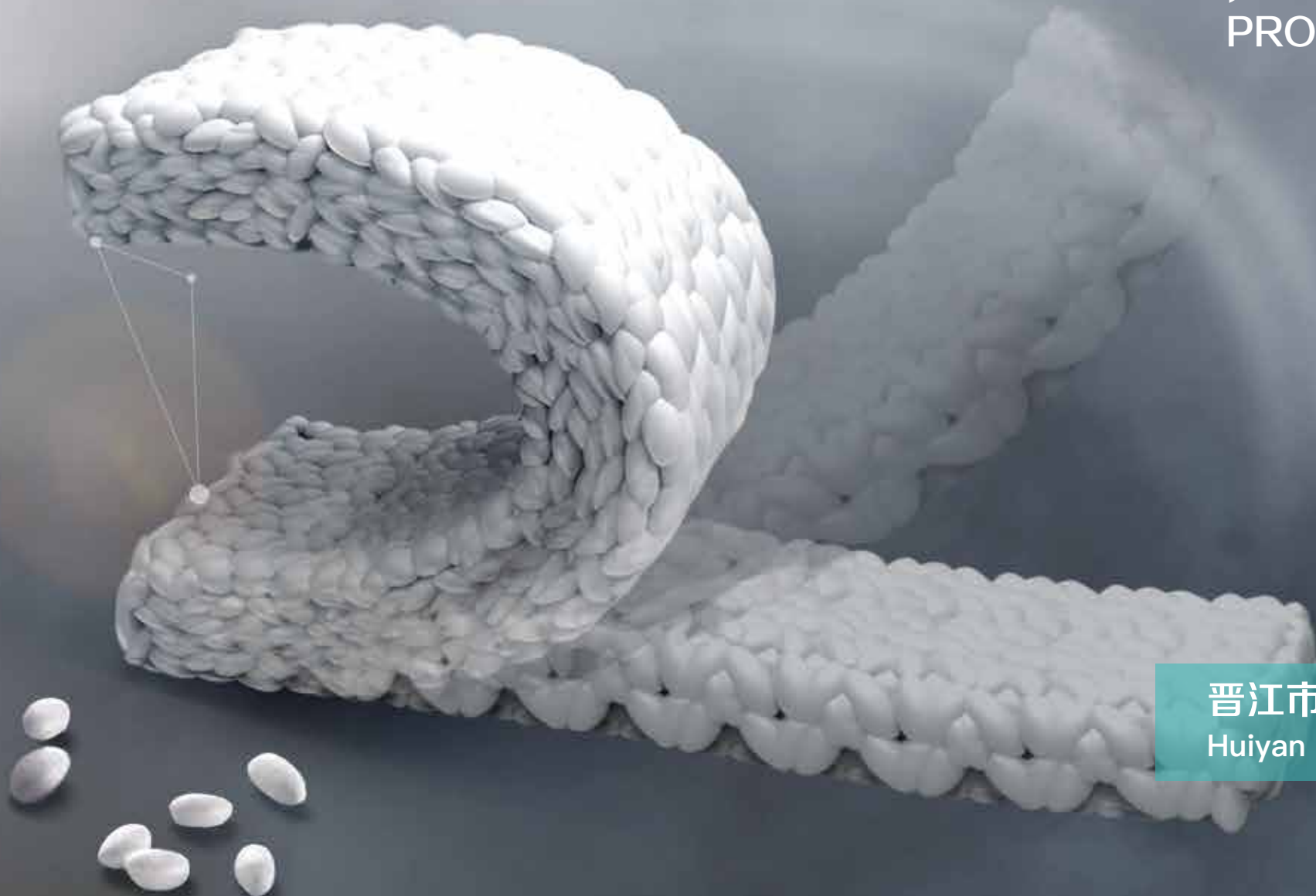


# 产品手册

PRODUCT MANUAL



晋江市辉燕塑胶有限公司  
Huiyan Polymers Co.,Ltd

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## ▶ 公司简介 Corporate Information



### 晋江市辉燕塑胶有限公司 Huiyan Polymers Co.,Ltd

辉燕塑胶有限公司是一家依托于强大的科研团队，致力于E-TPU新材料的研发和应用推广，将科研和销售紧密链接的生产企业。公司主要生产膨胀热塑性聚氨酯（E-TPU）是一种新型高分子材料。具有环保，超轻密度，不易变形，高耐磨，耐温变，耐黄变等特点。可广泛用于鞋材行业、包装材料、缓冲垫片、震动阻尼材料、汽车内饰材料和轮胎等。

As an manufacturing enterprise based on a credible science team, Huiyan Plastic Co., Ltd. is devoted to the research, application and popularization of E-TPU, as well as the integration of researching and marketing. Our major product E-TPU is a new polymer material of environmental friendliness, ultra low density, and resistance to deformation, abrasion, temperature change and yellowing. It can be widely used in shoes, packaging, cushions, vibration dampers, automobile interiors, tires, etc.

