

# 挤塑

# EXTRUSION

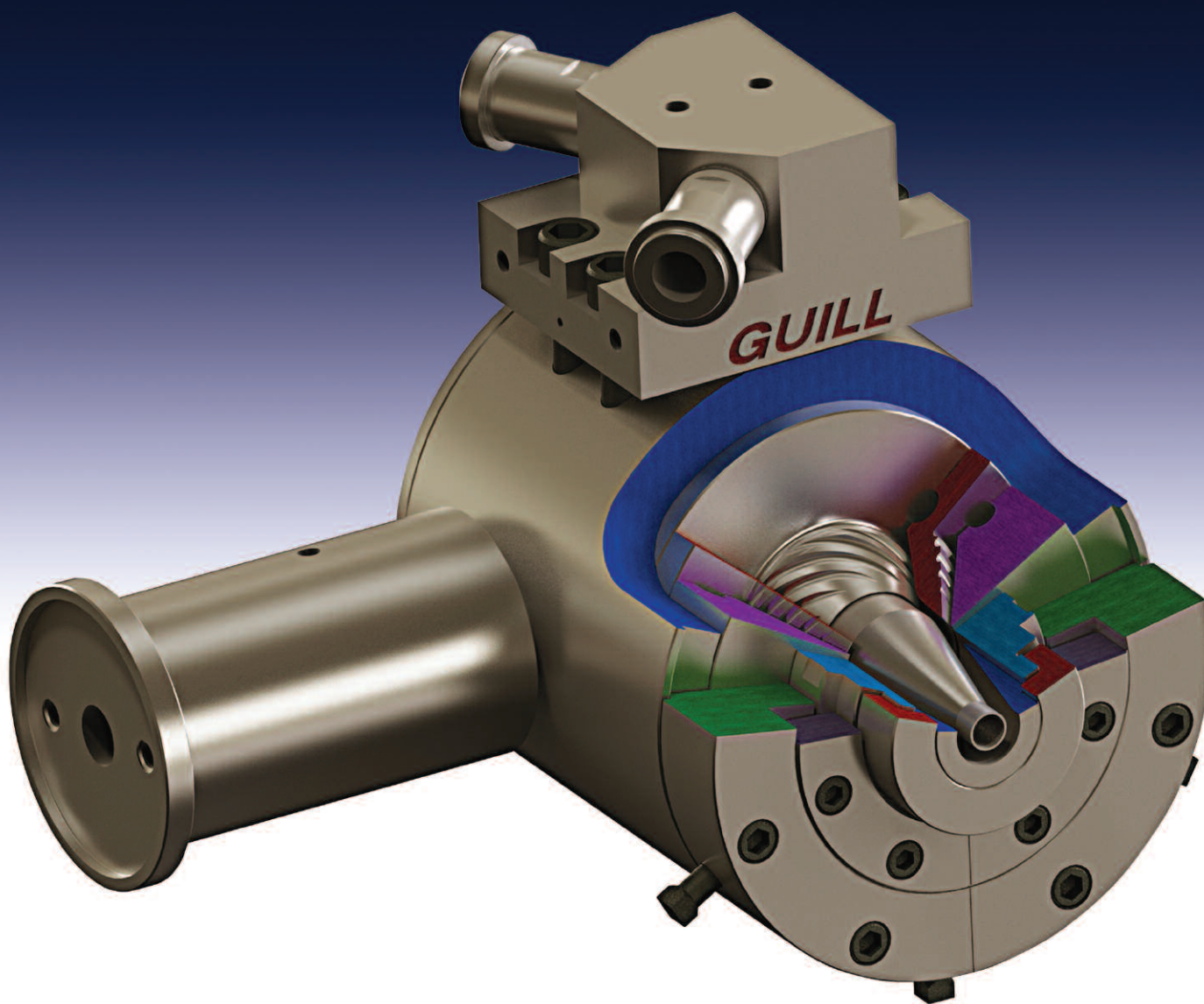
ASIA EDITION

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Cologne, Germany



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**30** Brückner: 就接获订单量而言, 过去的会计年度是公司历史上第二成功的年度。  
*In terms of incoming orders, the past fiscal year was the second most successful in Brückner's history.*



**23** 现在, 可以使用科倍隆 ZSK 双螺杆挤出机将 PET 薄片加工成粒子, 而无需预先干燥。  
*PET flakes can now be processed without pre-drying into pellets using Coperion ZSK twin screw extruders.*

独特的Gneuss旋转过滤技术确保了在恒定条件下不间断的生产过程-即使是消费后回收材料的处理。  
*The Gneuss Rotary Filtration Technology ensures an uninterrupted production process under constant conditions – even when post-consumer recycled material is processed.*

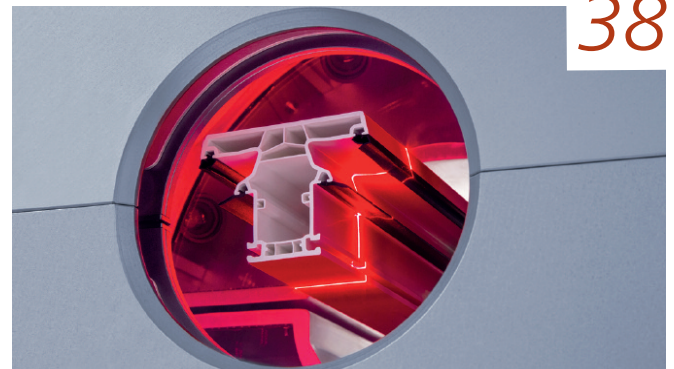


**35** 自 2013 年以来, 奥地利挤出和回收技术公司 MAS 和荷兰薄膜回收公司 Caroda 一直在薄膜回收系统的技术开发方面开展合作。这些系统专注于具有更高 LLDPE 含量的 LDPE 工业薄膜以及农用薄膜。  
*Since 2013, Austrian extrusion and recycling technology company MAS and Dutch film recycling company Caroda have been cooperating in the technological development of film recycling systems.*



SÜDPACK Verpackungen 和 ILLIG Maschinenbau在合作项目中开发出了热成型食品包装材料, 其产品经过可堆肥认证且主要基于生物材料。  
*In a cooperative project, SÜDPACK Verpackungen and ILLIG Maschinenbau have developed thermoformed food packaging with components that are certified compostable and predominantly bio-based.*

PIXARGUS 也在低预算领域占据了一席之地。  
*PIXARGUS is setting a strong foot also in the lower-budget segment.*



# EXTRUSION

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- Extrusion
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- Welding
- Finishing of Plastics and Elastomers



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**Extrusion International** (English)

**Extrusion International USA** (English)

**Extrusion Russia Edition** (Russian)

**Extrusion Asia Edition** (Mandarin/English)

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8 issues a year

6 issues a year

6 issues a year

4 issues a year

2 issues a year

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EXTRUSION**

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**VVA** Verlag GmbH Cologne/Germany



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www.guill.com
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### interplas

28. - 30. 09. 2021

Birmingham / United Kingdom  
伯明翰 / 英国

➡ [www.interplasuk.com](http://www.interplasuk.com)

### Fakuma

12. - 16. 10. 2021

Friedrichshafen / Germany  
腓德列斯哈芬 / 德國

➡ P. E. Schall GmbH & Co.KG  
[www.fakuma-messe.de](http://www.fakuma-messe.de)

### Plastics are future

06. - 07. 10. 2021

Online

➡ [www.plasticsarefuture.com](http://www.plasticsarefuture.com)

### Central Asia Plast World

11. - 13. 10. 2021

Almaty / Kazakhstan  
阿拉木图 / 哈萨克斯坦

➡ [www.plastworld.kz](http://www.plastworld.kz)

### China International Biodegradable Material Exhibition

18. - 20. 10. 2021

Shanghai / P.R. China  
上海 / 中國

➡ [www.expoencic.com](http://www.expoencic.com)

### ARABPLAST 2021

15. - 18. 11. 2021

Dubai / UAE

迪拜 / 阿联酋

➡ [www.k-globalgate.com/arabplast](http://www.k-globalgate.com/arabplast)

### interplastica 2022

25. - 28. 01. 2022

Moscow / Russia 莫斯科 / 俄罗斯

➡ [www.interplastica.de/en/](http://www.interplastica.de/en/)

### PLASTINDIA

17. - 22. 02. 2022

New Delhi / India

新德里 / 印度

➡ [www.k-globalgate.com/plastindia/](http://www.k-globalgate.com/plastindia/)

### CHINAPLAS 2022

25. - 28. 04. 2022

Shanghai / P.R. China

上海 / 中國

➡ [www.ChinaplasOnline.com](http://www.ChinaplasOnline.com)

## 世界塑料橡胶行业聚焦K 2022

■ 现在已经到了 K 2022 的注册截止日期，很明显，参展商对将于 2022 年 10 月 19 日至 26 日在杜塞尔多夫举行的世界上最重要的塑料和橡胶行业贸易展览会的兴趣有增无减。“K 2022 将再次占据整个展览场地，”杜塞尔多夫展览公司董事总经理 Erhard Wienkamp 欣喜若狂，并继续说道：“在与参展商交谈时，我们感到全球范围内对个人交流有着巨大的需求。”K 2022 将再次欢迎国际塑料和橡胶行业的“名人”来到杜塞尔多夫 - 没有其他地方拥有如此高的国际出席率。来自各大洲的约 3,000 家公司已注册，将展示其在以下领域的创新：原材料和助剂；半成品、技术部件和增强塑料制品；塑料和橡胶工业的机械和设备。

K展为全球塑料和橡胶行业提供最重要的信息和业务平台。来自世界各地的参展商和参观者齐聚一堂，利用全球位居第一的展会所提供的机会，展示该行业的出色运营，讨论当前形势并规划未来的发展方向。在疫情大流行引起的变化之后，K 2022 恰逢其时，再次为塑料和橡胶行业提供了方向。K展不仅是每三年举办一次的前瞻性产品创新舞台，而且还通过应对当今时代及其行业所面临的挑战来突出其卓越的地位。这首先体现在 K 2022 的三个主要指导主题上：

- 循环经济
- 数字化
- 气候保护

这些领先的主题将在参展商的演讲中以及官方特别节目“塑料塑造未来”、科学园区和 VDMA 循环经济论坛的焦点中得到呼应。

杜塞尔多夫 K展 的成功模式还意味着：始终以市场需求为导向并进一步发展其理念。这就是为什么现场的实体活动将扩展到包括了额外的数字化内容。

### *The World's Plastics and Rubber Industry focuses on K 2022*

■ Now the deadline for registrations for K 2022 has been reached, it is clear that the interest taken by exhibitors in the world's most important trade fair for the plastics and rubber industry, to be held in *Düsseldorf* from *19 to 26 October 2022*, continues unabated. “K 2022 will again occupy the entire fairgrounds,” re-



joices Erhard Wienkamp, Managing Director at Messe Düsseldorf, and goes on to say: “When talking to exhibitors we feel that there is an enormous demand for personal exchange on a global level.” K 2022 will again welcome the “Who’s Who” of the international plastics and rubber industry to Düsseldorf – there is no other place with such high international attendance. Some 3,000 companies from all continents have registered to exhibit their innovations in the segments: Raw materials and auxiliaries; Semi-finished products, technical components and reinforced plastic products; Machinery and equipment for the plastics and rubber industry.

K provides the global plastics and rubber industries with their most important information and business platform. Exhibitors and visitors from all over the world get together here and use the opportunities their No. 1 trade fair offers to demonstrate the operational excellence of this industry, discuss current trends and chart the course for the future. K 2022 comes precisely at the right time to offer the plastics and rubber industry orientation again after the changes induced by the pandemic.

K not only serves as the arena for forward-looking product innovations every three years but also underlines its exceptional positioning by addressing both the challenges of our day and age and of its industry, in particular. This is reflected above all by the three major guiding themes of K 2022:

- Circular Economy
- Digitalisation
- Climate Protection

These leading themes will be echoed by both the exhibitors’ presentations and in

the focus of the official special show *Plastics Shape the Future*, the Science Campus and VDMA's Circular Economy Forum.

The winning formula at K in Düsseldorf also means always being oriented towards market needs and developing its concept further. This is why the physical event on site will be extended to include additional digital content.

► **Messe Düsseldorf GmbH**  
www.k-online.de

## 德国迪能刀具参展 ANEX-SINCE 2021

■ 2021 亚洲非织造材料展览会 (ANEX) 及第十九届上海国际非织造材料展览会 (SINCE) 与 2021 年 7 月 22-24 日在上海举行, 德国迪能刀具参加了这个重要展会。

上海国际非织造材料展览会 (SINCE), 技术与商务并重, 吸引了 30000 多名专业观众以及 500 多家展商, 是非织造产业链的一个重大盛会; 亚洲非织造材料展览会 (ANEX) 同时也

是世界上最重要无纺布行业展会之一。

这次两者合并成 ANEX-SINCE, 在上海世博展览馆举行, 成为行业里面的绝对焦点。

尽管由于疫情的管控和影响, 参观人数减少一点, 尤其是国外的访客; 但是对于德国迪能刀具, 这是一次成功的展会, 不论跟光临展厅的潜在客户, 或是老客户, 都进行了成功有效的交流,

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展会上，德国迪能刀具展示了丰富的产品和无纺布行业里面的瞩目新科技，包括：

1. SIMU-FLASH 自动定位分切系统
2. SENSO CONTROL 刀深控制功能

### DIENES at the ANEX-SINCE 2021

■ ANEX SINCE 2021 took place in Shanghai from 22. to 24. 07. 2021 – and DIENES was there.

