

VESPEL[®] FORWARD ENGINEERING



THE FIVE FAMILIES OF VESPEL[®] PARTS AND SHAPES

	S LINE	Aerospace Automotive Business Machines Compressors Electronics Glass Industrial Semiconductor
	TP LINE	
	CR LINE	
	CP LINE	
	ASB LINE	

CONSIDER THE LIMITLESS POSSIBILITIES

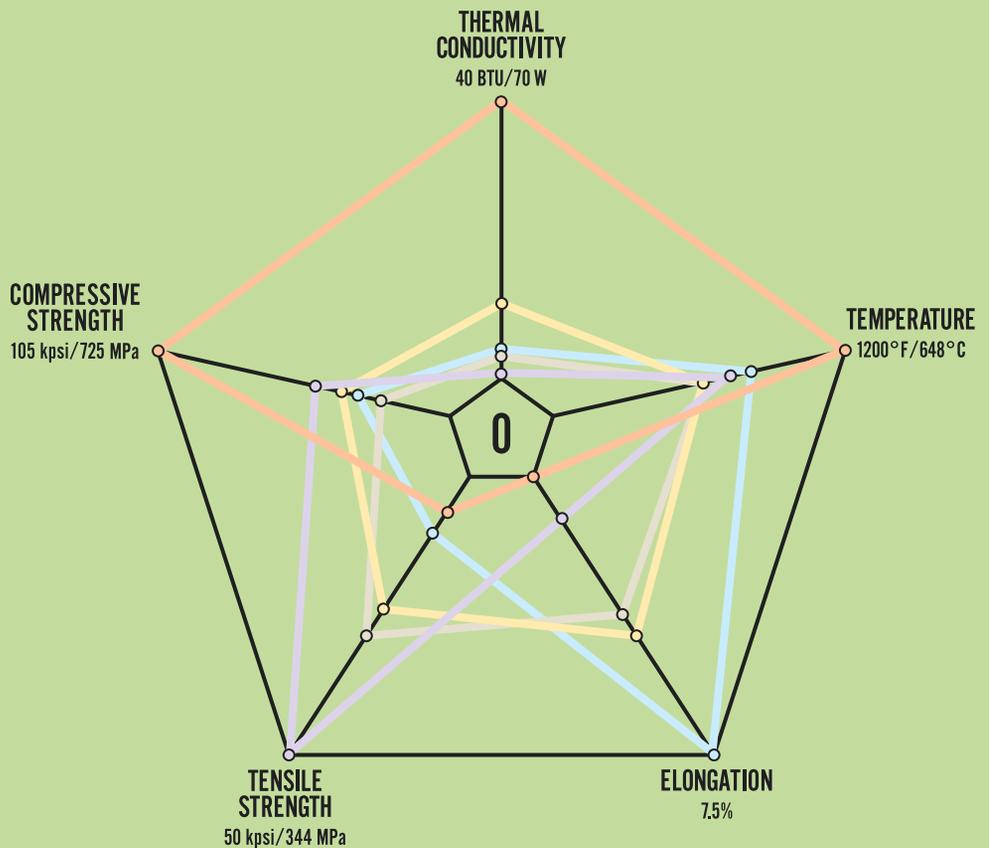
of working with materials as versatile as your imagination. When you think DuPont[™] Vespel[®] Parts and Shapes early in the design process, getting started becomes an opportunity for progress, rather than a hurdle. Our expanded lineup consists of five families of materials that provide a unique combination of physical properties, offering you the ultimate in design flexibility. Starting as the Vespel[®] S line, the family has grown to include the introduction of Vespel[®] TP, a new innovative thermoplastic material by DuPont; Vespel[®] CP (composites); Vespel[®] CR (chemical resistant); and Vespel[®] ASB (assemblies). With this expanded line of products and in-depth technical expertise, Vespel[®] Parts and Shapes are the perfect solution for an engineer focused on not only meeting requirements, but breaking new ground as well. After all, making things stronger, faster and lighter is what Vespel[®] Forward Engineering is all about. For more information on what our line of material solutions can do for you, go to www.dupont.com/vespel or call 1-800-972-7252. If you can dream it, we can make it.