### 公司文化 Corporate culture

我们坚信有使命感的创新才能创造出有生命力的科技，有责任感的企业才会有可持续的未来！公司坚持质量为本，科研为先，服务制胜的核心价值观，愿与全世界范围内的同行与客户紧密合作，创造和推广更多，更完美的产品和应用。

We believe that only innovation with a sense of mission can create technology of vitality, and only responsible enterprises can achieve sustainable development! Our core value is quality oriented, with priority on research and advantage in service. We wish to create and promote more and better products as well as applications in close cooperation with our peers and clients around the world..

## ETPU技术简介 Introduction to ETPU Technology

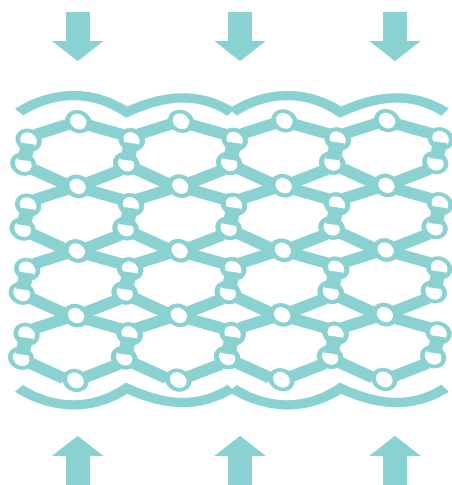
- 工程塑料发泡技术是本公司自主研发的制备超轻材料的技术  
Engineering plastic foaming, the technology researched and developed by our company, produces ultra-light materials.
- 主要采用气相微分的原理，首先将气体渗透到材料内部  
According to gas phase differentiation, gas is infiltrated into materials.
- 再通过改变环境条件，使得气体扩散膨胀  
Then gas is inflated and expanded by changing environment.
- 最后通过冷却材料将气体保存在材料内部形成微孔发泡材料。  
At last, by cooling down materials, gas is kept and microcellular foaming materials are formed.

## ETPU材料简介 Introduction to ETPU

运用气相微分原理制备的新型TPU发泡颗粒，该颗粒内部含有大量微孔结构，泡孔直径从30微米到300微米不等，由于泡孔内裹有大量空气，颗粒能像爆米花一样膨胀为原来体积的5-8倍，相比于传统发泡材料，其独特的发泡原理赋予颗粒以超低的密度，超强的回弹性和柔韧性。当制成鞋中底时，利用蒸汽模压工艺将若干颗发泡颗粒加工成所需要的形状，过程中发泡颗粒最外层轻微融化，同时内部气孔不受影响。鞋中底受到压力后，可压缩至一半大小，压力消失后可迅速回弹到原来的形状，大大减轻脚底所承受的震动力。同时ETPU的应用范围也可以很广，家具填充，运动防护，婴童防护，跑道，汽车阻尼，汽车内饰，爬行垫等等...

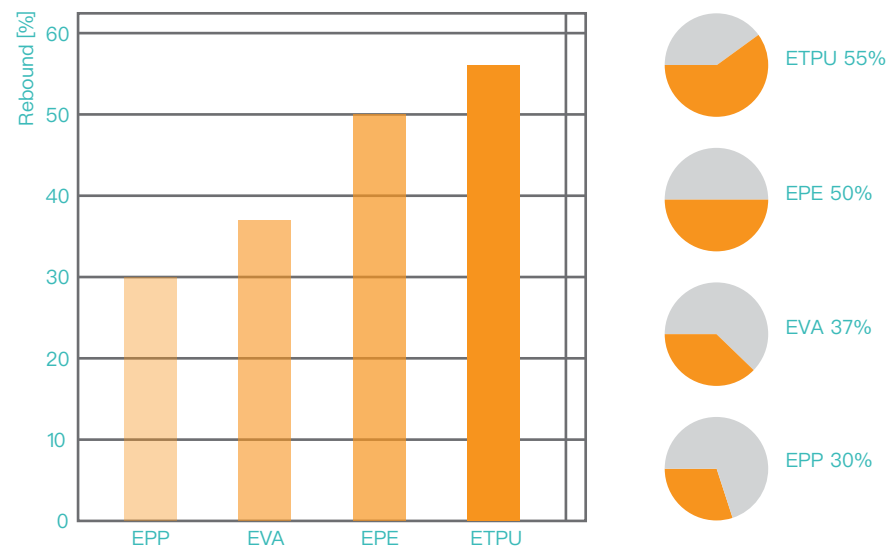
Guided by gas phase differentiation, TPU materials are made into ultra-light expanded TPU beads with high resilience. Like popcorn, these beads can expand to 5 to 8 times of the original size. There are numerous cells whose diameters range from 30 to 300um containing plenty of air inside the beads. The closed cells give low density, high resilience and elasticity to the expanded beads, compared with traditional foaming materials. When made into soles, countless beads are turned into needed shapes through steam molding process during which the surfaces of beads melt a little to adhere into fixed geometry, while interior cells do not change. The sole made from expanded beads compresses to half the size under impact, largely reducing the pressure on the foot. And the sole springs back into its original shape immediately after impact. In addition, ETPU can also be applied to fillers for furniture, protective sports equipment, the protection of babies, tracks, dampers, automobile interiors, play mats, etc.