As a technical and trade fair with around 30,000 visitors and over 500 exhibitors

the Shanghai International Nonwovens Exhibition (SINCE) is an important event for all companies along the production chain of nonwoven products. The Asia Nonwoven Exhibition (ANEX) is also one of the most important nonwoven trade fairs worldwide.

The combination of the two fairs to form ANEX-SINCE makes the fair in the Shanghai World Expo Exhibition & Convention Center one of the most important.

Despite lower visitor numbers due to the pandemic, especially from abroad, the fair was a success for DIENES: personal

discussions with potential customers, but also with existing customers, ensured a well-visited stand and a pleasant atmosphere on site.

Of course, the latest DIENES products and their bestsellers were presented at the fair. Of particular interest here were the latest developments for slitting nonwoven: the SIMU-FLASH simultaneous knife positioning system and the SENSO CONTROL sensor-based depth adjustment system.

► DIENES  
www.dienes.de

## 工业4.0使热成型更加有效率

■ 伊利格推出了“ILLIG Assist”，这是一个数字服务平台，在迈向工业4.0的道路上积极支持伊利格客户。由于技术的突破，数字化转型正日益成为现实。整个制造业和包装过程也越来越网络化。

数字化就在这里。IIoT（工业物联网）和连接性对于制造业和与生产系统（如制造执行系统、MES）的工业网络越来越重要。特别是，自描述标准接口对于减少定制工作和改进数据访问变得越来越重要。

### 学习系统使机器智能更加完善

伊利格系统长期以来一直采用智能控制概念（ILLIG IC）。包括机器参数计算、引导设置系统和动态优化。此外，热成型系统可以连接到本地网络和数据库，以查询生产相关数据。ILLIG Assist完善了这些数字系统，并作为学习组件帮助机器操作员处理日常工作流程中发生的事件。过去，公司只能依靠笔记和经验丰富的个人的“经验知识”传承。新的应用程序通过清晰的交互式图形用户界面简化了知识转移。

### 创建知识数据库

来自所连接机器和机器操作员自身的消息都按时间顺序记录和显示。该系统自动提供事件的可视定位，并基于解决方案数据库提供详细建议，最初由伊利格深厚的全球专业知识填充。此外，运营商可以积极提出自己的建议，并通过视频和图像丰富自己的建议。集成的评论功能允许用户对建议的解决方案进行评论和评估。

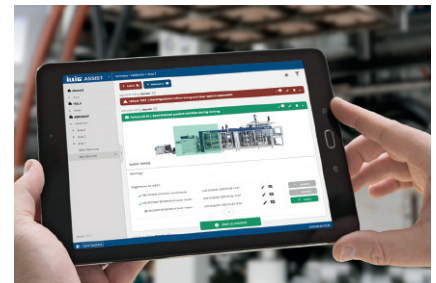
*Digital service platform: ILLIG Assist supports customers on their way to Industry 4.0 (Picture: ILLIG)*

数字服务平台：ILLIG Assist支持客户进入工业4.0（图片：伊利格）

用户还可以查看和管理轮班报告、维护信息和数字手册。这种方法用于建立一个永久性的知识数据库，防止由于有经验的机器操作员离开而造成的知识损失，并加快对新员工的培训。

### IIoT平台作为连接的基础

ILLIG Assist基于IIoT平台ADAMOS，可通过模块化微服务架构进行扩展，从而实现与外部系统的连接。向ILLIG Assist报告的事件可使用任何启用互联网的通信终端显示，并可远程通知操作员。事件通知由操作员发出，或者在未来版本中，如果网络机器连接到IIoT平台，则直接由机器发出。邮件将自动提供给组织内其他经批准的用户。除了每台机器的资产管理和聊天功能外，ILLIG Assist还提供创建和阅读评论和其他信息的权限管理。根据用户权限，系统提供对机器及其子功能模块的深入了解，以及对整个生产线、工厂或全球位置的概述。ILLIG Assist是与客户一起为机器操作员和生产经理开发的，旨在通过智能通信工具和主动知识管理系统提高生产、服务和维护的效率。通过数字化，伊利格使客户更接近他们的流程，提供更高的附加值。



## Industry 4.0 Makes Thermoforming More Effective

■ ILLIG Maschinenbau introduces “ILLIG Assist”, a digital service platform to actively support ILLIG customers on the way to Industry 4.0. Digital transformation is increasingly becoming a reality thanks to breakthrough technologies. This also applies to the packaging industry: manufacturing processes are becoming more digital and the entire value chain is being networked.

Digitalization is here. IIoT (Industrial Internet of Things) and connectivity are increasingly important for manufacturing and industrial networking with production systems such as Manufacturing Execution Systems, MES. In particular, self-describing standard interfaces are becoming important to reduce customizing efforts and improve data access.

### Learning system complements machine intelligence

ILLIG systems have long been equipped with the Intelligent Control Concept (ILLIG IC). Including calculation of ma-



chine parameters, a guided setup systems, and dynamic optimization. In addition, thermoforming systems can connect to local networks and databases to query production-related data. ILLIG Assist complements these digital systems and helps the machine operator as a learning component to cope with occurring events in the daily workflow. In the past, companies relied on notes and the "tribal knowledge" of experienced individuals. The new application simplifies knowledge transfer through a clear and interactive graphic user interface.

### Creation of a knowledge database

Messages from both connected machines and machine operators themselves are recorded and displayed chronologically. The system automatically provides a visual localization of events and offers detailed suggestions based on a solution database, initially populated by ILLIG's deep global expertise. Furthermore, operators can actively contribute their own suggestions and enrich them with videos and images. An integrated comment function allows users to comment on and evaluate proposed solutions. Users can also view and manage shift reports, maintenance information, and digital manuals. This approach serves to build up a permanent knowledge database, prevents the loss of knowledge due to the departure of experienced machine operators, and accelerates training for new employees.

### IIoT platform as a basis for connectivity

ILLIG Assist is based on the IIoT platform ADAMOS and is expandable through a modular architecture of microservices that enable connections to external systems. Events reported to ILLIG Assist can be displayed using any internet-enabled communication terminal and operators can be remotely informed. Event notifications are made by the operator or, in future versions, directly by the machine in the case of networked machines connected to the IIoT platform. Messages are automatically made available to other approved users inside the organization. In ad-

dition to asset management and chat function per machine, ILLIG Assist also provides rights management for creating and reading comments and other information. Depending on the user's rights, the system offers insight into the machine with its functional sub-blocks as well as an overview of the entire line, factory, or worldwide locations. ILLIG Assist has been developed together with customers, for machine operators and produc-

tion managers, with the aim of increasing efficiencies in production, service, and maintenance through an intelligent communication tool and active knowledge management system. With digitalization, ILLIG brings customers even closer to their process, delivering higher added value.

➔ ILLIG Maschinenbau GmbH & Co. KG  
www.illig.com



### 整体混炼解决方案

布斯为严苛的混炼应用提供世界领先的整体混炼解决方案。作为历史悠久的世界级服务商，布斯拥有多元化的客户群，针对各种需求提供专家级的咨询、规划、设计服务和创新产品。当混炼生产线跳动着一颗 COMPEO 心脏时，将迸发出澎湃的性能，呈现出无可比拟的灵活性，从而造就卓越的产品质量。

## 入选“塑料名人堂”

■ 国际塑料行业的十位领军人物最近入选“塑料名人堂”——其中之一是 Reifenhäuser 集团的 CSO，“K”展参展商顾问委员会主席和VDMA（德国机械设备制造业联合会）塑料和橡胶机械协会主席 Ulrich Reifenhäuser。

塑料工业协会 (PLASTICS) 于 1972 年创立了名人堂，以表彰通过其活动为全球塑料工业的成功做出特殊贡献的行业领导者。提名每三年进行一次，获奖者通常在美国最大的塑料展 NPE 上公布。

“我非常高兴和自豪地接受成为塑料名人堂成员的荣誉，”Ulrich Reifenhäuser 说。“目前我们塑料行业正处于转折点，这可能是自塑料发明以来最激动人心的阶段之一。过去，塑料行业的重点是材料性能和成本，而现在的主要主题是可回收性和整体循环经济。我们将以这种变化为机会。塑料由于重量轻、功能性强和可回收性，具备了对气候中和做出决定性贡献的所有特性。”

Hans Reifenhäuser 在 2014 年去世后入选塑料名人堂，作为 Hans Reifenhäuser 的儿子，Ulrich Reifenhäuser 注定要从事塑料行业。现在他与兄弟 Bernd Reifenhäuser（首席执行官）一起，作为第三代经营这家家族企业。他 16 岁开始在父亲公司的挤出机制造部工作。在学习经济学并担任过各种职位后，他于 1992 年加入 Reifenhäuser 集团的执行管理部门。从那时起，他一直担任首席销售官(CSO)，负责生产线的国际销售，并建立了首屈一指的国际客户和合作伙伴网络。2022年，他将连续第七次以“K展主席”的身份，共同负责世界领先的杜塞尔多夫塑料展。

### Inducted into the “Plastics Hall of Fame”

■ Ten leading personalities from the international plastics industry were recently inducted into the “Plastics Hall of Fame” - one of them is Ulrich Reifenhäuser, CSO of the Reifenhäuser Group, Chairman of the Exhibitors' Advisory Board of the “K” plastics show and Chairman of the Plastics and Rubber Machinery Association in the VDMA. The Plastics Industry Association (PLASTICS) founded the Hall of Fame 1972 to recognize the industry leaders who have



Ulrich Reifenhäuser (莱芬豪舍集团首席销售官) 现在成为了“塑料名人堂”的成员

*Ulrich Reifenhäuser (CSO, Reifenhäuser Group) is now a member of the “Plastics Hall of Fame” (Photo: Reifenhäuser)*

made a special contribution to the success of the plastics industry worldwide through their activities. Nomination takes place every three years and the winners are usually announced at the NPE, America's largest plastics show.

“It is with great delight and pride that I accept the honor of becoming a member of the Plastics Hall of Fame,” says Ulrich Reifenhäuser. “It comes at a turning point in our industry that is undergoing possibly one of the most exciting phases since the invention of plastic. Whereas the focus in the past was on material performance and costs, the dominant topics now are on recyclability and a holistic circular economy. We will harness this change as an opportunity. With its low weight, high functionality and recyclability, plastic has all the characteristics to make a decisive contribution to climate neutrality.”

Ulrich Reifenhäuser was predestined for a career in plastics. As the son of Hans

Reifenhäuser, who was also posthumously inducted into the Plastics Hall of Fame in 2014, he now runs the family business in the third generation together with his brother Bernd Reifenhäuser (CEO). He first started working in the extruder construction department of his father's company at the age of 16. After studying economics and holding various positions, he joined the executive management of the Reifenhäuser Group in 1992. Since that time, he has been responsible as Chief Sales Officer (CSO) for international line sales and has built up an international network of customers and partners second to none. In 2022, he will be jointly responsible for the world's leading plastics show in Düsseldorf as “Chairman of K show” for the seventh time in a row.

➔ **Reifenhäuser Group**  
www.reifenhäuser.com

## 斯机械制造有限公司管理团队继任计划

■ 考特斯机械制造有限公司始终如一地继续践行新愿景、新使命和新理念：Christian Pum 将于 2021 年 8 月 1 日接替 Andreas Lichtenauer 出任考特斯的销售总经理。未来，考特斯的 CEO Thomas Hartkämper 将额外负责服务业务。继任计划遵循长期的变革过程，是

考特斯战略新方向的一部分。

2019 年底，面对巨大变化的市场环境，考特斯做出了一致反应。秉持着对未来的新愿景、新使命和新理念，公司引入了新的战略方向并取得了成功：考特斯已经在公司的许多领域里迅速、持续和成功地实现了变革。

CEO Thomas Hartkämper解释：“考特斯管理团队的继任计划也是公司新战略的组成部分，始终合乎考特斯的新愿景、新使命和新理念。现在也到了在销售和服务领域实施战略变革的时候了。”

他补充道：“我们非常感谢 Andreas Lichtenauer 多年来对考特斯的热情奉献。他成功帮助公司创造了辉煌的时代。Andreas Lichtenauer不仅大力参与了中国市场的建设，还在世界各地成功建立起汽车油箱业务，对公司和整个行业产生了持久深远的影响。

**Management Succession**

■ Kautex Maschinenbau is consistently continuing the implementation of its new vision, mission and philosophy: as successor to Andreas Lichtenauer, Christian Pum took over as Managing Director Sales of the Kautex Group on August 1, 2021. CEO Thomas Hartkämper will additionally be responsible for the Service business unit in the future. The succession plan follows a long-term change process and is part of the new orientation of Kautex Maschinenbau.

At the end of 2019, Kautex Maschinenbau responded consistently to massively changed market conditions. With success: The company has already implemented the change quickly, consistently and successfully in many areas of the company.

Thomas Hartkämper, CEO, explains: "Part of this strategy is also the succession planning in the Group's management, always in line with the new vision, mission and philosophy for the future Kautex. Now it is time to initiate this change in sales and service as well." He added: "In this context, we would like to thank Andreas Lichtenauer for his many years of dedication and passion for Kautex Maschinenbau. He has helped shape a successful era for the company. Andreas Lichtenauer was not only instrumental in building up the Chinese market. His success in building up the tank business worldwide has also had a lasting impact on the company and the entire industry.