DuPont[™] Vespel[®]
forward engineering



THE FIVE FAMILIES OF VESPEL® PARTS & SHAPES

VESPEL® S LINE	VESPEL® TP LINE	VESPEL® CR LINE	VESPEL® CP LINE	VESPEL® ASB LINE
BALANCED PROPERTIES	MAXIMUM GEOMETRIC FLEXIBILITY	MAXIMUM CHEMICAL RESISTANCE	SUPERIOR STRENGTH	INTEGRATED MATERIALS
SP-1 SP-21 SP-211 SP-22 SP-221 SP-3 SMR-0454 SMR-0747 ST-2010 ST-2030 SCP-5000 SCP-50094 SM-30084 SMP-40025 SF-0920	TP-1012BK TP-2346 TP-2875 TP-7022 TP-8005 TP-8054 TP-8130 TP-8161 TP-8169 TP-8212 TP-8311 TP-8395 TP-8474 TP-8541 TP-8549 TP-8556 TP-8792 TP-8929	CR-6100 CR-6200 CR-6300 CR-6500	CP-0301 CP-0644 CP-0648 CP-0650 CP-8000 CP-8001 CP-8002	ASB-0664 ASB-0826 ASB-3000 ASB-5700 ASB-5710 ASB-5720 ASB-5730 ASB-5740 ASB-5750 ASB-5760 ASB-5770 ASB-5780 ASB-5790 ASB-5800 ASB-5810 ASB-5820 ASB-5830



V E S P E L[®]

S

L I N E



First in the Vespel[®] family of products—highly durable polyimides that deliver exceptional wear resistance, insulation, and a low coefficient of friction. But, since we know you like to push a little harder, so did we. Within the S line, Vespel[®] Parts and Shapes include many products with differing sets of attributes. So, you get exactly what your design needs.

TOUGH, VERSATILE, DIVERSE.

S HAS A SOLUTION FOR ALMOST ANY DESIGN CHALLENGE.



SP-1 Need a material with superior wear and insulation properties? Semiconductor manufacturers often find our SP-1 products useful in their production processes. And, with operating temperatures from cryogenic to 300°C, great plasma resistance, plus a UL rating for minimal electrical and thermal conductivity, it isn't hard to see why.



SP-21 If insulation is less important than low-friction properties, then you're looking for graphite-enhanced SP-21. Automotive engineers love to use SP-21 for parts like thrust washers, bearings and seals—because the low-friction properties mean they work with or without lubrication.



SP-211 Need a lower coefficient of friction than SP-21? Not as concerned about thermal and wear resistance? SP-211 could be your solution. With Teflon[®] PTFE as an additive, the coefficient of friction is further reduced, even without lubrication.



SP-214 If you need a material that can supply low-frictional properties and the benefits of even a longer life than our SP-21, look to SP-214. It's an S-line solution designed to withstand some of your harshest conditions, in non-lubricated environments.



SP-22 Designing with tight tolerances? SP-22 is the answer. When you've no room for error, SP-22's minimal thermal expansion and dimensional stability give you the freedom to create exactly what you've imagined.



SP-221 Created for highly specialized applications—against soft metals in "non-lube" conditions. Its excellent coefficient of friction and good creep resistance mean that not only will your SP-221 part have excellent wear, but so will the soft metal parts that come in contact with it.



SP-224 Need a bearing material that offers all the benefits of SP-22, plus the advantage of stable frictional properties and longer life? SP-224 is your answer. This patented material goes the extra mile—providing additional load-carrying capability.



SP-3 Of course, working in vacuum and dry environments has its own challenges. Aerospace engineers have to worry about extra difficulties like outgassing. But SP-3 has proven high performance in aerospace applications, largely due to its ultra-low outgassing.



SMR-0454 & SMR-0747 High modulus, low elongation, high compressive strengths and low creep—these products provide them all. Graphite-filled for low friction, SMR-0454 and SMR-0747 offer the same thermal resistance as the SP products, with less deflection under load. The addition of carbon fibers in SMR-0454 gives extra benefits: a steel-like coefficient of thermal expansion and better thermal conductivity.



ST-2010 & ST-2030 Want a material that wears like SP-21, but with improved toughness and better thermal oxidative stability? Consider ST-2010 or ST-2030. These products even include better resistance to solvents, acids and bases.



SCP-5000 & SCP-50094 Materials designed for those demanding applications that require even more toughness, thermal stability and chemical resistance than ST-2010. SCP-50094 has been put to the test in ultra-high-stress environments like aircraft engines. So, it's ready for just about any design challenge. But for better plasma resistance, dimensional stability and chemical resistance than SP-1, check out SCP-5000.



