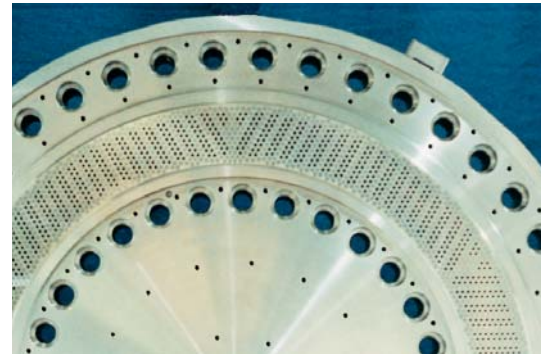
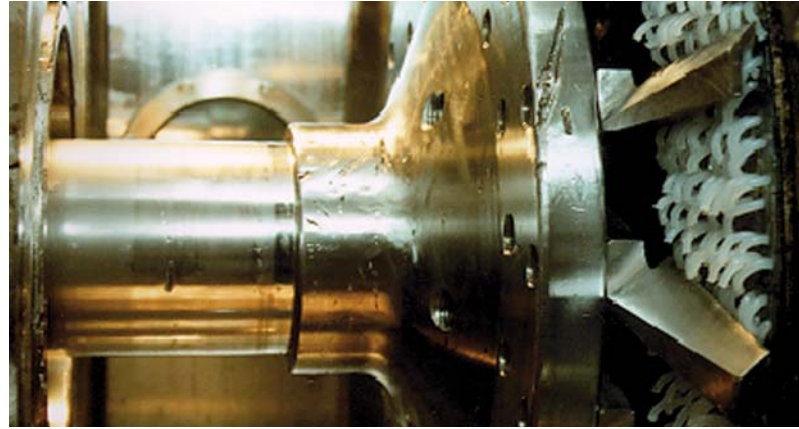


Engineering Your
Competitive Edge



Solutions for the Polyolefins Industry

HIGH PERFORMANCE TECHNOLOGIES



Product Innovation – Industry Expertise – Expert Solutions

Kennametal's Engineered Products Group

Kennametal's Engineered Products Group is recognized globally as a leader in the polyolefins industry. Customers around the world trust only Kennametal to supply critical components such as pelletizing plates and knives for underwater pelletizing and plungers for LDPE hypercompressors. We will work closely with your engineers to design and develop customized engineered products to satisfy your needs.



Kennametal is a leading global supplier of tooling, engineered components, and advanced materials that are consumed in production processes. We provide our customers with a broad range of technologically advanced tools, tooling systems, and engineering services. Our products use highly complex metallurgy and materials science in tungsten carbide powders, high-speed steels, ceramics, industrial diamonds, and other materials that are particularly resistant to heat, abrasion, pressure, and wear.

Kennametal is headquartered in Latrobe, Pennsylvania, and was founded in 1938. With 13,500 employees worldwide, the corporation's annual sales are approximately \$2.4 billion, nearly half of which comes from sales outside the United States. Today Kennametal is represented in more than 60 countries around the globe.



Kennametal is setting the standard in polyolefins technology!
Let us prove it.

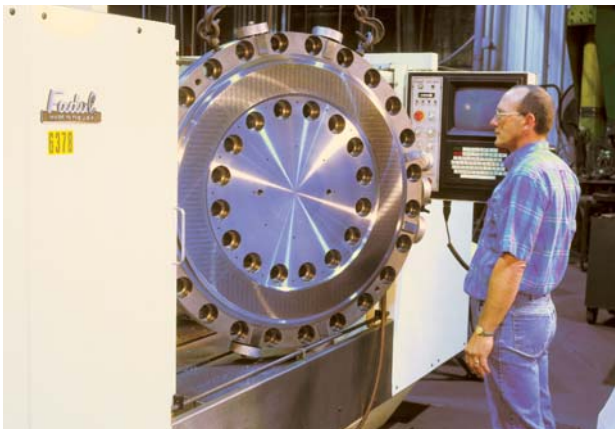
Underwater Pelletizing Plates

With over 40 years of experience designing, manufacturing, and servicing this product line, Kennametal is one of the largest producers of underwater pelletizing plates globally. We are devoted to developing the science of underwater pelletizing through expert engineering practices and customer intimacy. All of our pelletizing plates are custom designed to your exact process conditions, and will help you achieve maximum pelletizing performance for your specific production line.