**扩充顾问委员会**

■ Nadine Despigneux 成为了二手机械经销商 GINDUMAC集团的顾问委员会新成员。作为克劳斯玛菲技术有限公司 ( KraussMaffei Technologies ) 的董事总经理，她拥有多年的行业经验，是这家位于慕尼黑的塑料加工设备制造商的创新历程背后的推动者。


GINDUMAC集团董事总经理 Benedikt Ruf 描述道：“我们很高兴 Despigneux 夫人决定更积极地亲自参与 GINDUMAC 的活动。她的推动力和与克劳斯玛菲合作的协同效应再次为我们的发展战略和业务运营开创了宝贵的前景。”在“向前推进”的座右铭下，GINDUMAC今年将通过加强其核心市场并在中东和北非或独联体地区等增长地区新的市场潜力来实施有针对性的增长战略。“咨询委员会已经确认，我们在战略上走在正确的轨道上。我们一起修订了当前的行动计划，并会在未来几个月

内以新的推动力实施，”GINDUMAC 集团首席执行官 Janek Andre 评论道。

2021年初，GINDUMAC集团决定成立顾问委员会，以支持公司的战略发展。顾问委员会包括 Mag . Alexander Eisler ( WEILER Werkzeugmaschinen 和 Kunzmann Maschinenbau 的所有者和管理合伙人 )、Hans Ulrich Golz 博士 ( 管理顾问 )、Dominik Benner 博士 ( The Platform Group GmbH & Co. KG 的所有者兼首席执行官 ) 以及 Nadine Despigneux ( 克劳斯玛菲技术有限公司董事总经理 )。


**Advisory Board Extended**

■ Nadine Despigneux is a new advisory board member at used machinery dealer GINDUMAC. The Managing Director of

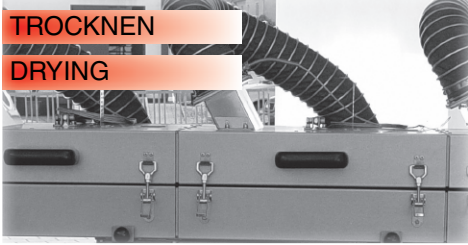


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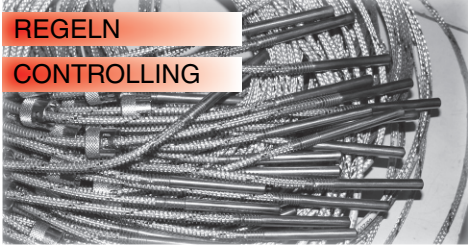
HEIZEN  
HEATING



TROCKNEN  
DRYING



REGELN  
CONTROLLING



ERGE  
ELEKTROWÄRMETECHNIK FRANZ MESSER GMBH

KraussMaffei Technologies GmbH has many years of industrial experience and is the driving force behind the innovation processes at the Munich-based manufacturer of plastics processing machines.

"We are delighted with Mrs. Despineux's decision to become more actively involved personally at GINDUMAC. Her impulses and the synergy effects in the co-operation with KraussMaffei once again open up valuable perspectives for our strategic and operational business development," describes Benedikt Ruf, Managing Director of the GINDUMAC Group.

Under the motto "Pushing Forward", GINDUMAC is pursuing a targeted growth strategy this year by strengthening its core markets and developing new market potential in growth regions such as the MENA or CIS region.

"The advisory board has confirmed that we are strategically on the right track. Together we have revised our current action plan and go with new impulses into the implementations for the coming months," comments Janek Andre, CEO of the GINDUMAC Group.

At the beginning of 2021, the GINDUMAC Group decided to establish an advisory board to support the strategic de-



GINDUMAC 集团董事总经理 Janek Andre (左) 和 Benedikt Ruf (右) 欢迎克劳斯玛菲技术有限公司董事总经理 Nadine Despineux (中) 成为顾问委员会的新成员

*The Managing Directors of the GINDUMAC Group, Janek Andre (left) and Benedikt Ruf (right), welcome Nadine Despineux (center), Managing Director of KraussMaffei Technologies GmbH, as a new member of the Advisory Board*

velopment of the company. The advisory board includes Mag. Alexander Eisler, (Owner and Managing Partner of WEILER Werkzeugmaschinen GmbH and Kunzmann Maschinenbau GmbH), Dr. Hans Ulrich Golz (Management Consultant), Dr. Dominik Benner (Owner & CEO

of The Platform Group GmbH & Co. KG) and Nadine Despineux (Managing Director of KraussMaffei Technologies GmbH).

➔ **GINDUMAC Group**  
www.gindumac.com

## 领导层的变化



■ 自 2021 年 7 月 1 日起，Paul Walach 博士与 Karsten Kratz 一起成为莱芬豪舍流延/片材/涂布部门的董事总经理。通过这一举措，莱芬豪舍集团专门从事流延薄膜、片材和挤出涂布生产线的业务部门在执行管理层的层面引入了换代变革。莱芬豪舍集团首席执行官 Bernd Reifenhäuser 解释说：“我们让年轻的高管负责，但仍然让经验丰富的高管作为他们的侧翼。这使得专业知识、多样性得以和稳定性很好地结合在

Paul Walach 博士 (照片由莱芬豪舍提供)

*Dr. Paul Walach (Photo: Reifenhäuser)*

一起。” Paul Walach 博士拥有机械工程博士学位，并已在莱芬豪舍集团的多个职位上成功工作了七年 - 其中最后三年担任流延/片材/涂布部门的技术总监。Karsten Kratz 除了担任莱芬豪舍集团的首席财务官外，直到最近还是流延/片材/涂布部门唯一的董事总经理。“就我个人而言，继续沿着我们目前的增长轨道前进既是一种动力，也是一种责任。”Paul Walach 博士解释说。“未来，我们将专注于将我们在特殊设备制造方面的专业知识与我们模块化系统中经过现场验证的组件结合起来，并提供有关循环经济和数字化主题方面的巧妙解决方案。为此，我们与薄膜制造商保持着密切联系。我们非常期待将他们当前所面临的挑战转化为未来的机遇。”

## Generation Change

■ Effective July 1, 2021 Dr. Paul Walach becomes Managing Director of Reifenhäuser Cast Sheet Coating together with Karsten Kratz. With this move, the Reifenhäuser Group business unit specializing in cast film, sheet and extrusion coating lines introduces a generation change at executive management level. Bernd Reifenhäuser, CEO of the Reifenhäuser Group, explains: "We are placing young executives in charge but with experienced executives to flank them. This makes for a good mix of know-how, di-

versity, and stability." Dr. Paul Walach holds a doctorate in mechanical engineering and has already worked successfully for the Reifenhäuser Group in various positions over a period of seven years - the last three of them as technical director of Cast Sheet Coating. Karsten Kratz, in addition to his function as CFO of the Reifenhäuser Group, was the sole Managing Director of Cast Sheet Coating until recently.

"Personally, continuing along our current track of growth represents a motivation as well as a responsibility," explains Dr. Paul Walach. "In the future we will focus

on combining our expertise in special machine tool manufacturing with field-proven components from our modular system and deliver clever solutions on the themes of the Circular Economy and digitalization. To achieve this, we keep close contacts with film manufacturers. We are very much looking forward to transforming their current challenges into opportunities for the future."

➔ **Reifenhäuser Cast Sheet Coating**  
www.reifenhauer.com

## 管理委员会的变动

■ 克劳斯玛菲集团首席财务官 (CFO) 兼执行委员会成员 Harald Nippel 博士自愿离职，于 2021 年 5 月 31 日离开公司。Nippel 博士于 2016 年在克劳斯玛菲开始了他的职业生涯，担任集团首席财务官。从那时起，他在全球推动了其职责范围内的关键举措和项目，从而为克劳斯玛菲的积极发展做出了重大贡献。

克劳斯玛菲集团首席执行官 Michael Ruf 博士说：“我们要感谢 Harald Nippel 对克劳斯玛菲的服务、宝贵贡献和广泛的个人奉献”。

克劳斯玛菲任命约尔格·布雷默 (Jörg Bremer) 为克劳斯玛菲集团和在上海上市的克劳斯玛菲有限公司 (KMCL) 的新首席财务官 (CFO)，自 2021 年 7 月 1 日起生效。布雷默还将成为克劳斯玛菲集团管理委员会的成员。



约尔格·布雷默对新的职位作出了说明：“克劳斯玛菲是一家在全球享有盛誉的历史悠久的公司，180 多年来一直体现着大型机械制造领域的开拓精神和创新精神。很荣幸有机会以 CFO 的身份在战略和运营层面帮助塑造这样一家公司。我期待为克劳斯玛菲的积极发展贡献我的经验和专业知识，尤其是在数字化、标准化和未来发展方面。”

## Changes in Management Board

■ Dr. Harald Nippel, KraussMaffei Group's Chief Financial Officer (CFO) and Member of the Executive Committee, left the company effective May 31, 2021 on his own wish.

Dr. Nippel started his successful career at KraussMaffei in 2016 as CFO of the Group. Since then, he has driven forward key initiatives and projects in his areas of responsibility worldwide and thus made a significant contribution to the positive development of KraussMaffei.

„We would like to thank Harald Nippel for his services, valuable contributions and extensive personal commitment to KraussMaffei“ says Dr. Michael Ruf, CEO of Krauss Maffei Group.

KraussMaffei has appointed Jörg Bremer

*Dr. Harald Nippel*



*Jörg Bremer (Photos: KraussMaffei)*

as new Chief Financial Officer (CFO) of the KraussMaffei Group and the Shanghai-listed KraussMaffei Company Limited (KMCL), effective July 1, 2021. Bremer will also become a member of the KraussMaffei Group Management Board. "A traditional company with a great global reputation, KraussMaffei has embodied the pioneering spirit and innovation in large-scale machine manufacturing for over 180 years. It's an honor to have the chance to help shape such a company strategically and operationally as CFO. I look forward to contributing my experience and know-how to KraussMaffei's positive development, especially with regard to digitalization, standardization and growth," explains Jörg Bremer.

➔ **KraussMaffei**  
www.kraussmaffei.com

## 部门合并巩固吹膜生产线的核心竞争力

■ 从 7 月 1 日起，莱芬豪舍 (Reifenhäuser) 集团为了应对吹膜行业的持续增长，合并了其吹膜业务领域的莱芬豪舍吹膜部门和莱芬豪舍 Polyrema 吹膜部门，这两个部门迄今为止还是独立运营的。此举进一步巩固了集团的核心竞争力，形成了一个联合品牌“莱芬豪舍吹膜”。初期阶段，这种变化仅仅是组织机构的变动，将给新的业务部门在开发用于标准设备和特殊设备制造的新技术方面带来更大的影响力。该变更将于明年 2022 年 7 月 1 日纳入公司章程。莱芬豪舍集团首席执行官 Bernd Reifenhäuser 指出：“我们有令人鼓舞的任务需要解决，特别是在吹塑薄膜生产的数字化和符合循环经济理念的资源节约型塑料的应用方面。我们共同努力，然后可以在克服内部阻滞、毫不延迟的情况下加快朝这个方向发展——这也将为我们的客户带来相当大的利益。”合并后的莱芬豪舍吹膜业务部门的联合董事总经理是 Andreas Neuss 博士和 Marcel Perrevort。两人都在莱芬豪舍集团的吹膜业务部门担任高管职位多年。

### Construction Competencies in Blown Film Lines Consolidated

■ With effect from July 1, the Reifenhäuser Group merged its blown-film business units Reifenhäuser Blown Film and Reifenhäuser Blown Film Polyrema, which have so far operated independently, in order to cope with ongoing growth in this sector. This move consolidates the Group's competencies even more than before to form a joint brand, Reifenhäuser Blown Film.

Initially the change is purely organizational and will give the new business unit more leverage in developing new technologies for standard and special machine tool manufacturing. The change will be incorporated in the company's statutes as of next year on July 1, 2022. Bernd Reifenhäuser, CEO of the Reifenhäuser Group: "We have exciting tasks to solve, especially when it comes to the digitalization of blown-film production and the resource-conserving use of plastics in keeping with the concept of a circular economy. Jointly, we can then speed up developments in this direction



莱芬豪舍吹膜部门董事总经理：Marcel Perrevort、Andreas Neuss 博士

*Managing directors of Reifenhäuser Blown Film: Marcel Perrevort, Dr. Andreas Neuss (FLTR)*

without the delay of internal barriers – and this will also bring our customers enormous benefits."

The joint managing directors of the merged business unit Reifenhäuser Blown Film are Dr. Andreas Neuss and Marcel Perrevort. Both have several years

of experience in executive positions in the blown-film business segment of the Reifenhäuser Group.

➔ Reifenhäuser Group  
www.reifenhäuser.com

## 格雷汉姆工程公司挤出系统销售经理

■ 格雷汉姆工程公司 (Graham Engineering Corporation) 已任命 Vladimir Ilyutovich 为挤出机和挤出系统的国际销售经理。

在这个职位上，他负责监督公司在欧洲、非洲、中东、亚洲和澳大利亚的技术发展。他的职责包括 Welex 片材挤出生产线、格雷汉姆工程挤出吹塑系统和美国 Kuhne 医用管材系统以及电线和电缆、薄膜、型材和复合材料的商业管理。



Vladimir Ilyutovich

“Vladimir 在各类挤出工艺方面的丰富经验是格雷汉姆工程公司为这个不断增长的市场提供服务的宝贵资产，”销售和服务副总裁 Michael Duff 说。Vladimir Ilyutovich 于 2014 年加入格雷汉姆工程公司，担任医疗系统国际销售经理。

### *Sales Manager for Extrusion Systems*

■ Graham Engineering Corporation has appointed Vladimir Ilyutovich as Interna-

tional Sales Manager for Extruders and Extrusion Systems.

