BOYD

TRUSTED INNOVATION

THERMOPLASTICS • 热塑材料

BOYD - WORLDWIDE ENGINEERED MATERIALS - SINCE 1928

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BOYD NIVELLES

Located in the heart of Europe, close to Brussels, **BOYD** Nivelles in Belgium has been designing, manufacturing and marketing high-tech parts since 1946. Recognised as a leader on the European market in the **elastomers, cellular rubbers and expanded plastics sector**, in recent years **BOYD** has expanded its range of materials to include **composites and thermoplastics**. Today, this expansion of the range allows **BOYD** to cover all **polymer-based** materials (elastomers, cellular rubbers, expanded plastics and **thermoplastics**), as well as composite materials with thermosetting, thermoplastic and elastomeric matrices. Clearly, **BOYD** aims to offer its customers the broadest possible portfolio of high-tech products, covering the most diversified range of applications.

THERMOPLASTICS

BOYD'S MOST RECENT PRODUCT RANGE

The range of **thermoplastic** products was developed a few years ago at our customers' request, with the aim of supplementing the polymer product range. Today, this range represents a growing part of our turnover.

BOYD NIVELLES 公司

BOYD Nivelles 地处欧洲核心，毗邻布鲁塞尔，是一家专业从事高科技部件设计、生产及销售的比利时公司，其悠久的历史可一直追溯至 1946 年。作为弹性材料、海绵橡胶及泡沫塑料行业的欧洲市场领军企业，**BOYD** 在近些年内还大大拓宽了自身的合成及热塑材料系列产品。如今，这一系列拓展更令 **BOYD** 的产品涵盖了所有以聚合物为基础的材料 (弹性材料、海绵橡胶、泡沫塑料及热塑材料)，并一举将全部热固及热塑性基质合成材料纳入麾下。很显然，**BOYD** 的愿景就是为客户提供覆盖多样化应用范围的全方位高科技产品系列。

热塑材料

几年前，开发热塑材料系列产品的初衷是为了更好地为客户提供服务，并推荐使用以聚合物为基础的整个系列产品，而目前此系列产品的销售额却年年增长。

Polycarbonate (PC)

GPLAST

GPLAST

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Polyethylene (PE-LD)

BOYD processes mass-market **basic thermoplastics** and **industrial and technical plastics**, as well as **high-performance variants** for special applications. These products are intended not only for traditional industrial applications but also for high-tech industries such as **railways, aeronautics, nuclear, energy, medical**, etc.

Thanks to its partnerships with several European laboratories and research centres, **BOYD** has become a specialist in the development of **accredited thermoplastics** complying with several **international standards** such as:

- Fire/smoke standards for railways and buildings (EN-45-545, NFPA130, NF F-16-101, DIN 5510, UL94, NBN EN 13501-2, etc.).
- FAR, NFL, ASTM, BOMBARDIER SMP800 standards for the aeronautical and space industries.
- Food standards (e.g. FDA: Food and Drug Administration).
- Standards for drinking water (e.g. ACS), etc.

BOYD 公司加工的热塑产品包括普通大众消费类产品，工业和技术用热塑产品以及特殊用途的高性能产品。这些产品不仅应用于传统的工业，而且还应用于先进的技术行业，如铁路、航空、核能、能源和医疗等。

通过与几家欧洲研究中心和实验室建立合作伙伴关系，**BOYD** 还可以根据下列几种热塑国际标准开发自己的认证，如：

- 铁路及建筑消防-排烟标准 (EN-45-545、NFPA130、NF F-16-101、DIN 5510、UL94、NBN EN 13501-2、…)
- 航空航天标准 FAR、NFL、ASTM、BOMBARDIER SMP800
- 食品标准 (如 FDA: 食品药品监督管理局)
- 饮用水标准 (如 ACS…)

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THERMOPLASTICS RANGE
GPLAST

BOYD offers its customers a full range of **amorphous or semi-crystalline thermoplastics** which can be easily identified by their product reference beginning with the letters **GPLAST**. This range includes all the **machinable** thermoplastics most commonly used in industry.

