THE SCIENCE + TECHNOLOGY FOR ENGINEERING PLASTICS
BETTER PROPERTIES. BETTER PERFORMANCE. BETTER TOMORROW.
ENGINEERING A NEW WORLD. ENGINEERING

From your car’s dashboard or brake lights, to the cockpit in a 747, your storage tank to the switches and circuits in your house, from food packaging to the vials your medicines come in, plastics have a whole array of benefits. They are effectively replacing traditional engineering materials like metals and ceramics. Industries like automobiles, aerospace, construction, pharmaceuticals, food, packaging, electric and electronics have started relying on engineering plastics for the various properties and characteristics they impart. In fact, the global market for engineering plastics is growing at 15% per annum and is expected to touch $76.8 billion by 2017.
At STEER, we build platform technologies with precision engineering for a wide range of engineering plastics, from the basic variant to those created for specific applications and industries.

Whether it’s working with difficult-to-process plastics with high operating temperatures, viscosities and sensitivities or enhancing properties of commodity resins, or creating high-end polymers known for strength, high temperature performance and structural properties, we ensure that you get the best possible quality, stability, strength and value using our platform technologies.

And should you need to create something that is extremely specific and custom, STEER has 3 state-of-the-art Application Development Centers (ADC’s) to help create it for you.
PEEK
PEEK is a polyetheretherketone with excellent individual characteristics and is part of the thermoplastic high-temperature plastic group as it maintains its property profile in high-temperature ranges above 100 °C. PEEK, combined with chopped fiber is used in high-strength applications over 150°C.
APPLICATION EXAMPLES: Piston rings, Fastening hardware, Medical implants, Sliding components

PEK
PEK is similar to PEEK. It is best suited for high strength, high temperature applications. PEK is an important material for automotive, aerospace, nuclear, electronics, food and even medical industries.
APPLICATION EXAMPLES: LED light parts, Unmanned aerial vehicle (UAV) structures, Transport planes, EPS gear, Steering column adjust, Signal relays, Endoscopy, Chromatography

PEI
Polyetherimide (PEI) is a thermoplastic with high mechanical strength and rigidity. The material has high degrees of toughness, chemical resistance, superior limiting oxygen index and dimensional stability, besides demonstrating a high creep strength over a wide temperature range.
APPLICATION EXAMPLES: Aerospace parts

PPS
Polyphenylenesulphide (PPS) is a high temperature thermoplastic and high resistant polymer with high strength and hardness. Besides it has low water absorption, good dimensional stability and excellent electrical properties.
APPLICATION EXAMPLES: Coil formers, Bobbins, Terminal blocks, Electrical components, Lamp housings.

PBT
PBT belongs to the group of thermoplastic linear polyesters. PBT is typically reinforced with fibers and provides for high density, high degree of toughness and good thermal and dimensional stability. The fiber reinforcement makes PBT suitable for higher strength requirements like in industrial components and electronics industries.
APPLICATION EXAMPLES: High power lighting components, Ignition rotors, Distributor caps

PA6, PA66
Technical thermoplastics reinforced with fiber, PA6 and PA66 (with a higher melting point that PA6) have a high thermal stability and are best suited for automotive industries and mechanical engineering applications because of their high toughness and chemical and abrasion resistance.
APPLICATION EXAMPLES: Under-bonnet automobile parts and most components on Wind-surfers.

POM
POM is a thermoplastic produced by the polymerisation of formaldehyde. It is a versatile engineering plastic possessing varied properties, designed for use in construction and automotive industries. It combines high rigidity, with mechanical strength and affords good elastic properties, high toughness, dimensional stability and excellent sliding friction properties.
APPLICATION EXAMPLES: Gears, Sliding and guiding elements, Housing parts, Nuts, Fan wheels, Pump parts, Valve bodies.
A standard thermoplastic, PPE is usually only used after being modified by the addition of PS and reinforced with glass fiber. The material provides for high strength, hardness and rigidity with low moisture adoption. Due to its excellent dimensional stability and impact strength, it is suitable for components that face high levels of stress, like electronics.

APPLICATION EXAMPLES: Electronic equipment like Printer cartridges, Housing equipment

Glass-reinforced polycarbonate is finding principal applications in designs where metals, particularly die-cast aluminium and zinc, are commonly used. The addition of glass fibers to polycarbonate in various amounts (10%, 20%, 30% and 40%) increases tensile strength, stiffness, compressive strength, and lowers the thermal expansion coefficient. GF PC has excellent impact resistance and dimensional stability and is tougher than most plastics.

APPLICATION EXAMPLES: Impact shields, Electrical components, Scientific and analytical instruments, Fluid-handling components.

Polyamides are polymers containing monomers of amides, joined by peptide bonds. Polyamides have excellent impact strength and notch impact strength, very high chemical resistance and excellent stress cracking resistance.

APPLICATION EXAMPLES: Bearings, Automotive parts

ABS is a thermoplastic co-polymerisate made from acrylonitrile, butadiene and styrene monomers. ABS types with different combinations have a wide range of properties. ABS is extra tough, offers high strength and hardness, a high degree of chemical resistance, is virtually scratch-proof and has excellent machining properties.

APPLICATIONS: Carbon filaments in cables, Mirror housings, Hair dryers, Housing components, Musical instruments.