In this position, he oversees the growth of the company's technologies in Europe, Africa, the Middle East, Asia and Australia. His responsibilities include commercial management of Welex sheet extrusion lines, Graham Engineering extrusion blow molding systems and American Kuhne medical tubing systems, as well as wire and cable, film, profiles and compounding.

"Vladimir's deep experience with extrusion processes of all types serves as a va-

luable asset to Graham Engineering in serving this growing market," said Michael Duff, vice president, sales and service. Vladimir Ilyutovich joined Graham Engineering Corporation in 2014 as international sales manager for medical systems.

► **Graham Engineering**  
www.grahamengineering.com  
► **American Kuhne**  
www.americankuhne.com  
► **Welex**  
www.welex.com

## 在中国设立新的子公司

■ 经验、勇气和创新——正是在这些前提下，继位于意大利、瑞士的生产设施和美国的 技术服务人员之后，ST中空成型公司在中国开设了新的子公司：位于江苏省苏州市的ST（苏州）中空成型技术有限公司。这一举措体现了即使在这样一个困难和不确定的时期，公司也保持着对市场的乐观和期望。苏州被选为新成立的ST 中空成型公司的所在地并非偶然，因为它是中国经济和技术发展最快的城市之一，是向亚洲国家拓展的完美前哨。

通过这一举措，ST中空成型公司向客户发出了持续参与市场的明确信息。几周前进行的远程调试，以及世界多个地区的技术人员的出席，都表明：将近24 小时的服务是有保证的。这样就减少了（如果说不可能完全避免）设备的意外停机并长时间等待帮助的现象。特别是在当前这样的时期，旅行和转机受到严重限制，仍能配备专门的技术人员向客户现场提供服务，范围包括从组装到启动和日常维护，360°全方位照顾机器，这就使我们具备了相当大的优势。

备件仓库几年前就已开业，与意大利技术人员的实时联系仍然全面畅通。

### *New Subsidiary in China*

■ Experience, courage and innovation – It is with these premises that ST BlowMoulding opens its new subsidiary in China, after the production facilities in Italy, Switzerland and the service technicians already present in America. Located in Suzhou, Jiangsu province, the new ST (Suzhou) BlowMoulding Technology Co. Ltd reflects all the optimism and the desire to get involved even in such a difficult and uncertain time. It is not by chance that Suzhou has been chosen as the location of the new ST BlowMoulding, since it is one of the cities with the highest economic and technological development in China, the perfect outpost for expansion towards Asian countries. With this choice, ST BlowMoulding sends a clear message of constant pre-

sence to its customers, as already shown with the remote commissioning made a few weeks ago and the presence of technicians in several parts of the world that guarantees an almost 24 hours service, reducing, if not avoiding, unexpected machine stop and long times waiting for assistance. Especially at a time like this, in which travel and transfers are severely limited, having specialized technicians dedicated to on-site customers who take care of the machine at 360°, from assembly to start-up and maintenance, leads to considerable advantage. The spare parts warehouse opened several years ago, and the real-time connection with technicians in Italy remains fully operational.

► **S.T. Soffiaggio Tecnica S.r.l.**  
**ST (Suzhou) BlowMoulding Technology Co.Ltd.**  
www.st-blowmoulding.com

## 欧洲商业参议院的任命

■ 德国 MAAG 副总裁兼董事总经理 Alaaddin Aydin 被任命为欧洲经济委员会成员。Alaaddin Aydin 在欧洲商业参议院代表 MAAG Germany GmbH 担任参议员。该任命于 2021 年 6 月 12 日在德国伯尔韦勒的圣安娜伯格酒庄举行的参议院葡萄酒节期间进行。Alaaddin Aydin 先生收到了德国商业委员会执行委员会主席 Norbert Streveld 和执行委员会基金会商业委员会主席 Christoph Brüssel 博士的任命证书。商业参议院由来自商业、科学和社会各界的人士组成，他们意识到自己对国家和社会的责任。他们共同致力于在对生态/社会负责的市场经济背景下，切实履行可持续发展的以共同利益为导向的目标。

为实现其目标，商业参议院正在与政界和科学界的代表进行对话。商业活动中的公平和伙伴关系以及企业家和高管的社会能力构成了参议院的工作。参议院社区的道德原则和价值观是参议院成员经济行为的基础和指导方针。

### Appointment to the European Senate of Business

■ **Alaaddin Aydin**, VP MAAG Germany / Managing Director, was appointed to the Senate of Economy Europe. Alaaddin Aydin represents MAAG Germany GmbH as Senator in the European Senate of Business. The appointment took place during the Senate's Wine Blossom Festival on June 12, 2021 at the Sankt Anna-berg Winery in Burrweiler, Germany. Alaaddin Aydin received the appointment certificate from Norbert Streveld, Chairman of the Executive Board Senate of Business Germany and Dr. Christoph Brüssel, Chairman of the Executive Board Foundation Senate of Business.

The Senate of Business is made up of personalities from business, science and society who are aware of their responsibility to the state and society. Together, they contribute to the practical implementation of the common good-oriented goals of sustainability in the context of an ecological / social responsible market economy.

To achieve its goals the Senate of Business is in dialogue with representatives

from politics and science. Fairness and partnership in business life as well as the social competence of entrepreneurs and executives shape the work of the Senate. The ethical principles and values of the Senate's community are the basis and

guideline for the economic actions of the members of the Senate.

➔ **MAAG Group**  
www.maag.com



从左至右：  
Norbert Streveld 和 Christoph Brüssel 博士对 Alaaddin Aydin 的任命表示祝贺

From left to right:  
*Norbert Streveld and Dr. Christoph Brüssel congratulate Alaaddin Aydin to his appointment*

## 实现了精确计量的自动料斗装置

■ 将一套气动装置安装在称重计量式混料机的一个料斗内，就可以准确地计量回收再生塑料以及其他易于结块或“架桥”的物料组分，这类物料通常会阻碍流经料斗分配阀的物料流动。

美奎 (Maguire) 已经为其最大的三种型号混料机系列引入了新型“架桥破碎机”，这些混料机的最大产量为

5,000 公斤/小时 (11,000 磅/小时)，并且能够混合多达 12 种物料成分。破碎机由下列部件组成：1) 一个料斗嵌入件，将材料直接向下引导到分配阀上方；2) 一个在分配阀开启时自动运行的旋转装置。该装置在顺时针和逆时针方向运动之间快速切换，从而提高了流过分配阀的物料流量。

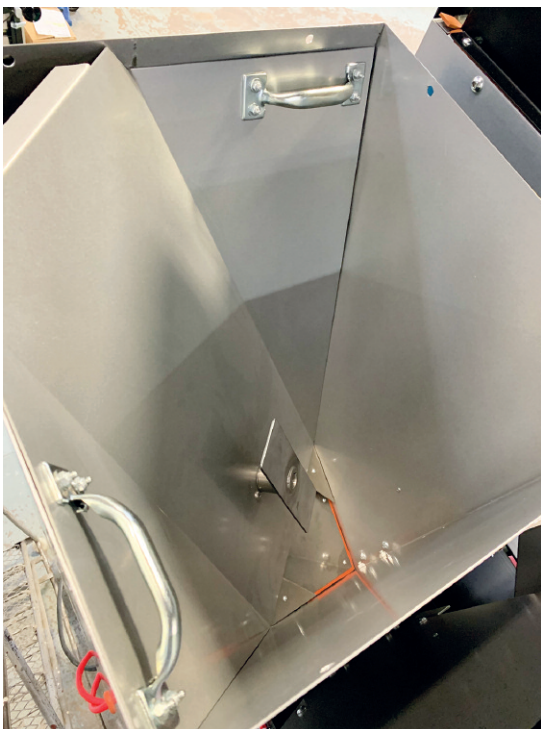


料斗嵌入件提供了一种将料斗斜壁升级为垂直壁的方案，可以对当前已投入运行的任何混料机进行改装。为了弥补嵌入件占用的料斗空间，完整的料斗嵌入组件还包括一套容量扩展装置，以容纳预定数量的物料。

三种大容量 Maguire® 混料机系列，即1200、2400 和 3000 系列，可混合多达十二种组分的物料，可实现范围广泛的可拆卸料斗和进料器配置，以及采用各种类型的分配装置。混料机处理各种类型的原材料，包括常规颗粒和再生料、散装粉末、薄片和特别容易架桥的组分，比如木粉。与其他美奎称重混料机一样，一旦所有组分都经过计量加入了称重室，该批次的原料就会落入混合室。微处理器将对每一批次的参数进行修正，包括对挤出速率或堆积密度的变化进行补偿调整，能够将整体的批次精度保持在  $\pm 0.1\%$  以内。

### *Automatically Hopper Device Enables to Accurately Dosing*

■ A pneumatically operated device that is deployed inside one of the hoppers in a gravimetric blender makes possible accurate dosing of regrind, recycled plastics, and other ingredients that tend to agglomerate or “bridge,” obstructing flow through the dispense valve of the hopper.



带碎桥器的料斗嵌入件

*Hopper Insert with Bridge Breaker*



带料斗扩展装置的混料机

*Blenders with Hopper Extensions*

Maguire has introduced the new “bridge breaker” for its three largest blender series, those with maximum throughput capacities of 5,000 kg/hr, (11,000 lb/hr) and capability of blending up to twelve ingredients. The bridge breaker consists of: 1) a hopper insert that directs material straight down onto the dispensing valve; and 2) a rotary device that operates automatically while the dispense valve is open. The device rapidly pulsates between clockwise and counter-clockwise movement, enhancing material flow through the dispense valve.

The hopper insert, which provides a vertical alternative to the sloping wall of the hopper, can be retrofitted in any blender currently in operation. To make up for the space occupied by the insert, the complete hopper assembly includes an extension to accommodate the desired quantity of material.

The three large-capacity Maguire® blender families, the 1200, 2400, and 3000 Series, blend up to twelve ingredients, using a wide range of removable hopper and feeder configurations and numerous dispensing devices. The blenders handle raw materials in a variety of forms, including regular pellets and regrind, bulk powders, flake, and ingredients that are especially bridge-prone, such as wood flour. As with other Maguire weigh scale blenders, once all ingredients are dosed into the weigh chamber, the batch falls into a mixing chamber. A microprocessor makes corrections from batch to batch, including adjustments to compensate for variations in extrusion rate or bulk density, maintaining overall batch accuracy to within  $\pm 0.1\%$ .

➔ **MAGUIRE PRODUCTS, INC.**  
www.maguire.com

## 先进的纯度扫描仪确保在中国使用的交联聚乙烯粒子达到最高纯度

■ 一家大型的中国交联聚乙烯高压和超高压 ( XLPE HV 和 EHV ) 电力电缆成功的制造商和全球供应商, 自 2017 年以来一直使用 SIKORA 的先进的纯度扫描仪对其生产线中的高压电缆进行质量保证。这家中国公司一直名列前茅, 是连续多年的电缆行业10强企业。

多年来, 该公司还积极从事海底电缆制造业务, 并配备了来自德国 SIKORA 的先进的纯度扫描仪, 用于其生产线的质量控制。

在销售海底电缆时, 可靠性是最重要的方面。通常, 该公司为此类电缆提供若干年的保质期。“我们不能在海底电缆的生产中冒险”, 工厂经理解释说。“每个生产步骤都需要安全。它从我们用于电缆绝缘的化合物开始。因此, 我们对交联聚乙烯材料实施了在线质量控制”, 他总结道。公司依靠 SIKORA 的先进的纯度扫描仪进行检查和分类。通过 X 射线技术和光学相机, 该系统可以可靠地检测交联聚乙烯颗粒内部及其表面的污染物。被污染的颗粒会被自动分类。

这家中国电缆制造商在海底电缆生产线上安装了先进的纯度扫描仪, 并于 2021 年初在另一条生产线上安装了该系统, 以确保最高水平的交联聚乙烯纯度、高质量的最终电缆和最高的客户满意度。

SIKORA 很荣幸能在这个重要项目中成为这家中国全球企业的合作伙伴。两家公司在在线直径、壁厚和偏心测量领域已经合作了二十多年。

### *PURITY SCANNER ADVANCED to ensure the Highest Purity of XLPE Pellets used in China*

■ A large and successful Chinese manufacturer and global supplier of XLPE HV and EHV power cables, has been using the PURITY SCANNER ADVANCED from SIKORA for quality assurance of high voltage cables in their production lines, since 2017. The Chinese company has been ranking among the top 10 competitive enterprises in the cable industry for many years.

For some years, the company has also been active in the business of manufacturing subsea cables and integrated



SIKORA的先进的纯度扫描仪安装在一家中国高压、超高压和海底电缆制造商的设备上, 用于对交联聚乙烯粒子进行检查和分类

### *SIKORA's PURITY SCANNER ADVANCED installed at a Chinese manufacturer of HV, EHV and subsea cables for inspection and sorting of XLPE pellets*

among others the PURITY SCANNER ADVANCED from the German based SIKORA for quality control in its production lines.

Reliability is the most important aspect, when selling subsea cable. Typically, the company offers certain years of warranty for this type of cable. “We cannot take any chances at the production of subsea cables”, explains the plant manager. “Each production step needs to be safe. It starts with the compound that we use for the cable insulation. Accordingly, we have implemented an online quality control of the XLPE material”, he concludes, whereby the company relies on the PURITY SCANNER ADVANCED for inspection and sorting from SIKORA. By means of X-ray technology and optical cameras, the system reliably detects contamination inside XLPE pellets as well as on their surface. Contaminated pellets are automatically sorted out.