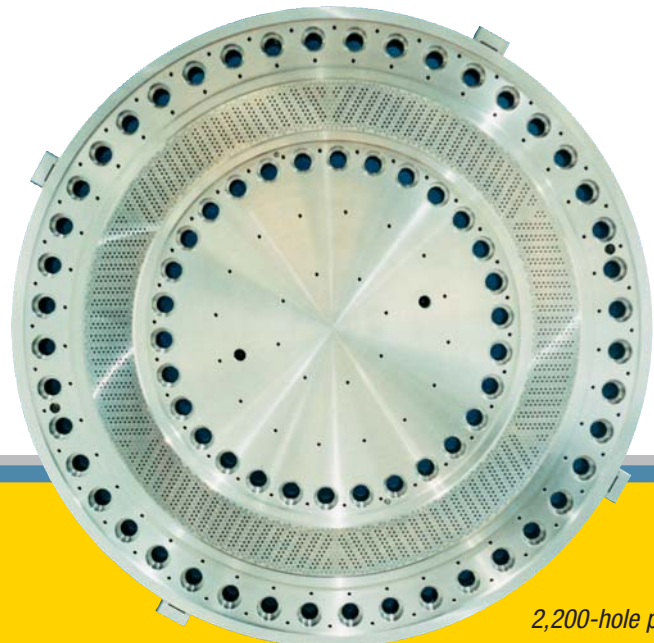


Large Plate Capability

Kennametal has extensive experience fabricating plates as large as 1250mm (49 inches) in diameter, and for lines producing up to 50 tons per hour or more. We have the experience and credibility you can trust with your largest production needs.



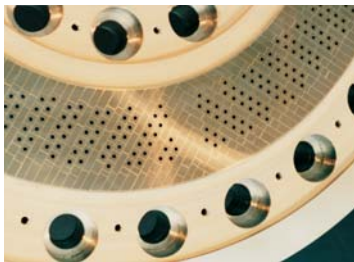
4,000-hole plate for LLDPE



2,200-hole plate for PP



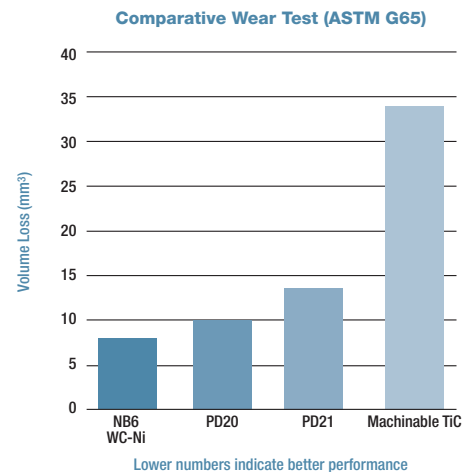
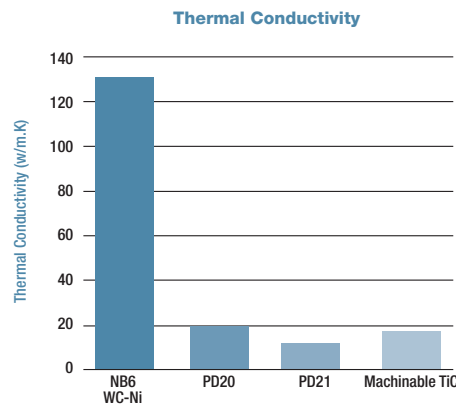
Round nib design



Tile design

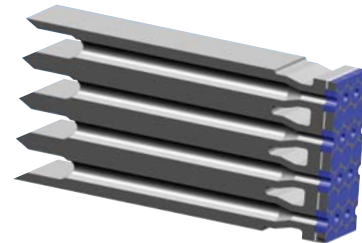
Superior Cutting Face Technology

Kennametal has leveraged its core competencies to innovate several superior cutting face materials. Our latest PD-21 titanium carbide provides properties unmatched by any other material suitable for this application. This material combines excellent wear resistance with outstanding thermal retention to promote underwater startups, reduce orifice hole freeze-off, reduce melt fracture, and solve many other pelletizing issues.