SM-30084 As any engineer knows, sometimes strength lies in flexibility. Allow us to introduce SM-30084. It was originally developed to provide higher elongation for engine piston rings and valve spring washers. But, because of its outstanding strength, SM-30084 is being tested more and more, showing truly incredible versatility.



SMP-40025 S Line's "best in class" regarding thermal oxidation resistance and thermal stability. (It's even better than SCP-50094!) As such, SMP-40025 is ideal for use in jet engines—particularly high-vibration applications. Its high modulus and low elongation provide dimensional stability at temperatures and loads that make other polymers wilt.



SF-0920 Other materials "can't touch" SF-0920's superior thermal and electrical insulating properties, not to mention resilient cushioning. That's what sets SF-0920 apart from the rest of the Vespel[®] Parts and Shapes S line. This unique polyimide foam has high durability and thermal resistance that make it ideal for use in those "can't-touch" hot-material-handling applications. Plus, it's lightweight and safe—won't burn, offgas, or release toxic fumes.

VESPEL® TP LINE



Introducing the newest member of the Vespel® family — TP. This innovative thermoplastic material lets you improve functionality in ways you never thought possible. In fact, just like the S line, TP parts have superior wear, chemical and temperature resistance; you can even use them to replace metal and ceramic parts. And also like the S line, various TP products have been created to fit a variety of design specs.

STRENGTH OFTEN LIES IN FLEXIBILITY. THAT'S WHY WE CREATED TP.



TP-1012BK Gears that are quiet, flexible and strong. Bushings that can be UL-V0 rated for flame resistance. TP-1012BK gives you high-modulus parts with superior wear resistance in dry environments. Plus, they're an excellent value.



TP-2346 Not many flexible materials can hold up under heat, solvents and chemicals...especially in non-lubricated environments. But TP-2346 can, and on top of everything else, it has great wear resistance! That toughness makes it perfect for use in transmission shift pads, ATV thrust washers, clutch buttons and more.



TP-2875 Outstanding fuel and solvent resistance and a low coefficient of friction—TP-2875 is ideal for gasoline and diesel fuel-pump parts, thrust washers, and other applications in lubricated environments.



TP-8005 Translucent polyimide parts designed specifically for semiconductor and high-purity applications. Plasma etch chamber components made with Vespel® TP-8005 have excellent erosion resistance. Parts are either thermoformed or injection molded for excellent geometric versatility.



TP-8311 Looking for temperature-resistant parts with excellent mechanical properties? Whether you're working on lubricated or non-lubricated applications, TP-8311 is the answer. It can be used in shift lever bushings and thrust washers, plus gasoline or diesel fuel-pump applications.



TP-8541 When you need compressor valve poppets and vanes that can really take a beating, think of TP-8541. It has excellent mechanical properties (especially impact resistance), plus excellent chemical resistance and a high heat-deflection temperature.



TP-8549 TP-8549's excellent physical properties make it a great product for applications like blower motor bushings on business machines, scanner mirror bushings and more.



TP-8556 Seal rings require excellent compliance, wear and mechanical properties. TP-8556 does it all, and is especially easy to assemble in difficult manufacturing situations.

VESPEL®
CR
LINE



*Be prepared for the worst.
We're talking about some
of the harshest chemicals
in industry today. Luckily,
being prepared simply
means thinking Vespel® CR
when you're designing
for a tough chemical
environment. Plus, CR can
provide ultra-high purity
for semiconductor
applications, high-creep
resistance for seals, even
easy machinability for
tight-tolerance parts
like ball-valve seats.
And of course, aside from
chemical resistance, CR
falls in line with the other
Vespel® Parts and Shapes
families — with its high
resistance to conventional
wear and corrosion.
So, what could CR do
for your design process?*

STANDS UP TO YOUR TOUGHEST ACID TEST. NOT TO MENTION BASES, SOLVENTS AND OTHER CHEMICALS.



CR-6100 A Teflon® PFA body, reinforced with high-tensile-strength carbon fiber — CR-6100 offers excellent chemical resistance while exhibiting superior resistance to creep — even up to 550°F! It also provides excellent wear resistance and easy machinability for tight-tolerance applications. Add in a CTE lower than steel in the x-y plane (due to planar carbon-fiber reinforcement), and you have an ideal material for a variety of applications.



CR-6200 Has the same resistance to creep and chemicals as CR-6100, but with a more random orientation of its fiber. Consequently, CR-6200 doesn't exhibit the degree of x-y property orientation provided by CR-6100, but offers a balance of properties in the z and x-y directions instead.