The Chinese cable manufacturer installed the PURITY SCANNER ADVANCED in the submarine cable production line and equipped the system also in another production line at the beginning of 2021 to ensure the highest XLPE purity, a high-quality final cable and the highest customer satisfaction.

SIKORA is proud to be a partner of the Chinese global player also in this important project. Both companies have already been cooperating for more than twenty years in the area of online diameter, wall thickness and eccentricity measurement.

► SIKORA AG  
SIKORA (Fuzhou)  
Electronic Technology Co., Ltd.  
www.sikora.net

## PET 回收 – 一步完成净化和IV值控制

■ 目前，消费后的PET瓶片的回收已经很成熟，并且已经成为第二次寻求回收的机会。

越来越多的重点转移到使用其他PET废料进行回收，例如工业后纤维废料，以及使用其他PET的消费后废料，例如热成型罐子，盆子和托盘。

回收这些材料的重要区别在于，对于PET瓶片而言，一定的IV降低是可以接受的，而纤维废料或热成型的罐子，盆子和托盘的IV的水平应使任何进一步的IV降低都会导致不可接受的机械性能。

通常，唯一的答案是在挤出机下游安装复杂的和/或高能耗的液相或固态IV增粘工艺。

适用于PET的Gneuss MRS挤出机具有无与伦比的去污性能（并已获得食品接触批准用于消费后的废物，而无需对该材料进行任何额外的热处理。

除此之外，该挤出机的新型MRSjump版本可在真空下显著提高表面交换速率，从而在挤出机内发生部分缩聚反应，并且可以保持输入的IV数值。

另外，尽管输入材料的残留水分水平不可避免地发生变化，但仍可以控制聚合物在真空下强烈的脱挥发分和长时间的停留时间，以提供一致的输出IV值。

因此，新型Gneuss MRSjump既可以与食品接触水平提供净化性能，又可以在单个挤出加工步骤中保持和控制PET的IV。

无需在挤出之前处理材料，并且除了挤出之外，不需要其他的熔融或固相IV增粘工艺。

结果：更低的能耗，更好的材料质量，更大的灵活性，更小的机器占地面积，更低的复杂性，更少的操作员关注以及使用以前不经济回收的原材料类型的可能性。

### *PET Recycling – Decontamination and IV Control in One Step*

■ Currently, the recycling of post-consumer PET Bottle Flake is well established and it has become a sought after secondary meantime. Increasingly, the focus is shifting toward using other sources of



PET waste for recycling, such as post-industrial fibre waste and to other post-consumer sources of PET, such as thermoformed pots, tubs and trays.

The important difference in recycling these materials is that whereas with PET bottle flake, a certain IV drop extrusion is acceptable, the IV of fibre waste or thermoformed pots, tubs and trays is at a level that any further IV drop would result in unacceptable mechanical properties. Typically, the only answer is to install a complicated and/or energy intensive liquid phase or solid state IV boosting processes downstream of the extruder.

The Gneuss MRS extruder for PET offers unparalleled decontamination performance (and has food contact approval for post-consumer waste without the need for any additional thermal treatment of the material). In addition to this, the new MRSjump version of this extruder provides a drastically increased surface exchange rate under vacuum so that partial polycondensation takes place within the extruder and it is possible to retain the input IV.

Additionally, the intense devolatilisation and long residence time of the polymer under vacuum can be controlled to provide a consistent output IV in spite of the inevitable variations in the residual moisture level of the input material.

The new Gneuss MRSjump therefore offers both decontamination performance to food contact levels and the ability to maintain and control the IV of the PET in one single extrusion processing step. There is no need to treat the material prior to extrusion and no need for an additional melt or solid phase IV boosting process in addition to extrusion.

The result: lower energy consumption, better material quality, greater flexibility, smaller machine footprint, lower complexity, less operator attention and the possibility of using types of raw material which were previously uneconomic to recycle.

## 熔融过滤器可在PP编织包装中实现添加高含量的回收料

■ 在可持续包装和闭环包装循环等流行语风靡的时代，史太林格公司现在能够为塑料包装行业提供另一种解决方案来确保更强的可持续性。史太林格销售总监Hermann Adrigan解释道：“我们提供久经考验的技术，通过我们的SPB过滤器，使编织袋制造商能够在不影响质量和成本效益的情况下使用回收材料进行袋子生产。这样，通过回收料生产的袋子与使用100%新料生产的袋子具有完全相同的规格和性能。”

特别是对于以高强度为特点的扁丝编织包装来说，高质量的扁丝是最重要的要求。将耐撕裂的袋子装满50公斤的东西——如果是大袋子，布料甚至要承受2到3吨的重量。使用再生材料时，史太林格 SPB过滤器可确保出色的熔融过滤，达到所需的高质量扁丝要求。Adrigan说：“这使得编织袋制造商的工作更加可持续，同时满足在包装市场中一个越来越重要的标准：在产品中添加一定量的回收料。”

**50%及以上的回收料**：在扁丝生产中，杂质以及在许多情况下，回收的输入材料中不同聚合物的范围会导致过滤器堵塞或扁丝撕裂等问题，进而降低生产效率。另一方面，来自史太林格的SPB熔体过滤器实现了高熔体吞吐量，即使在输入材料污染更严重的情况下也具有优异的清洗能力。这样，生产过程稳定，效率高。

多亏了过滤器的液压反冲功能，当相应的过滤器达到规定的污染程度时，对滤网进行反冲洗，从而进行清洁。由于过滤器中的高压积聚，反冲周期相对较短，挤出过程不会中断，这是节省材料和时间的重要标准。根据熔体的污染程度，过滤器可达到720 kg/小时的吞吐量，并允许在扁丝生产中添加50%或更多的回收料。

**闭环包装循环的专有技术**：Hermann Adrigan说道：“为了获得最佳的回收质量，我们史太林格回收技术提供回收厂，是专门服务于袋子制造商的特殊需求。原则上，我们在史太林格将“循环包装”的专业知识和技术结合在同一屋檐下：从制造过程和包装回收过程到相同产品中回收料的重复使用。我们的客户将从中受益。有了我们的设备，包装制造商在挤出过程中使用回收材料要容易得多，因为他们可以依赖回收颗粒的质量。”



Starlinger SPB Filter\_300dpi.jpg: 史太林格公司生产的单活塞反冲洗过滤器，用于扁丝生产中的再生聚丙烯

*Single-piston backflush filter from Starlinger for use of recycled polypropylene in tape production*

回收设计是包装行业实施循环经济的另一个重要标准。Hermann Adrigan说：“在这方面，聚丙烯编织袋是一个完美的例子，它们是由99%PP组成的单一材料包装，即使它们有涂层。考虑到这一点，很明显，袋子应该在使用后收集并回收。我们希望用我们的技术促进和推进这一进程。”

### **Melt Filter Enables High Recycled Content in Won Packaging Made of PP**

■ In times where buzzwords like sustainable packaging and closed packaging cycles are on everyone's lips, Starlinger is now able to provide another solution to the plastic packaging industry that will ensure greater sustainability. "With our SPB filter, we are offering tried and tested technology that enables woven bag manufacturers to use recycled material for bag production without compromising on quality and cost-effectiveness. As such, you get exactly the same specifications and properties with recycled in-

put material as with tapes made from 100% virgin material," explains Hermann Adrigan, Head of Sales at Starlinger.

Especially when it comes to packaging made of tape fabric, which is characterized by its high strength properties, high-quality tapes are the most important requirement. The tear-resistant sacks are filled with up to 50 kg of contents – in the case of big bags, the fabric even has to sustain two to three tonnes of weight. When using recycled material, the Starlinger SPB filter ensures excellent melt filtration for the high tape quality required. "This enables fabric bag manufacturers to work even more sustainably and at the same time meet a criterion that is becoming increasingly important in the packaging market: the amount of recycled content in the product," says Adrigan.

**50% and more of recycled content:** In tape production, impurities and, in many cases, the range of different polymers in the recycled input material cause problems such as filter blockages or tape

tears, which, in turn, reduce production efficiency. The SPB melt filter from Starlinger, on the other hand, achieves a high melt throughput with excellent cleaning capacity even in the case of more heavily contaminated input material. This way, a stable production process and high degree of efficiency are ensured.

Thanks to the hydraulic backflushing function of the filter, the respective filter screen is backflushed and thus cleaned when a defined degree of contamination is reached. The backflush cycles are relatively short due to the high pressure build-up in the filter, and the extrusion process is not interrupted – an important criterion that saves material and time. Depending on the degree of contamina-

tion of the melt, the filter can achieve throughput rates of up to 720 kg/hour and allows for 50% and more of recycle in tape production.

**Know-how for a closed packaging cycle:** “For optimum recycle quality, our division Starlinger recycling technology offers recycling plants that are tailored to the specific needs of bag manufacturers,” adds Hermann Adrigan. “In principle, we at Starlinger combine the know-how and technology for “circular packaging” under one roof: From the manufacturing process and the packaging recycling process to reusing the recycle for the same product. And our customers benefit from this. With our equipment, it is a lot easier for packag-

ing manufacturers to use recycled material in the extrusion process because they can rely on the quality of the recycled pellets.”

Design for Recycling is another important criterion for implementing a circular economy in the packaging sector. “In this respect, woven bags made of polypropylene are the perfect example,” says Adrigan. “They are a mono-material packaging consisting of 99% PP – even if they are coated. Considering this, it is obvious that the bags should be collected after usage and recycled. We want to promote and advance this process with our technologies.”

► **Starlinger & Co. Ges.m.b.H.**  
www.starlinger.com

## 挤出工具

■ Guill推出最新一代800系列产品，这是一种2至6层挤压模具，旨在为汽车、医疗、家电和工业应用生产高品质、高材料效率的1/8至6英寸外径管材。经过重新设计的800系列可针对任何多层、多腔医用管路以及燃料管路结构、多层PEX管道和滴灌应用等生产完美平滑挤压及具有层定义的氟聚合物和其他材料。Guill设计进一步允许薄层（0.02毫米以下）组合聚合物和粘合剂。

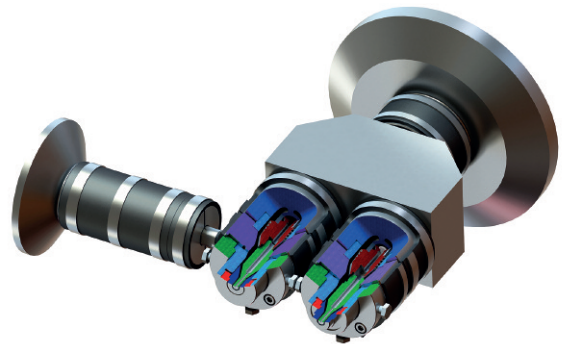
Guill提供各种十字头和内联管路模具，具有固定或可调节中心，适用于单挤压或共挤压应用。该工具可用于加工任何化合物，并具有公司的专利精密 Feather Touch同心度调节系统（即 Seal Right系统），该系统与 Feather

Touch系统相结合，可消除聚合物泄漏。Guill还提供独特的螺旋流量分配系统。

所有Guill工具都是通过使用计算流体力学（CFD）程序对流动通道进行严格的计算机模拟生成的，从而优化均匀流动，而且没有焊接线。

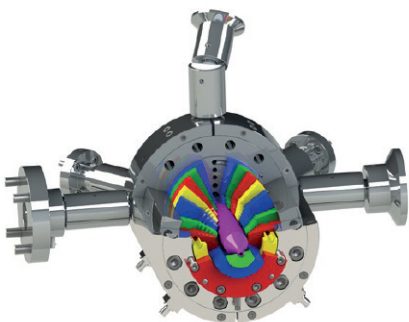
### Extrusion Tooling

■ Guill introduces the latest generation of its Series 800, the 2-to-6 layer extrusion tooling designed to produce the highest quality, highest material-efficient 1/8" to 6" OD tubing for automotive, medical, appliance and industrial applications. The redesigned Series 800 produces flawlessly smooth extrusion and layer definition of Fluoropolymer and other materials for all multi-layer, multi-lumen medical tubing, as well as fuel line constructions, multi-layer PEX pipe and drip irrigation applications, among others. The Guill design further allows thin layer combinations of polymers and adhesives to .02mm or less.



Guill offers its extensive line of cross-heads and inline tubing dies in fixed and adjustable center, for single or co-extrusion applications. The tooling is designed to process all compounds and features the company's patented, precision Feather Touch Concentricity adjustment, the Seal Right System, which combines with the Feather Touch system to eliminate polymer leaking. Guill also offers its unique spiral flow distribution system. All Guill tooling is produced with rigorous computer simulation of the flow channels using Computational Fluid Dynamics (CFD) programs, resulting in optimum uniform flow with no weld lines.