These can generally be classified into four distinct categories based on their **maximum working temperature** (Tu), their **chemical and mechanical resistance**, and **degree of crystallinity**. These four categories respectively comprise mass-market **basic thermoplastics** with a Tu below 65 °C, industrial thermoplastics with a Tu of between 65 °C and 120 °C, **technical thermoplastics** with a Tu of between 120 °C and 230 °C, and finally **high-performance thermoplastics** with a Tu above 230 °C. Each of these categories can in turn be divided into two sub-categories according to whether the material is amorphous or semi-crystalline (see table and diagram).

Generally speaking, the thermal and/or chemical performance of machinable thermoplastics depends on their T_U. It should be noted that the T_U of a thermoplastic is below its **melting temperature** (T_m), i.e. the temperature at which the material becomes liquid. In terms of physical properties, the **glass transition temperature** (T_g) of a thermoplastic represents the temperature interval over which the material passes from a rubbery state to a glassy state, i.e. a solid state.

BOYD requires all its suppliers of thermoplastics to have their products certified according to the two European **REACH** and **RoHS** directives concerning the use of hazardous substances.

GPLAST
系列热塑产品

BOYD 可以为客户提供全系列的无定形或半结晶热塑性材料，其参考号均以 **GPLAST** 字母开头以便于识别。该系列产品包含最常用于所有工业的可加工热塑产品。这些产品可以根据最大使用温度 (T_U) 及其机械性能、热性能和化学性能分为四种不同类别。四种类别分别包括大众消费类普通热塑性材料，(T_U) 低于 65° C 时；工业用热塑材料，(T_U) 在 65° C 和 120° C 之间；技术性热塑性材料，(T_U) 在 120° C 至 230° C 之间；高性能热塑性塑料，(T_U) 大于 230° C 时；并且，每个类别都可以根据材料是无定形还是半结晶分成两个小类 (请参阅下面的表格和图表) 。

*请注意，使用的热塑性材料的最高温度低于其熔化温度 (Tf)。在物理性质方面，热塑性材料的玻璃化转变温度 (T_V) 表示的温度范围是该材料从橡胶胶态向玻璃状态 (即固体) 转变的温度。

BOYD 公司要求所有热塑原材料供应商的产品在危险品使用方面必须获得 **REACH** 及 **RoHS** 欧洲两大法令的认证

Ultra-high molecular-weight polyethylene (PE-UHMW)

Polypropylene (PP)

TABLE 1 - DISTRIBUTION OF MACHINABLE THERMOPLASTICS ACCORDIND TO THEIR MAXIMUM SERVICE TEMPERATURE, CHEMICAL AND MECHANICHAL RESISTANCE, AND DEGREE OF CRYSTALLINITY