## ETPU七大性能 Seven Reasons for Popcorn



- |   |  |
|---|--|
| ● 1.高回弹 发泡tpu的回弹性可达55%以上<br>High resilience                                       | Expanded TPU achieves a rebound of over 55%.   |
| ● 2.极佳环保性 发泡tpu材料及整个制备工艺均为绿色环保<br>Excellent environmental friendliness            | Expanded TPU and the whole process are green and environment friendly.                           |
| ● 3.低温性能好 在零下20度，发泡tpu材料依然保持良好的回弹性和柔韧性<br>Outstanding low-temperature performance | At extremely low temperatures of -20°C, expanded TPU still keeps high resilience and elasticity. |
| ● 4.超轻的密度 可制备密度范围在0.15-0.25g / cm 的发泡TPU颗粒。<br>Low density                        | Expanded TPU beads of 0.15-0.25g/cm can be produced.   |
| ● 5.高耐磨性 发泡TPU材料的磨耗量测试值低<br>High abrasion resistance                              | Tests show the abrasion of expanded TPU is low   |
| ● 6.高耐折性 发泡TPU制品耐折次数高于12万次。<br>High folding resistance                            | Folding resistance degree of expanded TPU exceeds 120,000.                                       |
| ● 7.耐发黄性 发泡TPU材料耐黄变性强<br>Good yellowing resistance                                | Expanded TPU is resistant to yellow changing.  |

## ETPU鞋底应用 Application in the sole



Test item		Test standard	Limit Value	Result	Conclusion
Before the aging test	Tensile Strength Mpa	GT/B 14833-2011	≥0.4	0.91	Up to standard
	Elongation at break %	GT/B 14833-2011	≥40	122.6	Up to standard
After the aging test	Tensile Strength Mpa	GT/B 14833-2011	≥0.4	0.87	Up to standard
	Elongation at break %	GT/B 14833-2011	≥40	118.5	Up to standard

检测项目		检测依据	限量值	检测结果	判定
老化试验前	拉伸强度 Mpa	GT/B 14833-2011	≥0.4	0.91	符合
	拉断伸长率 %	GT/B 14833-2011	≥40	122.6	符合
老化试验后	拉伸强度 Mpa	GT/B 14833-2011	≥0.4	0.87	符合
	拉断伸长率 %	GT/B 14833-2011	≥40	118.5	符合

TPU材料运用气相微分的原理制备了超轻高弹的TPU发泡颗粒。该颗粒像爆米花一样膨胀到原来体积的5-8倍，颗粒内部含有大量微孔结构，泡孔内部包裹着大量的空气，泡孔直径从30微米到300微米不等。这些密闭气泡能够赋予发泡颗粒以优异的超低密度、较高的回弹性和柔韧性。利用蒸汽模压工艺将若干颗发泡颗粒加工成所需形状的制品，在这个过程中发泡颗粒最外层轻微熔化并粘连成稳定形状，同时内部气孔结构不受影响。当制品为鞋底时，鞋底受到压力后，可压缩到一半大小，大大减轻脚底所承受的震动力，压缩力消失后，鞋底可迅速回弹恢复到原来的形状。

Guided by gas phase differentiation, TPU materials are made into ultra-light expanded TPU beads with high resilience. Like popcorn, these beads can expand to 5 to 8 times of the original size. There are numerous cells whose diameters range from 30 to 300um containing plenty of air inside the beads. The closed cells give low density, high resilience and elasticity to the expanded beads, compared with traditional foaming materials. When made into soles, countless beads are turned into needed shapes through steam molding process during which the surfaces of beads melt a little to adhere into fixed geometry, while interior cells do not change. The sole made from expanded beads compresses to half the size under impact, largely reducing the pressure on the foot. And the sole springs back into its original shape immediately after impact.