► **Guill Tool & Engineering**  
Bill Conley: bconley@guill.com, www.guill.com



## 从瓶子到瓶子回收再生的创新工艺

■ 聚对苯二甲酸乙二醇酯 (PET) 是一种高价值材料，有望在塑料行业走向循环经济的道路上发挥关键作用。现在，可以使用科倍隆 ZSK 双螺杆挤出机将 PET 薄片加工成粒子，而无需预先干燥。接下来，它们在 SSP (固态缩聚) 反应器中冷凝，获得与纯新材料相同的质量，并再次重新加工成瓶子。

使用这种创新工艺制造的 PET 回收料已获得美国食品和药物管理局 (FDA) 的批准，可用于接触食品的用途。由于 ZSK 挤出机具有高效的塑化能力，用于这种从瓶到瓶回收工艺的科倍隆系统具备了每小时 2 至 8 吨的产出量，由于有着非常高的产品质量，且运营和物流费用得到降低，塑料回收再生公司可以从中获益。与传统的 PET 回收方法相比，能源成本节省高达 30%。

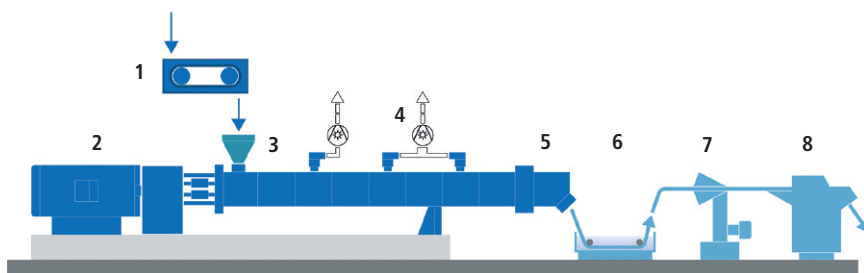
由于当今使用大量 PET 作为包装材料，所以这种材料在回收利用方面发挥着越来越重要的作用。PET 是一种非常有价值的材料，具有非常好的再加工特性。所以在一次性和可重复使用的瓶子方面的应用不断扩大。同时，通过储存收集系统进行回收，增加了它的价值。相应地，公司专注于 PET 回收可能是有利可图的。

在 PET 进行再加工之前，必须先将其切碎成薄片，然后进行清洗。普通技术需要在洗涤后对 PET 瓶片进行预干燥、结晶或附聚。但是，使用科倍隆的专业技术，可以将切碎的 PET 直接送入 ZSK 双螺杆挤出机并进行混合。使用“科倍隆-开创”的高精度 SWB (智能称重皮带) 喂料机或称重组式喂料机，可将切碎的瓶片可靠地送入 ZSK 挤出机。此外，还可以添加其他回收料、新材料或混合料。在熔体通过齿轮泵和带有自动换网器的过滤器输送到用于生产粒子的拉条造粒机或水下造粒机之前，先要在 ZSK 挤出机的加工段进行熔化、强力脱除挥发成分并完全均质化。

然后，熔体在 SSP 固态缩聚反应器中冷凝成球团。粒子足以达到纯新材料的质量要求。通过将 PET 回收料直接加工成瓶子，回收商将特别受益于极高的终端产品质量。从瓶到瓶的加工过程中，加工过程非常温和。物料在 ZSK 挤出机中的停留时间非常短，分散性非常好。ZSK 挤出机具有高扭矩特性，能够在低温下进行加工，物料几乎没有粘度损失。

ZSK 挤出机的自清洁功能可以快速变更配方和颜色。ZSK 双螺杆挤出机具有非常好的脱除挥发成分的选项，单

科倍隆新颖的从瓶到瓶回收再生技术 / Coperions innovatives Bottle-to-Bottle Recycling



回收再生系统用于经济地将 PET 瓶片加工成用于制造瓶子的 PET 粒子。典型配置：  
1) SWB (智能称重皮带) 喂料器；2) ZSK 双螺杆挤出机；3) 添加 PET 瓶片；4) 挥发性成分的脱除；5) 通过齿轮泵和过滤器输送；6) 水浴；7) 拉条干燥；8) 拉条造粒  
(图片：科倍隆)

*Typical set-up of a recycling system for economically processing PET flakes into PET pellets that can be used in turn to manufacture bottles: 1) SWB (Smart Weigh Belt) feeder; 2) ZSK twin screw extruder; 3) Addition of PET flakes; 4) Devolatilization of volatile components; 5) Discharge via gear pump and filter; 6) Water bath; 7) Strand drying; 8) Strand pelletizing (Image: Coperion)*

体、低聚物和水等挥发性成分在输送到加工段之前已被可靠地去除并分流，然后在合适的分离器中排出。

### Innovative Process for Bottle-to-Bottle Recycling

■ Polyethylene terephthalate (PET) is a high-value material that is on course to take over a key function in the plastics industry's path toward a circular economy. PET flakes can now be processed without pre-drying into pellets using Coperion ZSK twin screw extruders. Next they are condensed in the SSP (Solid State Polycondensation) reactor, and re-processed back into bottles again with the quality of virgin material.

PET recycle manufactured using this innovative process has received approval from the United States Food and Drug Administration (FDA) for food-contact uses. Thanks to the highly efficient plastification within the ZSK extruder, Coperion systems for this bottle-to-bottle recycling process achieve throughput rates between 2 and 8 tons per hour, therefore recycling companies profit from very high product quality, reduced operating and logistic expenses as well as from energy cost savings up to 30% in com-

parison to conventional PET recycling methods.

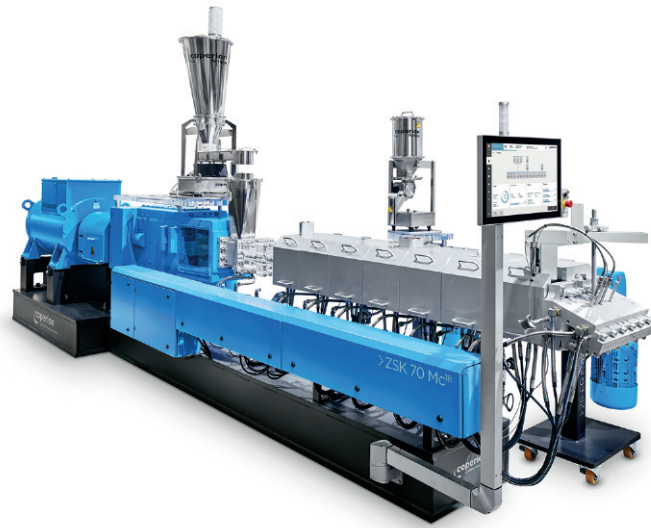
PET plays an ever more important role in recycling, due to the large volume of packaging materials in use today. PET is a very high-value material, possessing extremely good properties for reprocessing. Its continuously expanding use in single- and reusable bottles, as well as its recovery via deposit systems, add to its value. Correspondingly, it can be lucrative for companies to focus on PET recycling.

Before PET can be reprocessed, it must first be shredded to flakes and then cleaned. Ordinary technologies require pre-drying, crystallization or agglomeration of the PET flakes following washing. However, using the specialized technology from Coperion, the shredded PET can be fed directly into the ZSK twin screw extruder and compounded.

The shredded flakes are reliably fed into the ZSK extruder using high-accuracy SWB (Smart Weigh Belt) feeders or gravimetric feeders from Coperion K-Tron. In addition, other regrind materials, new materials, or mixtures can be added. Melting, intensive devolatilization, and complete homogenization take place in the ZSK process section before the melt is transferred via a gear pump and filter

科倍隆 ZSK 双螺杆挤出机具备非常出色的挥发成分脱除能力，在加工段的停留时间短，且分散性非常高，从而显著提高了最终产品的质量（照片：科倍隆）

*Coperion ZSK twin screw extruders provide very good devolatilization with short residence times in the process section as well as very high dispersion, contributing significantly to high end product quality (Photo: Coperion, Stuttgart)*



with an automatic screen pack changer to a strand or underwater pelletizer for pellet production.

Pellets are then condensed in an SSP reactor. The pellets' quality meets the requirements of virgin material.

With this direct processing of PET into bottles, recyclers profit particularly from the very high end product quality. Product handling in the bottle-to-bottle process is very gentle. The residence time in the ZSK extruder is very short and disper-

sion is very good. The ZSK extruders' high torque enables processing at low temperatures and with almost no viscosity loss. ZSK extruders' self-cleaning enables rapid recipe and color changes. Thanks to the ZSK twin screw extruder's very good devolatilization options, volatile components such as monomers, oli-

gomers, and water are reliably removed and channeled away from the exhaust flow in suitable separators before discharging the process section.

➔ **Coperion GmbH**  
www.coperion.com

## PET瓶对瓶回收

■ 独特的Gneuss旋转过滤技术确保了在恒定条件下不间断的生产过程-即使是消费后回收材料的处理。Gneuss熔体过滤系统特别适用于现有挤出生产线的改造。

PET瓶片的加工对熔体过滤系统提出了特殊的挑战。一方面，消费后的原料来源通常具有相对较高的污染水平，另一方面，质量要求（精滤）非常高——尤其是当材料要放回透明瓶中饮用时。

为了不需要手动不断更换过滤网片，理想的熔体过滤系统应进行自清洗。通常，使用反冲洗原理。一部分熔体流动被分流，使其反向流过未使用的过滤网片，以清洗污染网片。在市场上不同的过滤系统中，反冲洗的清洗效率和反冲洗所需材料的数量有很大的差异。

通过格诺斯RSFgenius熔体过滤系统，高压顺序清洗系统确保过滤器网片被完全清洁，聚合物损失量绝对最小。

西班牙的Nosoplas公司决定使用RSFgenius旋转过滤系统，因为它提供

的高效和快速的投资回报。Nosoplas公司使用PET瓶片生产瓶级颗粒(切片)。这些颗粒(切片)供应给其他公司，在那里，他们被注射成型成预成型制品，然后吹成高质量的饮料瓶。

由于反冲洗的问题和过量的聚合物损失，Nosoplas决定更换现有的传统过滤系统。他们用Gneuss RSFgenius 175取代了这一传统系统，其吞吐量为1.500 kg/h，过滤细度为56µm。事实上，客户甚至可以为特殊产品使用30µm的操作。而且，这一切都具有恒定的、稳定的熔体压力，最小的损失由于反冲洗和没有任何生产变化，甚至在更换过滤网片期间。

### *PET Bottle to Bottle Recycling*

■ The Gneuss Rotary Filtration Technology ensures an uninterrupted production process under constant conditions – even when post-consumer recycled ma-



terial is processed. Gneuss Melt Filtration Systems are especially well suited for retrofitting to existing extrusion lines.

The processing of PET Bottle Flakes presents particular challenges for Melt Filtration Systems. On the one hand, the post-consumer material source typically has a relatively high contamination level, on the other hand, the quality requirements (fine filtration) are very high – especially when the material is to be put back into transparent bottles for beverages.

In order that the filter elements do not need to be constantly changed by hand,

the ideal Melt Filtration System should be self-cleaning. Typically, the principle of back flushing is used. A proportion of the melt flow is diverted so that it flows in the reverse direction across filter elements which are not in use in order to wash the contamination out. The cleaning efficiency of the back-flushing and the quantity of material needed for back flushing vary greatly between the different systems available on the market.

With the Gneuss RSFgenius Melt Filtration System, the high pressure sequential cleaning system ensures that the filter

elements are completely cleaned with the absolute minimum of polymer.

Nosoplas in Spain decided in favour of the RSFgenius Rotary Filtration System due to the high efficiency and the fast return on investment which it offers. Nosoplas manufactures bottle grade pellets (chip) from PET bottle flake. The pellets (chip) are supplied to other companies, where they are injection moulded to pre-forms which are later blown into high quality bottles for beverages.

Nosoplas decided to replace their existing, conventional filtration system due to problems with back flushing and high

polymer losses. They replaced this conventional system with a Gneuss RSFgenius 175 for a throughput of 1.500 kg/h and a filtration fineness of 56 µm. In fact, the customer is even able to operate with 30 µm for special products. And this all with a constant, steady melt pressure, minimal losses due to back flushing and without any production variations, even during replacement of the filter elements.

► Gneuß Kunststofftechnik GmbH  
www.gneuss.de

## 提出新的Skyreef系列

■ 迈向自主化挤出吹塑设备——全新Skyreef 包装机器能够提供基于通用平台的灵活机器解决方案。

考特斯机械制造有限公司是全球领先的挤出吹塑技术供应商之一，旗下的吹塑机生产高效、经久耐用，品质卓越。作为产品创新计划的一部分，考特斯以未来为导向，正在重新调整其全部产品组合。如今，公司更加侧重于标准化、模块化的设计方案和平台战略，而非高度专门化的单一解决方案。

考特斯在今年的Chinaplas上让参观者第一次看到了其新的Skyreef系列。新款机器将考特斯多种不同系列的技术和组件相结合，专为未来的智能生产而设计，旨在打造自主化机器。Skyreef 机器可采用液压、全电动或者电液混合的运行方式，由客户自行选择，确保高灵活性与高匹配度。

中国是考特斯的一大核心市场。考特斯在广东顺德建立了生产基地，至今已有25年。

### New Skyreef Series Unveiled

■ Next step: an autonomous extrusion blow molding line – the new Skyreef packaging machines open the door to flexible machinery solutions based on a common platform.

Kautex Maschinenbau is one of the world's leading producers of extrusion technology. Its blow molding machines

are synonymous with maximum productivity, sustainability, and product quality. Kautex is currently realigning its whole product portfolio for the future as part of its product promotion campaign: Instead of highly specialized individual solutions, the company is now focusing more on standardization, modular concepts, and platform-based strategies.

Kautex gave visitors to this year's Chinaplas their first glimpse of its new Skyreef series. The innovative idea behind the machines combines technologies and components from different Kautex series

and is designed for a future of smart production. The ultimate aim? The autonomous machine. Customers can choose whether their Skyreef is powered by a hydraulic, all-electric or hybrid drive, making it both flexible and adaptable.

China is a major market for Kautex, and the company has run its own production site in Shunde in the south of the country for over 25 years now.