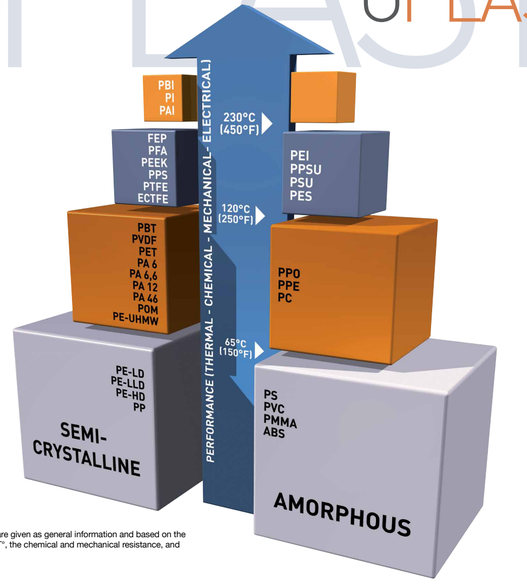
SEMI-CRYSTALLINE		AMORPHOUS	
Standard thermoplastics (T < 65°C)			
PE-LD :	Low-density polyethylene	**PS :**	Polystyrene
PE-LLD :	Linear low-density polyethylene	**PVC :**	Poly (vinyl chloride)
PE-HD :	High-density polyethylene	**PMMA :**	Poly (methyl methacrylate)
PP :	Polypropylene	**ABS :**	Acrylonitrile butadiene styrene copolymer
Industrial thermoplastics (65°C ≤ T < 120°C)			
PBT:	Polybutylene terephthalate	**PPO :**	Poly (p-phenylene oxide)
PVDF :	Polyvinylidene fluoride	**PPE :**	Poly(p-phenylene ether)
PET :	Polyethylene terephthalate	**PC :**	Polycarbonate
PA 6 :	Polyamide 6		
PA 6,6 :	Polyamide 6,6		
PA 12 :	Polyamide 12		
PA 46 :	Polyamide 46		
POM :	Polyoxymethylene (polyacetal)		
PE-UHMW:	Ultra-high molecular-weight polyethylene		
Technical thermoplastics (120°C ≤ T < 230°C)			
FEP:	Fluorinated ethylene propylene copolymer	**PEI :**	Poly (etherimide)
PFA :	Perfluoroalkoxy	**PPSU :**	Poly(phenylsulfone)
PEEK :	Polyetheretherketone	**PSU :**	Polysulfone
PPS :	Poly (p-phenylene sulfide)	**PES :**	Poly(ethersulfone)
PTFE :	Polytetrafluoroethylene		
ECTFE :	Ethylene chloro trifluoroethylene		
High-performance thermoplastics (T > 230°C)			
PBI :	Poly (benzimidazole)		
PI :	Polyimide		
PAI :	Polyamide-imide		

表格 - 可加工热塑材料基于最大使用温度和性能的分类

半结晶		无定型	
普通热塑 (T < 65°C)			
PE-LD :	低密度聚乙烯	**PS :**	聚苯乙烯
PE-LLD :	线性低密度聚乙烯	**PVC :**	聚氯乙烯
PE-HD :	高密度聚乙烯	**PMMA :**	聚 (甲基丙烯酸甲酯)
PP :	聚丙烯	**ABS :**	丙烯腈 - 丁二烯 - 苯乙烯共聚物
工业热塑 (65°C ≤ T < 120°C)			
PBT:	聚 (对苯二甲酸丁二醇酯)	**PPO :**	聚 (对 - 亚苯基氧化物)
PVDF :	聚 (聚偏氟乙烯)	**PPE :**	聚 (亚苯基醚)
PET :	聚 (聚对苯二甲酸乙二醇酯)	**PC :**	聚碳酸酯
PA 6 :	聚酰胺		
PA 6,6 :	聚酰胺		
PA 12 :	聚酰胺		
PA 46 :	聚缩醛		
POM :	聚缩醛		
PE-UHMW:	超高分子量聚乙烯		
技术热塑 (120°C ≤ T < 230°C)			
FEP:	氟化乙烯丙烯共聚物	**PEI :**	聚 (醚酰亚胺)
PFA :	全氟烷	**PPSU :**	聚 (苯基砜)
PEEK :	聚 (醚 - 醚 - 酮苯基)	**PSU :**	聚砜
PPS :	聚 (苯硫醚)	**PES :**	聚 (醚砜)
PTFE :	聚 (四氟乙烯)		
ECTFE :	聚 (乙烯 - 共 - 三氟氯乙烯)		
高性能热塑 (T > 230°C)			
PBI :	聚 (苯并咪唑)		
PI :	聚酰亚胺		
PAI :	聚酰胺 - 酰亚胺		

CHART - DISTRIBUTION OF MACHINABLE THERMOPLASTICS ACCORDIND TO THEIR MAXIMUM SERVICE TEMPERATURE, CHEMICAL AND MECHANICHAL RESISTANCE, AND DEGREE OF CRYSTALLINITY*

图表 - 可加工热塑材料基于最大使用温度和性能的分类*



* The T° in the above graphic are given as general information and based on the maximum allowable service T°, the chemical and mechanical resistance, and the degree of crystallinity.