## 家具填充 Fillers for sofas and mattresses



### 01

高承托性,高弹力快速回弹,可以很好的吸收冲击力并作用于身体,避免对脊柱的冲击,提供足够的舒适性和支撑力让您拥有良好的睡眠和休息。

Strong holding power, high elasticity and swift resilience enable ETPU to absorb impact forces and react to the body, so forces on the spine are avoided and comfort as well as holding power are sufficient. Thus you can enjoy a sound sleep and rest.

### 02

ETPU 材料无味环保,经过各项严格检测,均未检测出对身体有害的物质,可以很好的保护您和您家人的安全,且可降解。

ETPU is smell free and environment friendly. Rigorous inspections show no harmful substances, so this degradable material can well protect the health of you and your families.

### 03

ETPU 材料的超轻密度,可以使整个填充材料具备良好的透气性。

Low density of ETPU makes fillers breathable

### 04

易于保养,防水,耐黄变。可以大大增加家具的使用寿命,在使用很久之后性能不受太大影响。

ETPU is easy to maintenance, waterproof and resistant to yellow changing, so the furniture is durable and the properties will not be seriously damaged after long use.

### 05

高韧性、耐型变、耐温变不仅延长使用家具寿命,更可以为身体提供足够的支撑力有效的缓解久坐对身体的伤害。

High tenacity, deformation resistance and temperature change resistance of ETPU not only prolong the life span of furniture, but also support the body effectively so as to relieve the damage of sedentariness.

## ▶ 运动防护 Applied to protective sports equipment

极佳的减震缓弹性能, 能为人体提供强大支撑力同时最大程度吸收剧烈运动中所产生的相互作用力。ETPU 良好的减震效果能大大降低人体在运动中所产生的对人体骨骼的损耗。在对 ETPU 的各项有害物质抽检当中, 有害物质的含量均低于国家标准, 生产过程当中也不会产生有害气体和物质, 选择 ETPU 可以让使用者更放心地运动。ETPU 材料低密度, 大大减少成型之后安装到坐垫的重量。可以减少自行车或者摩托车的重量, 为运动者减少运动负担, 加快运动速度。



- 健身地垫  
Gym floor mats
- 自行车、摩托车坐垫  
Bike helmets
- 运动防护垫  
Exercise mats
- 自行车、摩托车头盔填充  
Bike helmets

Marvelous shock absorption and resilience can strongly support the human body and take in as much interaction force as possible in strenuous exercise. With superb shock absorption, ETPU can significantly alleviate the damages on bones in exercise. The sampling inspection shows that the amount of harmful substances in ETPU is lower than national standards, and the manufacturing process produces no deleterious gases or substances. The ultra low density means that shaped ETPU installed to seats is very light. As the weight of bikes or motorbikes is reduced, it is easy for the riders to speed up.

## ▶ 婴童防护 To protect babies and kids

▶ 我公司 E-TPU 具有以下特点:

- 01** 材料本身及加工过程无味环保, 保证婴幼儿更安全的娱乐环境。  
Both ETPU and its manufacturing process are environment friendly without smell. Babies and kids are better protected when having fun.
- 02** 具有温和 Q 弹的触感, 轻便透气营造舒适运动空间。  
Soft and springy, light and breathable. Comfortable for sports.
- 03** 由独立的充气颗粒组成, 拥有绝佳的冲击力吸收及能量返还效果, 大大减少婴幼儿在游戏中摔碰的风险, 对膝盖, 腕关节和韧带也起到保护作用。  
Composed of independent inflated beads. Excellent in absorbing impact forces and returning energy. Less risks for babies and kids to fall down or bump. Protective to knees, wrist joints and ligaments.
- 04** 优良的抗老化及耐候性, 温差下的物性保持和耐磨、耐撕裂的特性便于收纳存放, 大大延长爬爬垫使用期限。  
The remarkable aging resistance and weather resistance. Easy to be stored due to stable physical properties regardless of temperature difference, abrasion and tear resistance. All the qualities prolong the service life of play mats.