► Kautex Maschinenbau GmbH  
www.kautex-group.com



考特斯机械制造公司的新Skyreef系列

*The new Skyreef range from Kautex Maschinenbau*



## 出新型500系列橡胶/硅胶挤压十字头

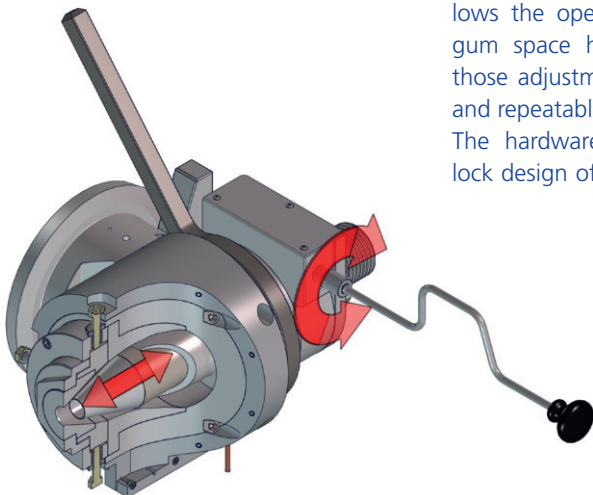
■ Guill Tool推出了具有MAGS胶空间调节系统的新型500系列十字头。500系列专为弹性体化合物的流动特性和独特的加工挑战而设计。Guill推出的这种新型十字头设计的关键特性之一是机械辅助胶空间(MAGS)调节系统。新的胶空间调节方法使操作员可以使用普通套筒扳手从单点进行轻松调节。调节胶空间时无需多个螺母和螺栓,这可以缩短调节时间。核心管上的视觉指示灯让操作员能够查看胶空间移动了多远,使调节更加准确且可重复。

Guill推出的新型500系列无需硬件并采用专利凸轮锁设计,无需浪费时间拆卸和重新固定紧固件,便于拆卸和重新组装。只需将凸轮螺母转半圈即可松开并自动从十字头体部取出导流板,这进一步节省了时间。此外,导流板上没有底切,在取出导流板时无需挂起任何材料,从而可以更快、更轻松地清洁和转换。

新型500系列还采用了最新的中央平台同心度调节系统,可显著降低工具压力,可以在不松动端面螺栓的情况下更轻松、更精确地进行同心度调节。用于调节螺栓的易取插件还允许轻松地更换锁定或损坏的调节螺栓,从而进一步减少维修费用并减少宕机时间。

这种新型橡胶/硅胶十字头的另一个创新特点是铸铝液体冷却套管,让用户可以在发生线路阻塞时切换冷却套管,与传统集成冷却系统相比,进一步减少了宕机时间。

Guill 500系列十字头,具有机械辅助胶空间(MAGS)调节系统.....专为弹性体化合物的流动特性而设计



带有MAGS胶空间调节功能的新型500系列十字头是大多数现有NRM生产线的直接替代品,但这种十字头设计也可以适应任何挤压机设计或生产线布局。

添加了新设计的流入口通道后,可减少材料加工时产生的剪切力和热量,这有助于降低十字头的压力,使材料以更平衡和均匀流动的方式穿过十字头。

Guill提供的所有十字头都配有用于装配和拆卸的工具套件以及详细的操作员说明书。Guill工程团队可随时协助用户实施和操作新型500系列十字头。

有关具有MAGS胶空间调节系统的新型Guill 500系列十字头的视频,请访问:

<https://youtu.be/jeNovmMtcBs>

### *New 500 Series Rubber/Silicone Extrusion Crosshead*

■ Guill Tool introduces the NEW 500 Series crosshead with MAGS gum space adjustment. The 500 Series is designed specifically for the flow characteristics and unique processing challenges of elastomeric compounds. One of the key features engineered by Guill on this new crosshead design is the mechanically assisted gum space (MAGS) adjustment system. This new method of gum space adjustment allows the operator to make an effortless adjustment from a single point using a common socket wrench. No more need to struggle with multiple nuts and bolts in order to adjust gum space, which leads to faster adjustments. The visual indicator on the core tube allows the operator to see how far the gum space has been moved, making those adjustments much more accurate and repeatable.

The hardware-free and patented cam lock design of the NEW 500 Series from

*Guill Series 500 crosshead with Mechanically Assisted Gum Space (MAGS) adjustment...specially designed for the flow characteristics of elastomeric compounds*

Guill means no time is wasted unbolting and re-securing fasteners for disassembly and re-assembly. Only half of a rotation of the cam nut is required to loosen and automatically extract the deflector from the head body, which is another time saver. Also, with no undercuts on the deflector, there are no material hang-ups when extracting the deflector, allowing for faster and easier cleaning and changeover.

The NEW 500 Series also features the latest Center-Stage concentricity adjustment system that significantly reduces pressure on the tooling, allowing easier and more precise concentricity adjustments without loosening the face bolts. Easy-Out inserts for the adjusting bolts also allow simple replacement of locked or damaged adjusting bolts, which further saves on repair and downtime.

Another innovative feature of this new rubber/silicone crosshead is a cast aluminum liquid-fed cooling sleeve that allows the user to switch out the cooling jacket in the event of a line obstruction, again reducing downtime compared to traditional integrated cooling systems.

The NEW 500 Series crosshead with MAGS gum space adjustment is a drop-in replacement on most existing NRM lines, however this crosshead design can also be adapted to fit any extruder design or line layout.

The addition of a newly designed flow inlet channel reduces the shear and heat that is generated as the materials are being processed. This leads to lower head pressures allowing the material to move through the head in a much more balanced and even flow.

All crossheads supplied by Guill are furnished with a tool kit for assembly and disassembly as well as a detailed operator's instruction manual. The engineering team at Guill will gladly assist users in the implementation and operation of the NEW 500 series crosshead.

For a video of the NEW Guill 500 Series crosshead with MAGS gum space adjustment, please go to:

<https://youtu.be/jeNovmMtcBs>

# 充分利用您的挤出模具

## Getting the Most from Your Extrusion Tooling

作者：Glen Guillemette，总裁

模具维护可以提高医用管材应用的挤出效率，提升质量及整体生产力。

By Glen Guillemette,  
President Guill Tool & Engineering

*Tooling maintenance improves extrusion efficiency, enhances quality and boosts overall productivity for your medical tubing applications.*



Guill 712 Series

通过使用最先进的生产设备和工艺，当今多腔和多层医用管材的加工公差可以降低至最低。需要注意的重要一点是，模具的任何误差都可能在成品中被放大。清洁的零件，尤其是密封和定位表面，是保证产品性能和优质成品的关键。这些表面在制造过程中获得的关注最多，并且是确保整个管材一致性的控制表面。请记住，哪怕直径仅千分之几英寸的灰尘也会对精密机械加工的对位产生影响。人的发径约为0.003英寸（0.08毫米），由于高质量模具中有许多这样的表面，清洁度至关重要。

检查模具是否有任何变形也很重要。毛刺、划痕和刮伤通常是由粗心搬运和/或存放设备造成的。双层和三层挤出头的维护难度更高。密封和定心表面的数量倍增，从而会放大模具不洁净的影响。在更换时，您可以先拆卸挤出头，以便更换化合物和/或头端和模具。异物通常会在此时进入，您必须彻底清除残留物质。由于处理不当和储存技术不佳，通常会在此阶段给模具造成机械损坏。这些零件是高精密零件，但同时也笨重、巨大，难以徒手拆卸。建议使用专门配备用于挤出头维护的专用工作车。该工作车配备有备件和硬件，建议购买和使用，特别是考虑到良好维护的模具可帮助您降低成本。您应当注意以下事项：1.) 使用柔软、干净、可恢复的工作表面，保持工作区域干净整洁 2.) 使用软钳口的钳子，例如铜制钳口 3.) 使用特殊设备，如刀尖清除工具等 4.) 标准工具包括扳手、软面锤等 5.) 常备柔软干净的抹布 6.) 使用瓶装喷雾清洁剂 7.) 使用工具供应商建议的妥善管理和储存的备件 8.) 将设备维修/维护手册保存在方便查阅的地方 9.) 使用小型平板，以提供平坦表面 10.) 使用一套适当的量规和顶针进行初始工具位置调整 11.) 确保您拥有所有适当的举升辅助工具，包括高架起重机、液压升降机等。

在大多数情况下，挤出头和模具将仍然处于高温，因此

搬运时需要佩戴衬里的手套。如今，管路制造商需要与全球的公司竞争。要想成为一家成功、盈利的公司，质量和效率至关重要。在挤出领域尤其如此，因为材料成本通常远高于人工成本。就像一辆身陷凹坑的赛车一样，许多挤出机由于模具不良或损坏而处于闲置状态，并且需要过多的维护时间。管理费用会迅速上升，最终造成亏损。有些挤出机能够快速启动，但只是在制造废料，而另一些挤出机制造的产品超大，无法达到最小容差的要求。10%到20%的材料被浪费，占产品成本的50%到90%。模具供应商在竭尽全力将头端和模具加工到确定的规格，以确保完美的同心度和对位。然后，材料将作为成品的一部分被安放到适当的位置。

### 了解维护程序

例1：在这个例子中，未能正确居中的模具导致计算出的超容差面积达到0.059平方英寸（38平方毫米）。比较这两个表面积时，计算出的材料浪费率占成品的11.8%。公式为：壁厚% = 最小壁厚 / 最大壁厚 × 100。例2：或者，如果壁厚%可以从80%增加到95%，则可以节约大约12%的总成本。当然，成本节约情况会因设计而异。处理沉重和笨重部件时，请寻求帮助。表面和边缘很硬，有点脆，因此零件坠落或相互碰撞可能导致损坏。将模具妥善存放在干燥清洁的地方——最好是每个模具都有专门的存放位置。这些区域应该有柔软的表面，每个器械在清洁后均应盖好。另外，模具应该彼此隔离，以免它们彼此接触。模具和所有器械在储存前应彻底清洁。

拆卸模具时，必须使用专用工具来帮助拆卸。您的供应商可以提供这些专用工具。如果他们不能提供专用工具，请联系信誉良好的工具厂商购买替换件。这些工具的成本很容易就被潜在的损坏所抵消，而损坏通常是由不适当的设备

(如锤子)和位置偏移造成的。请遵循操作手册中的说明。个别模具可能会有特殊要求,所以,如果有任何不清楚的地方,请联系您的供应商。您的供应商明白,最佳性能取决于正确的保养和维护。这里提供一些有用的提示:1.)请在设备还热的时候清洁设备,因为此时更容易清除残留物。一次应仅拆卸和清洁一个模具,这样可以保持模具具有较高的温度。2.)清洁双成分十字头时(塑料和橡胶),先清洁塑料模具,然后再清洁橡胶模具。3.)切勿使用刮刀或螺丝刀等钢制工具,因为这些工具可能划伤和损坏模具。4.)不要使用明火,因为这会产生过多的热量,特别是在较薄的部分,从而影响部件的硬度、同心度和容差。推荐的清洁工具和材料包括:a.)黄铜钳子,用于抓lao材料并协助拉动 b.)不同宽度的黄铜刮刀,用于清洁平坦的暴露表面 c.)黄铜丝管刷,直径从1/16英寸到1英寸,增量为1/16英寸(适用于清洁孔和凹槽) d.)黄铜棒—不同直径的黄铜棒适用于将材料推出流孔 e.)铜丝网,用于清洁和抛光暴露的圆形或圆锥形表面 f.)铜刀,用于清除凹槽和其他难触及区域的残留物。另外,抛光化合物用于修复抛光表面 g.)压缩空气可以更有效地吹除塑料,同时也有助于去除橡胶。小心不要用压缩空气将残留物压入凹槽 h.)清洁剂也会有帮助,请记住使用新的干净抹布(旧抹布通常嵌有金属屑,可能会划伤抛光表面) i.)清洁烤箱——仅限用于塑料部件。遵循制造商的建议。如果没有指定温度,不要超过850华氏度(454摄氏度)。不要淬火冷却模具,这可能会影响模具的硬度、同心度和容差。j.)清洗化合物—几种清洗化合物可以用来清洗挤出机螺杆/筒体残留的聚合物和橡胶化合物 清除过量材料以实现最佳的加工效率 清洁的零件对挤出模具的性能和加工质量至关重要。密封和定位表面尤其如此,因为它们控制生产过程的一致性。对于工具的一般维护,在储存或工具转换之前,彻底清洁和清除多余材料可确保生产具有精准容差成品所需的精密加工对位。设备应在温度仍然很高时清洁,因为会更容易清除残留的聚合物和橡胶。加热工具时请务必遵守所有MSDS建议。请戴防热手套,以保护手部因接触加热工具表面而受伤。建议使用黄铜刮刀和黄铜或绒绒清洁布,因为它们足够柔软,不会划伤表面。

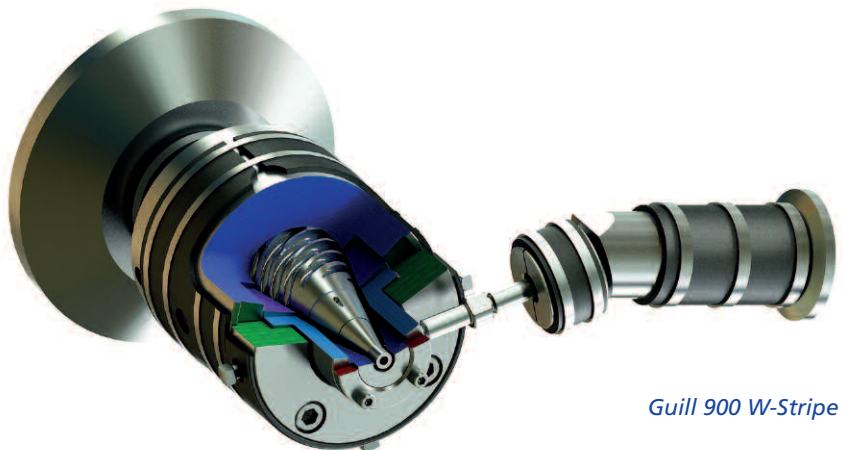
让清洁模具更容易 取出模具的最快方法是利用挤出机的压力将其推出。使用空气压缩机和黄铜钳清洁模具体部,以便材料冷却,从而增加熔体强度,使其成为一体,而不会成为难以去除的弹性胶状物质。使用压缩空气和黄铜钳清洁体部进料口,以同时冷却和去除进料口上多余的残留物。完成此步骤后,用圆形黄铜刷刷表面,以抛光表面。使用黄铜刷仔细清洁2英寸(51毫米)法兰接合器的流动区域。