MANUFACTURING
AN ULTRA-MODERN MACHINING CENTRE

Thanks to its expertise in **the machining of thermoplastic materials (milling, turning, cutting, drilling, tapping, etching, etc.)** and an ultra-modern set of machines including several milling tables and 3-5 axis machining centres (NC), **BOYD** is capable of satisfying its customers' most exacting requirements. All machined parts supplied by **BOYD** to its customers comply with the quality criteria imposed by the main international standards (IEC, ISO, etc.).

生产制造
超级现代的机械加工中心

可凭借其在热塑材料机械加工领域的专业技术 (切割、铣削、车削、钻孔及攻丝)，以及由众多铣削工作台及 3 至 5 轴机械加工中心 (CN) 组成的超级现代设备园区，完美满足客户最苛刻的各种需求。**BOYD** 向客户提供的所有机加工部件，均可完全符合以下主要国际标准要求的质量标准 (如IEC, ISO等)

A WIDE RANGE OF FINISHED AND SEMI-FINISHED PRODUCTS

Thermoplastics are processed into **semi-finished** or **finished products** by using various manufacturing processes, i.e. chiefly **machining** but also **moulding, stamping and extrusion**.

THE RESULTING PRODUCTS ARE AVAILABLE IN THE FORM OF:

- Plates
- Tubes
- Bars
- Machined parts
- Injection-moulded parts
- Stamped parts
- Cut parts
- Extruded profiles

种类齐全的成品及半成品系列

经过机械加工、冲压、模塑或挤压拉伸等多个主要生产流程后，热塑材料被加工成半成品或成品。

可以选择下列各种产品：

- 机加工部件
- 模具注塑件
- 冲压件
- 切割件
- 挤压件
- 冲壓件
- 切割件
- 擠壓型材

Polyamide 6 (PA6)

THE THERMOPLASTICS IN THE GPLAST RANGE ARE USED IN PARTICULAR FOR THE FOLLOWING INDUSTRIAL APPLICATIONS:

- Resistance to extreme temperatures (> 300 °C continuous)
- Dimensional stability at high temperature
- Resistance to wear and friction
- Electrical and dielectric insulation
- Thermal insulation
- Chemical and hydrolysis resistance
- Mechanical strength and rigidity (e.g. shock resistance)
- Dissipation of electrostatic charges
- Resistance to UV rays and atmospheric agents
- Resistance to high-energy radiation (X rays and gamma rays)
- Resistance to high-temperature creep
- Inert food contact
- Excellent fire resistance and low toxicity of combustion fumes (GRAIL range), etc.

GPLAST系列热塑材料工业应用领域非常广泛，主要包括：

- 耐极端温度 (持续温度超过 300 °C)
- 在高温下的尺寸稳定性
- 耐磨损和耐摩擦
- 电气和介电绝缘
- 隔热
- 耐化学品腐蚀及耐水解性能
- 机械强度和刚性 (如耐冲击性)
- 静电荷耗散
- 耐紫外线和大气因素
- 耐高能辐射 (X 和 γ 射线)
- 高温蠕变强度
- 与食物接触的惰性
- 卓越的耐火性和燃烧烟气的低毒性 (GRAIL 系列产品)

GPLAST PRODUCT RANGE GPLAST 系列热塑产品

… AND ARE INTENDED MAINLY FOR THE FOLLOWING INDUSTRIAL SECTORS:

- Chemical and petrochemical
- Pharmaceutical
- Agri-food
- Aeronautics and space
- Nuclear
- Energy
- Metallurgical
- Paper
- Textiles
- Glass
- Electrical and electronic
- etc.

这些应用可以满足众多业务领域需求，具体包括：

- 化工和石化
- 制药电子/电力
- 食品
- 航空航天
- 核能源
- 能源工业
- 冶金
- 造纸
- 纺织
- 玻璃行业
- 电子电力行业……

AN EXPERIENCED ENGINEERING OFFICE

BOYD Nivelles offers its customers the services of an engineering office experience in the design of any new part. Our engineers use advanced software such as **Catia, Rhinoceros, Mastercam, Autocad, etc**. for the design of any new technical part. Thanks to solid experience in materials engineering and staff highly qualified in materials physics and chemistry, **BOYD** undertakes to find an optimal solution to meet your specific technical needs.