Internal Insulation Feature

Kennametal set a high-performance standard when we innovated the internal insulation feature. This feature consists of a ceramic layer embedded under the cutting face of the plate. It helps to reduce overall heat loss from the plate, and focus this extra energy into the tip of the orifice where it is needed most. This exclusive Kennametal design provides the most heat-intensive and uniformly heated pelletizing plate in the industry today.



Cross-section showing internal construction

Reconditioning and Maintenance Services

We can replace the cutting face of your worn Kennametal pelletizing plate at approximately one-third the cost of a new plate. We operate the largest pelletizing plate maintenance center in the world, and can provide simple repairs or major rebuilds.



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Let us prove it.

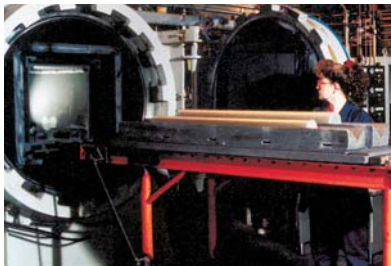
LDPE Hyper Compressor Plungers

Kennametal Cemented Carbide Plungers

Kennametal is globally recognized as the quality leader for solid cemented carbide hyper compressor plungers, liners, bushings, valves, and bearings for polyolefins applications. Plungers used in LDPE processing are exposed to pressures up to 50,000 psi with an expected performance of tens of thousands of hours. Kennametal has over 40 years of continuous experience with this product and has produced more than 9,000 plungers for use in critical LDPE hyper compressor processes, a peerless record of success in this industry.

K94 Carbide – The Industry Standard Plunger Material

For years, Kennametal has worked with LDPE customers to understand the important aspects of solid carbide plunger performance. Our primary goal is to provide a component that will perform with a high level of confidence for the extended lifetime expected in hyper compressor operations. Kennametal's K94 grade was designed and engineered to meet these exacting standards, and its performance record is proof of success. That is why K94 carbide is the world's most requested cemented carbide grade for plungers.



Plungers ready for loading into a sinterHIP furnace

Size Capabilities

Kennametal has the capability to manufacture solid carbide plungers up to 180mm (7 inches) in diameter and up to 1525mm (60 inches) in length.

Process Control and Secondary Hot Isostatic Pressing

Vertical integration of the entire manufacturing process from raw material conversion to complete on-site Non-Destructive Testing provides Kennametal with process control advantages to ensure consistent plunger quality.

Densification of the plunger body is one of the key processes during manufacturing. Kennametal has proven the significant benefits of sinterHIP followed by a secondary Hot Isostatic Press operation (HIP). Other plunger manufacturers prefer sinterHIP alone due to the high cost of a secondary HIP operation, but Kennametal will continue to bring the additional value of a secondary HIP operation to our plunger products.

Finishing – Plunger Grinding and Polishing

Kennametal has invested in state-of-the-art polishing and CNC grinding equipment intended specifically for plungers. This equipment enables strict control of material removal rates, exacting size control during the plunger grinding processes, and a uniform high-polish surface finish. Finishes of less than .2 microinches Ra (5 nanometers Ra) are achievable.