## ▶ 汽车填充 Fillers for cars

- 汽车外置座椅套
- 汽车座椅填充
- 汽车阻尼

沥青阻尼片有不同的类型，主要分为热熔型、自粘型和磁吸型。沥青按照来源主要可分为煤焦油沥青和石油沥青，前者是毫无疑问的严重有毒有害物质，而后的毒性相对有限。汽车使用沥青阻尼片这一事实并不可怕，可怕的是使用不达标甚至煤焦油沥青材质的阻尼片。煤焦沥青显然不可能达到车辆生产的要求；而国内主要阻尼片企业都是从大庆等油田直接采购石油沥青做材料。绝不能说石油沥青没毒，但这种毒性相对轻微，在国际癌症研究中心(IARC)致癌物分类(2005)中显示，煤焦油沥青属于1类致癌物，但气化沥青提取物，以及工人在铺路等工作中直接暴露在沥青及其挥发物等情况，都被归类于2B类，也就是“可能致癌但没有明确的证据”。我公司的大独创技术之一，高端净味配方，无任何刺鼻气味产生，施工者的安全都有保障。在对ETPU进行各项有害物质苯、甲苯和二甲苯总和、游离甲苯二异氰酸酯(TDI)、可溶性铅、可溶性镉、可溶性汞、的检测中，都符合标准。让您拥有健康的乘车环境同时，ETPU良好的减震缓弹性也可以让您的汽车有很好的减震降噪效果。

in which the amount of formaldehyde should not exceed 10mg/kg and volatiles 1.5%. There are many types of asphalt damping plates, including hot-melt, self-sticking and magnetic ones. In terms of source, there are coal-tar asphalt and petroleum one, among which the former is undoubtedly poisonous and harmful while the latter is less poisonous. What is terrible is not that cars employ asphalt damping plates, but that they use substandard asphalt or even coal-tar asphalt which clearly cannot meet the requirements of vehicle production. Furthermore, the petroleum asphalt used by main domestic companies of damping plates from oil fields like the one in Daqing is by no means non-toxic, because it is only relatively less poisonous. Based on the Cancer Hazard Ranking (2005) by IARC, coal-tar asphalt is classified as a Group 1 carcinogen, whereas the gasification of asphalt and laborers' direct contact with asphalt or its volatiles when paving a road are defined into Group 2B, substance which is "possibly carcinogenic without clear proof". ETPU it is advanced and clean without any pungent smell, therefore the safety of constructors is guaranteed. ETPU meets all the regulations about harmful substances, including benzene, toluene and xylene, TDI, soluble lead, soluble cadmium, soluble chrome, and soluble mercury



## ▶ 跑道应用 Application in tracks



从2014年开始北京、苏州、无锡、南京、常州、深圳、上海、河北等地，大量的学校升级改造，使用塑胶跑道替代原有操场材料，但是由于缺乏监管体制，塑胶跑道的质量堪忧，一些不良商家采用有毒材料施工，给使用跑道的师生身体带来很大的伤害。小小的跑道，慢跑道，运动地塑却承载国人的健康和未来。我公司的ETPU颗粒经过加压加热预处理后，每颗TPU（是一种耐磨、耐撕裂的热塑性弹性体材料）粒子能膨胀到原体积10倍；于是就形成内含微型密闭气泡的椭圆形非交联发泡颗粒ETPU将EPTU用于跑道、地塑、慢跑道。

Since 2014, numerous schools in Beijing, Suzhou, Wuxi, Nanjing, Changzhou, Shenzhen, Shanghai and Hebei Province started to upgrade their playgrounds with plastic tracks. However, the quality has been at risk at due to a lack of supervision, and some fraudulent contractors even adopted toxic materials which greatly impaired the health of teachers and students. A few miles of tracks (including jogging tracks) and plastic playgrounds are related to the health and future of our nation. Therefore, the importance of ETPU is clear. After the pretreatment of heat and pressure, all TPU beads (thermoplastic elastomers resistant to abrasion and tear) will expand by 10 times into ETPU, oval non-crosslinked foaming beads with micro closed cells inside. For the sake of health, it is suggested to apply ETPU in tracks (including jogging tracks) and plastic playgrounds.

### ▶ ETPU相比于老式跑道 Compared with traditional tracks, ETPU is

- 安全环保，无害无味  
Safe and environment friendly, free of harm and smell
- 平整度好，触感好  
Smooth and tactile
- 抗压强度高，不易变形  
Resistant to pressure and deformation
- 绝佳的缓冲和回弹性能，可调节弹力输出以适应不同要求。  
Excellent buffering and resilience, with adjustable elasticity in response to different requirements,
- 物理性能长期稳定，耐磨，耐高温  
Stable physical properties, resistant to temperature difference and abrasion.



晋江市辉燕塑胶有限公司

Huiyan Polymers Co.,Ltd

# TO BE CONTINUED

E-TPU 优越的物性和环保特性将在未来拥有更多的可能 .....

Given the excellent physical properties  
and environmental friendliness,  
E-TPU has a promising future.



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