CR-6300 & CR-6500 In some situations, the electrical conductivity of carbon fiber is a downright nuisance. That's why the forward-thinking engineers at DuPont are developing CR-6300 and CR-6500 — the glass- and quartz-fiber-reinforced versions of CR-6100. Coming soon.

VESPEL®
CP
LINE



COMPOSITES DESIGNED TO OUTLAST ALUMINUM OR TITANIUM. ACTUALLY, THEY'LL OUTLAST JUST ABOUT ANYTHING.



CP-0301 Sheet-molded and reinforced polyimide resin. Since it's lightweight yet tough, CP-0301 is ideal to use instead of aluminum or titanium in parts like aircraft brackets, gearbox adapter covers and seal plates. Plus, with CP-0301 tube clamps, you can create clamping systems that are more fatigue-resistant than those using die-cast aluminum.



CP-0644, CP-0648 & CP-0650 Washers that are lighter-weight than aluminum. Bushings that are ideal for high-temperature, high-friction, highly oxidative environments. Even self-lubricating slide blocks. CP-0644, CP-0648 and CP-0650 are fiber-reinforced composite fabrics that are stronger than powder-filled compositions, making your designs more durable.



CP-8000, CP-8001 & CP-8002 With high temperature resistance, high oxidation resistance, and enough strength to eliminate the need for metal, CP-8000, CP-8001 and CP-8002 are ideal for bushings in gas turbine engine compressors, balls for self-aligning spherical bearing assemblies and more. That extraordinary strength comes from fiber-reinforced polymer matrices—braided into a tube or rope for maximum toughness.

We know. For your designs to be successful, they have to do more than work well. They have to keep on working, year after year, in some pretty harsh user environments. Wear and impact resistance are key. You want polyimide tube clamps that can replace cast aluminum or titanium, slide blocks that are stronger than powder-filled compositions, and wear strips that are self-lubricating. That's why CP was created. We have an array of fiber-enhanced composites for a range of unique design needs.

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The miracles of science™

VESPEL®
ASB
LINE



HIGH-STRENGTH POLYMERS WITH METAL BACKBONES.

DESIGNED FOR THE HOTTEST APPLICATIONS.



ASB-0664, ASB-0826 & ASB-3000 Rod ends with ultra-high oxidation resistance. Self-lubricating track rollers. Wear-resistant, self-aligning spherical bearings. These polymer- and metallic-supported composites stand up to the toughest of engineering challenges. What's more, we can consider any assembly technique to fulfill your performance and cost-benefit requirements.



ASB-5000 SERIES There's heat, and then there's heat. The ASB-5000 family was created to withstand the kind of heat that melts glass. Our line of metal-supported composites should be first in mind when you need to design for intensely high-temperature environments. In such applications, ASB is superior to straight-metal parts, especially because of its self-lubricating properties.



ASB-7000 SERIES Sometimes you need a part to do double duty. This product combines the performance of non-polymeric materials with the excellent properties of our TP product line. Specifically, materials like steel or ceramic are insert-molded with our TP resin.



ASB-8000 SERIES Our S family has unique properties, which solve many difficult problems. But occasionally, customers need more geometric flexibility than our S products can provide. ASB-8000 products are composed of S parts overmolded with other engineered polymers.

The ASB family brings together our broadening product line for increased flexibility in developing a solution to meet your individual performance and value demands.

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The miracles of science™

For more information about DuPont™ Vespel®:

UNITED STATES

DuPont Engineering Polymers
Pencader Site
Newark, DE 19714-6100
Tel: 800-222-VESP
Fax: (302) 733-8137

EUROPE

DuPont de Nemours
(Belgium) BVBA-SPRL
Engineered Parts Center
A. Spinostraat 6
B-2800 Mechelen
Belgium
Tel: ++32 15 441527
Fax: ++32 15 441408

ASIA-PACIFIC

Japan DuPont K.K.
Arco Tower
8-1, Shimomeguro 1-chome
Meguro-ku, Tokyo 153-0064
Tel: 03-5434-6989
Fax: 03-5434-6982

Korea DuPont Korea Limited
4/5 Floor, Asia Tower, #726
Yeoksam-dong, Kangnam-ku
Seoul 135-082
Tel: 02-222-5200
Fax: 02-222-5470

Taiwan/
China DuPont Taiwan Limited
13th Floor, Hung Kuo Building
167, Tun Hwa North Road
Taipei, Taiwan 105
Tel: 02-719-1999
Fax: 02-712-0460