swelling)	*	*	*		
Light weight, low inertia with AL hub	*				
Maximum wear resistance	*		*	*	
Lubrication free	*		*	*	
Eliminates internal stress	*	*			
Homogenous crystalline structure	*	*			
Metal hub, steel, Al, SS part of gear blank	*				
Gear blanks with metal core OD .5" to 36"	*				
Keyway in metal, stress risers absorbed	*	*			
Stable physical properties in varying conditions	*	*			
High AGMA class	*	*			
Dimensionally stable	*	*			
Proven life calculation	*	*			
Engineering design	*	*			
Gear-sizing assistance	*	Ask your supplier			

[www.intechpower.com](http://www.intechpower.com)



What's the solution to noisy metal gears — and plastic gears that don't last because their teeth break?

## Introducing Intech's self-lubricating, low-maintenance "plastic on metal" Power-Core™ gear technology

### A look at the problem

You know the problems with conventional metal or plastic gears.

*Metal gears* are noisy. They must be enclosed in gear boxes — or maintenance crews have to lubricate them. Gear boxes leak oil. And grease on open gearing can contaminate products.

*Plastic gears* absorb moisture and lose dimensional stability. Teeth break or wear out. Gears must be replaced frequently, causing equipment repair and down-time headaches.

### The Power-Core solution

Now there's Intech Power-Core technology: "plastic on metal" gears that give you all the advantages — and none of the disadvantages — of both metal and plastic gears.

Here's how our Power-Core technology works:

The gears are precision machined from blanks cast in nylon 12 with a proprietary process that ensures a homogenous crystalline structure.

To produce a gear blank, the outer plastic is gravity-cast onto a rigid metal hub, which absorbs keyway stresses to transfer maximum torque to the composite material.

A unique, tension-free crystalline structure enables the nylon 12 composite to retain tensile and flexural strength, providing exceptional stability over time.

The metal hub helps the gear to maintain its shape even at high speeds and temperatures. So the gear lasts longer, without deformation or breakage.

OD 6.5", FW 0.75" High temperature, corrosive environment, 55316 core; clean room application



OD 9", FW 1.0" High speed, low inertia gear with Al core to dissipate heat generated by high torque and speed



Intech designs and builds complete assemblies. Shown: electrically insulated planetary gear box for highly corrosive process.



OD 12mm, FW 3mm Used in marine instrumentation. Selected for dimensional stability in high humidity.



OD 9", FW 1.5" Anti-backlash tooth geometry to accommodate large speed variation within one rotation.



OD 17.5, FW 1.5" Ring gear with cast in ports replaced SS sprocket and chain on metal plating drum.



I-Cam® Followers Intech offers complete line of high load, maintenance free rollers and cam followers.