Kennametal HIP furnace



Grinding plunger on specially designed CNC unit



Plunger being lowered into C-Scan ultrasonic tank

Testing and Certification

Kennametal's Non-Destructive Testing expertise has resulted in the development of testing procedures explicitly for qualification of LDPE plungers. Kennametal employees trained and certified as NDT technicians have designed Liquid Dye Penetrant and Ultrasonic equipment and testing methods for plunger products. Equipment such as our on-site C-Scan ultrasonic tank is equipped specifically to evaluate solid cemented carbide plungers. This capability allows Kennametal to achieve a comprehensive understanding of our material and processes while ensuring that the stringent quality standards necessary for plunger components are met.

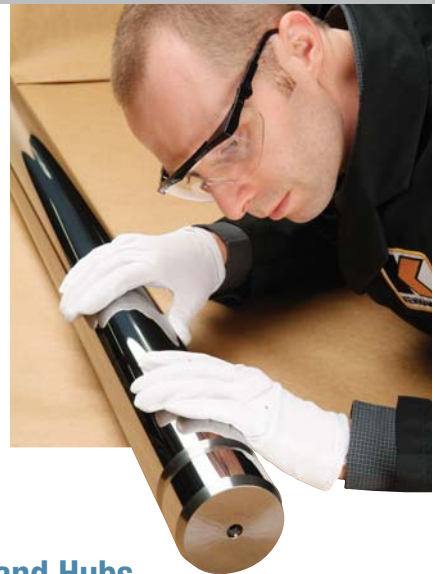


Kennametal is setting the standard in polyolefins technology!

Let us prove it.

Commitment

Other manufacturers have participated in the solid carbide plunger market since these products were first introduced in the 1960s. Some have left the market due to performance issues, others due to a lack of capability to meet the stringent quality requirements. Only Kennametal has a continuous performance record over the last 40 years, not only meeting but also continuously improving LDPE plunger quality standards. This invaluable experience provides Kennametal with unrivaled insight into the requirements for this challenging application. Choose Kennametal with confidence for your LDPE plunger applications.



Underwater Pelletizing Knives and Hubs

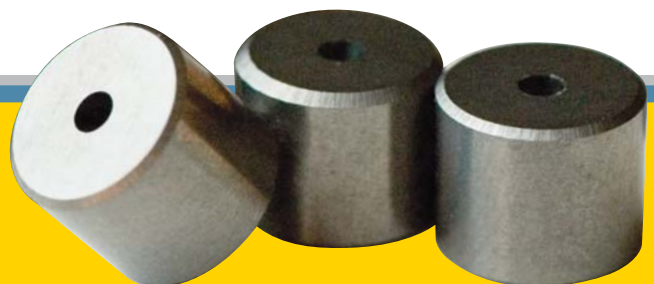
Kennametal offers a complete line of custom-designed, brazed, bi-metal knives to improve pelletizing performance, reduce knife consumption, and give you the flexibility to cut a vast range of products like PE, PP, and PS. Our improved steel properties reduce permanent deformation of the knife body. Optimum cutting performance is influenced by proper material selection and knife geometry, so allow Kennametal's experience to work for you.

Stirrer Bearings

Kennametal manufactures cemented carbide stirrer bearings for all types of LDPE autoclave reactors. Cemented carbide bearings offer a number of advantages over traditional bearings such as improved wear and strength properties, as well as self-alignment. Using carbide can extend stirrer bearing life six to eight times, resulting in reduced maintenance and significant cost savings.

Capillary Rheometer Dies

Kennametal offers wear-resistant tungsten carbide dies to be utilized with your capillary rheometer for the accurate testing of melt index. We maintain dies in stock that comply with ASTM D-1238-73. We can also fabricate custom dies to meet your exact specifications.



Why most polyolefins manufacturers trust Kennametal for their critical components:

- Reduced production costs
- Improved performance and service life
- Increased profitability

With Kennametal components you will attain operational excellence, strengthen customer loyalty, and thrive in an increasingly competitive marketplace.

Conclusion:

Seek out and stay with the global leader of critical components for the Polyolefins Industry. Nothing comes close to Kennametal components in quality and performance.

Most companies support products, we support customers. Call us today – our engineers will custom-design components to optimize your production.



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