经验丰富的工程办公室

BOYD Nivelles 拥有经验丰富的工程办公室，可以在各类新部件的设计及构思方面为客户提供卓越服务。我们的工程师将运用尖端软件进行 **Catia**、**Rhinoceros**、**Mastercam**、**Autocad** 等全新技术部件的设计构思。而且，**BOYD** 在材料工程领域拥有丰富的行业经验，并且同时还拥有大批材料化学及物理学科方面的高端人才，定可为您找到满足您的特定技术需求的最佳解决方案。

A FIRST-RATE SALES DEPARTMENT

Commercially, **BOYD** Nivelles is known for its very short production lead times, the responsiveness of its after-sales service and a highly competitive quality/price ratio. These strengths, among others, make it one of the European market leaders in **thermoplastics processing**.

卓越非凡的商务部门

从商务角度来看，**BOYD** Nivelles 具备生产周期超短、售后服务反应迅速以及性价比极具竞争力等诸多突出优势。这些制胜关键与其他强势点一起，成就了 **BOYD** 在热塑材料加工市场的领先地位。

Polyamide (PA6 GF30)

SATISFYING CUSTOMER NEEDS IS OUR MAIN OBJECTIVE - EVERY DAY

满足客户需求是我们每天的目标

BOYD - WORLDWIDE ENGINEERED MATERIALS

BOYD TRUSTED INNOVATION

GPLAST PRODUCT RANGE GPLAST 系列热塑产品

ISO 9001

QUALITY CONTROL AND CERTIFICATION ISO 9001

Over the years, **BOYD** has invested in human and material resources that ensure rigorous and systematic quality control after each production run. Our internal quality control laboratory (**QCL**) allows us to rapidly perform visual and dimensional checks, as well as checks on certain basic mechanical, thermal and electrical properties.
For more detailed analyses, **BOYD** works in partnership with a number of industrial and university laboratories in Europe.

Since 2008, **BOYD** Nivelles **ISO 9001** certification has been successfully renewed each year.

QC - 质量控制与 ISO 9001 认证

多年来，**BOYD** 始终在使用作为先进的人力与物力资源，确保对每个生产环节进行严格而系统的质量控制。我们的内部质量控制实验室 (**QC**)，可以帮助操作员快速完成尺寸目测和其他基本的机械性能测试，如肖氏硬度，抗拉强度及抗压强度等。
对于更为尖端的分析，**BOYD** 将会与欧洲多家工业实验室和大学实验室合作完成。

自 2008 年以来，**BOYD** Nivelles 每年都会成功通过 **ISO 9001** 认证。

CERTIFICATION ISO 9001 BQA

BQA_QMS_C_2007342

REACH COMPLIANT

RoHS

HSE

PEEK

HSE - HEALTH, SAFETY AND ENVIRONMENT

BOYD HSE (**H**ealth - **S**afety - **E**nvironment) policy combines good working conditions and the health and safety of staff with the continuous improvement of this process. **BOYD** also supports the protection of the environment, which forms an integral part of its comprehensive approach to sustainable development. For several years, the management of **BOYD** has had a special internal health and safety adviser responsible for coordinating actions aimed at **developing and maintaining the HSE system**.

HSE - 健康，安全和环境

超级现代的机械加工中心

BOYD 的健康-安全-环境政策包含生产安全规范、持续改进策略、工作环境和工作人员健康规范等。遵守工作环境和安全工作规范是 **BOYD** 公司长期可持续发展政策的一部分。几年来，**BOYD** 领导层特聘了一位内部安全预防顾问，并委托他负责协调所有的实际措施来实施此政策，以及开发和维护现有的 **HSE** 体系。

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BOYD

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