MATERIALS STEER TECHNOLOGY CAN DEVELOP:

FLAME RETARDANT
- Halogenated Flame Retardant
- Non-Halogenated Flame Retardant

GLASS FIBER REINFORCED
- PC + Chopped Glass Fiber
- Glass Fiber + Polyetherimide
- PPS + Glass Fiber Reinforced + PTFE Lubricated

MINERALS REINFORCED
- PA + Short Glass Fiber + Mica
- ABS + Mica + Glass Fiber
- PEEK + Glass Fiber + Talc
- PP + Mica
- Unsaturated Polyester + Mica
- PC + PET + Talc

CARBON REINFORCED
- PEK + Carbon Fiber
- POM + Carbon Fiber
- PPE + Carbon Fiber
- ABS + Carbon Fiber

BIO REINFORCED PLASTICS
- PP + Jute
- PP + Coir
- PP + Rice Husk
- PP + Chicken Feather
- PP + Wood

BLEND & ALLOYS
- Acrylonitrile Styrene Acrylate (ASA)+PVC
- ASA + PC
- ASA + PA
- ABS + NYLON
- PPO + PA
- ABS + Pa6
- PP + Pa6
- PMMA + ABS

Log on to steerworld.com for a detailed list of everything we help create
THE IDEAL PLATFORM FOR PROCESSING SUPERIOR ENGINEERING PLASTICS

KEY POINTS FOR ENGINEERING PLASTICS PROCESSING

- Can include extruder from 18mm to 140mm in size
- High volume screws with low shear attributes and a Do/Di of 1.5 or more is preferable
- Feed materials are usually of a high bulk density
- Compounding energy requirements vary significantly depending on the melt viscosity of the base resin and the content of reinforcements
- Line configuration may be horizontal or vertical depending on manufacture volumes
- Reinforcements are frequently added downstream, though filler levels are light to moderate.
- A typical process section for engineering thermoplastics is 36D-40D in length.

RECOMMENDATIONS FOR ENGINEERED PLASTICS

<table>
<thead>
<tr>
<th>Shear rate</th>
<th>Bulk density/Specific gravity</th>
<th>Specific energy</th>
<th>Horizontal/Vertical setup</th>
<th>100% premix or split feed</th>
<th>% of loading</th>
<th>L/D of the machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.5 / 0.9 g/cm³</td>
<td>0.2-0.3 kwh/kg</td>
<td>Depends upon the output of the extruder. Up to 800 horizontal setup is preferred and above 1000kg/hr vertical setup is preferred</td>
<td>Both can be adopted</td>
<td>5 to 50%</td>
<td>0.36-0.40</td>
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STEER’s innovative co-rotating twin-screw extruder (TSE) platforms make the compounding process consistent, effective, efficient and scalable. We think through every possible detail when it comes to designing, creating and implementing platform technologies that give you the highest possible quality at the best possible value.

THE REVOLUTIONARY OMEGA PLATFORM
1.71 Do/Di | For shear sensitive materials

THE MEGA SPECIAL
1.55 Do/Di | For everything else

* varies based on application process
BEATING CONVENTION WITH ‘FRACTIONAL-LOBE’ GEOMETRY

BEST-IN-CLASS PERFORMANCE

Only STEER platforms are built using the revolutionary ‘Fractional-Lobe’ geometry, replacing the conventional integer-lobe design. This patented design screw geometry eliminates shear peaks, is self-cleaning and ensures that energy is transferred uniformly to the materials being processed. It creates significant improvements in product quality and provides manufacturers with the capability and control required to work with sensitive materials. Besides, this design reduces the energy consumed considerably, increasing overall efficiencies.
SPECIAL ELEMENTS FOR BREAKTHROUGH OUTCOMES

RFV Elements

FME Elements

FKB Elements

SFV Elements

DSE Elements
A WORLD LEADER IN MATERIALS PLATFORM TECHNOLOGY THAT EFFECTIVELY TRANSFORMS AND FUNCTIONALISES MATERIALS IN THE FIELD OF PLASTICS, PHARMACEUTICALS, FOOD & NUTRACEUTICALS, BIOMATERIALS AND BIOREFINING.

ADVANCED TECHNOLOGY
STEER is committed to the design, creation and implementation of advanced technology to deliver greater performance, better stability and superior characteristics in biomaterials, food, nutraceuticals, pharmaceuticals, paints and plastic products. Whether it is the 9 patents we hold or the 20 others we have applied for, everything we create at STEER is a result of the coming together of science and technology to help steer a new world.

FOCUS ON INNOVATION
STEER is driven by continuous innovation and engineering excellence. The 500+ gifted engineers, technicians and scientists at STEER love challenging convention. For instance, the Omega platform technology with a 1.71 Do/Di and the patented ‘Fractional-Lobe’ design is setting a new standard in co-rotating twin-screw extruder lines and opening up new possibilities in the creation of advanced materials.

APPLICATION DEVELOPMENT CENTERS
A leader in materials development, STEER has 3 state-of-the-art Application Development Centres (ADC) across the U.S., India and Japan. Each ADC is dedicated to progressive research and comes fully equipped to develop new and advanced compounding applications capable of positively impacting the way we live, the food we eat or even the medicines we need.
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5 REASONS THAT MAKE STEER, STEER!

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GLOBAL OFFICES, SATELLITE OFFICES

3 APPLICATION DEVELOPMENT CENTERS

1 STATE-OF-THE-ART FOUNDRY FOR SPECIAL STEEL

700+ CUSTOMERS IN 36 COUNTRIES

500+ EMPLOYEES

9 PATENTS HELD, 20 APPLIED FOR

USED BY OVER 5500 LINES

MAKE STEER, STEER!

COST PERFORMANCE

At STEER we are focussed on creating maximum value for our partners and our customers. Every platform, element or equipment produced at STEER is designed to provide a superior return on investment and best-in-class performance.

RAPID RESPONSE UNITS

24x7, 365 days of the year, STEER has a dedicated support team of engineers and technicians to cater to your needs, quickly and efficiently.

Global Office  Satellite Office  Application Development Center  Countries Served  Foundry
NO MATTER WHERE YOU ARE, YOU ARE NEVER FAR FROM A **STEER STAR**

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