检查所有表面是否有任何不平整的地方,如毛刺和划痕,因为在重新组装挤出头前必须修复上述现象。大多数制造商建议使用手工抛光石来去除有害的毛刺。使用抛光石清洁后,必要时使用600目砂布进行轻微磨光,但不要打磨本应锐利的边缘。平坦的密封表面也可以用抛光石清洁,然后用600目砂布磨光。将布放在干净、平整的表面上,最好是平板上,然后用手以画圆的方式施加摩擦,直至相应区域干净平整。这些部件应全部为硬化钢合金,不会因使用上述方法而受到不利影响。铬镍铁合金、蒙乃尔合金和哈氏合金通常没有经过热处理,因此需要特殊的养护和处理以避免损坏。

### 不要忽视维修

模具保养有助于确保高质量的挤出产品,即符合尺寸规格、保持指定的最小容差且经济实惠的产品。沾污、未经适当维护和未经妥善调整的模具会导致施用过多的化合物,从而使维持最小厚度容差变得更复杂。过多的材料会导致不必要的成本支出,这会直接影响贵公司的盈利能力以及客户关系。重要的最后一步—重新组装使用专用工具车,按照制造商的说明进行重新组装。在安装之前,请使用干净的抹布对每个部件进行最后的擦拭。必须清除哪怕是极微量的砂砾、污垢和残留物质。对于沉重和笨重部件,使用机械或请他人帮助,以避免不必要的事故。如果需要,在所有紧固件上重涂一次防卡化合物。按照制造商推荐的规格以及建议的顺序拧紧紧固件。手册应当规定了这种紧固顺序,通常以星形图的方式呈现。逐渐拧紧紧固件,直到达到适当的扭矩,以防止模具变形。模具制造商的一个主要目标是尽可能在挤出物刚刚从模具的分布毛细管中被挤出时,快速、准确地在模具的主要部分形成同心圆锥体。设计和制造适当的模具在挤出物入口点附近具有均匀的分布,但是一旦模具被调整,这种分布就会受到影响,从而使挤出物向一侧偏移。在主要区域形成一个偏心圆锥体,并且在该过程中仅在一个点存在同心圆锥体,而不是形成体积逐渐减小的平滑连续的流动路径。正确制造和对位精确的挤出头以及良好维护的模具只需很少的调整直至不需要调整。不必要的模具调整的另一个不利影响是不平衡流动对挤出物产生压力。最终结果是最终产品保留了所产生的这种不平衡,并且发生了不可预测的模口膨胀。

By utilizing state-of-the-art production equipment and processes, machining tolerances are held extremely close on today's multi-lumen and multi-layer medical tubing. It is important to note that any misalignment of the tools may be exaggerated in the final product output. Clean parts, especially with sealing and locating surfaces, are key to product performance and successful end products. These surfaces receive the most care and attention during manufacturing and are the control surfaces that ensure uniformity throughout the tubing. Remember, precision-machined alignments are affected by even a speck of dirt measuring only a few thousandths of an inch. A human hair is about 0.003" (0.08 mm), and since there are ma-



Guill 900 W-Stripe

ny such surfaces in a quality tool, cleanliness is critical. Checking of the tools for any deformities is also important. Burrs, scratches and scrapes are usually a result of careless handling and/or storage of equipment. Double and triple-layer extrusion heads pose an even greater challenge for maintenance. The number of sealing and centering surfaces multiplies and can magnify the results of dirty tools. During changeovers, the head may be disassembled in order to change compounds and/or tips and dies. Foreign matter is usually introduced at this point and residual materials must be thoroughly removed. Physical tool damage often occurs during this phase, due to mishandling and poor storage techniques. These are highly precise parts, but can also be heavy and bulky to remove by hand. Use of a dedicated work cart exclusively reserved and equipped for extruder head maintenance is recommended. This cart along with a supply of spare components and hardware is easily justified, especially when examining the potential cost savings that result from well-maintained tools. The following should be considered: 1.) Maintain a clean, organized work area with soft and clean renewable work surfaces; 2.) Use a vise with soft jaws, such as copper; 3.) Use special equipment, such as tip removal tools, etc.; 4.) Standard tools include wrenches, soft-faced hammers, etc.; 5.) Maintain a supply of soft, clean rags; 6.) Use cleaning solutions in spray bottle; 7.) Use spare parts as suggested by your tooling supplier, properly organized and stored; 8.) Keep handy your equipment's repair/maintenance manual; 9.) Have a small surface plate to provide a true flat surface; 10.) Use a set of appropriate gauge and tip pins for initial tool location adjustment; 11.) Make sure you have all the proper lifting aids available, including overhead hoists, hydraulic lifts, etc. In most situations, the head and tooling will still be at elevated temperatures, therefore lined gloves are needed when handling.

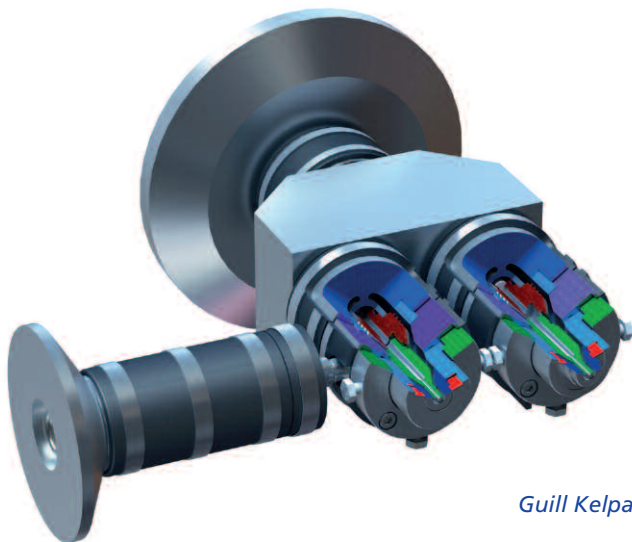
Today, tubing manufacturers compete with companies all over the world. To be a successful and profitable company, quality and efficiency are essential. This is especially true in extrusion, where material costs are usually much higher than labor costs. Like a racing car stuck in the pit, many extruders sit idle because of poor or damaged tooling, plus excess maintenance time. Overhead costs add up and losing money is the result. Some start up quickly and make scrap, whereas others start up

and run a product oversized to hold minimum tolerance. They waste 10% to 20% of the material, which can run from 50% to 90% of the product cost. The tooling supplier goes to great lengths so that tips and dies are machined to a determined specification, ensuring perfect concentricity and alignment. The material is then distributed in the proper location as part of the finished product.

### Understanding Maintenance Procedures

**Example 1:** In this example, with an improperly centered tool, a calculated out-of-tolerance area of 0.059 in<sup>2</sup> (38 mm<sup>2</sup>) was derived. When the two surface areas were compared, the calculated material waste was 11.8% of the finished product. The formula is  $\% \text{ wall} = \frac{\text{min. wall thickness}}{\text{max. wall thickness}} \times 100$ . **Example 2:** Alternatively, if the  $\% \text{ wall}$  can be increased from 80 to 95%, a savings of about 12% of total cost can result. Savings will vary depending on the designs, of course. Get help for heavy parts and awkward situations. Surfaces and edges are hard and therefore somewhat brittle, so dropping a part or striking parts together can result in damage. Store your tools properly in a dry, clean area – a dedicated spot for each tool is best. These areas should have soft surfaces and each instrument should be covered after cleaning. Also, tools should be segregated so that they do not come into contact with each other. And tools and all instruments should be cleaned thoroughly before storage.

For disassembly of tools, it is imperative to use purpose-built tooling to facilitate disassembly. These should be available from your supplier. If they are not, consult with a reputable tooling house for replacements. The cost of these tools is easily offset by potential damages, frequently caused by improper equipment such as hammers and drifts. Follow the guidelines outlined in your operator's manual. Individual tools may have specific recommendations, so contact your supplier if anything is unclear. Your supplier understands that optimum performance relies on proper care and maintenance. Here are some useful tips: 1.) Clean your equipment while it is still hot as the residue is easier to remove. It helps to remove and clean one piece of tooling at a time in order to maintain elevated temperatures. 2.) When cleaning a dual compound crosshead, (plastic and rubber) clean the plastic tooling first; the rubber second. 3.) Never use steel tools such as scrapers or screwdrivers because these can scratch and mar the tooling. 4.) Do not use open flames because this generates excessive heat especially in thin sections, which can affect hardness, concentricity and tolerances of components. Recommended cleaning tools and materials include: a.) Brass pliers to grip material and aid in pulling; b.) Brass scrapers available in different widths for cleaning flat exposed surfaces; c.) Brass bristle tube brushes that are available in diameters from 1/16" to 1" in 1/16" increments (ideal for cleaning holes and recesses); d.) Brass rods – different diameter rods are good for pushing material out of flow holes; e.) Copper gauze for cleaning and polishing exposed round or conical surfaces; f.) Copper knives for removing residue from recesses and other hard-to-reach areas. Also, polishing compound restores polished surfaces; g.) Compressed air, which is more effective for releasing plastic, but also aids in rubber removal. Be careful not to force debris into recesses with com-



Guill Kelpac

pressed air; h.) Cleaning solutions may be useful, so remember to use fresh, clean rags (used rags often have metal chips embedded in them, which may scratch polished surfaces); i.) Cleaning oven – for plastic only. Follow manufacturer's recommendations. If no temperatures are specified do not exceed 850 degrees F (454 degrees C). Don't quench tooling to cool, as this could affect tooling hardness, concentricity and tolerances. j.) Purging compounds – several are offered to purge the extruder screw/barrel of residual polymer and rubber compounds.

### **Removing Excess Material for Optimum Machining Efficiency**

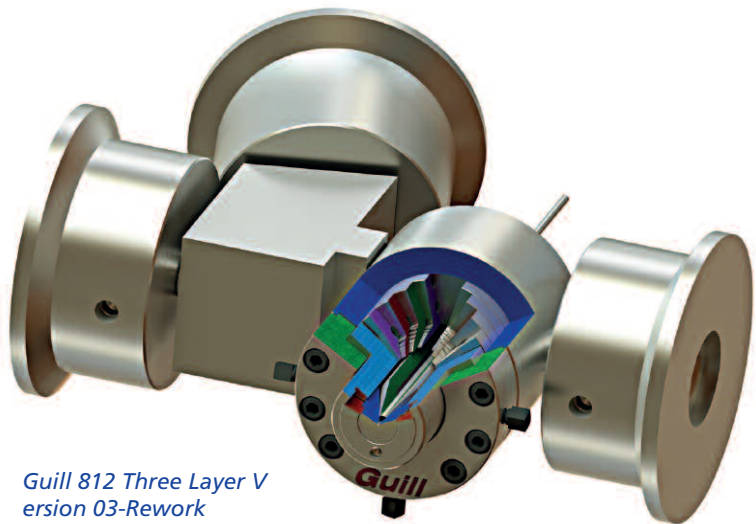
Clean parts are critical to extrusion tooling performance and quality manufacturing. This is especially true for the sealing and locating surfaces – that control uniformity of the production process. For general maintenance of the tools, before storage or tooling changeover, a thorough cleaning and removal of the excess material assures the precision machining alignments required to produce end products to the precise tolerances. Equipment should be cleaned while it is still hot, since residual polymer and rubber will be easier to remove. Be sure to follow all MSDS recommendations when heating the tooling. Thermal gloves are used to protect the hands from the heated tooling surfaces. A brass scraper, as well as a brass or copper wool cleaning cloth are recommended because they are soft enough not to scratch the surface.

**Make Tool Cleaning Easier** The quickest way to remove the die is to employ the pressure of the extruder to push it out. Clean the body by using an air compressor and brass pliers so that the material cools down which increases the melt strength, making it into one-lump versus an elastic, gummy-like substance that is harder to remove. Cleaning the body feed port using compressed air and brass pliers to simultaneously cool and remove the excess residue from the feed ports. This procedure is followed by brushing with a round brass brush that polishes the surface. The flow area of the 2" (51 mm) flange adapter should be cleaned by carefully using a brass brush.

Examine all surfaces for any irregularities such as burrs and scratches since these must be repaired before the head is reassembled. Most manufacturers recommend using a hand polishing stone to remove the offending burr. Follow stoning with a light application of 600-grit emery cloth if necessary, but avoid rounding edges that are intended to be sharp. Flat sealing surfaces can also be cleaned using a stone, followed by a 600-grit emery cloth. Place the cloth on a clean, flat surface, preferably a surface plate, then apply friction in a circular hand motion until the area is clean and even. The parts in question should all be hardened steel alloys and will not be adversely affected using these methods. Inconel, monel and Hastalloy® are typically not heat-treated, requiring special care and handling to avoid any damage.

### **Don't Overlook Repairs**

Tooling maintenance helps ensure a quality extruded product – one that meets dimensional specifications, maintains the speci-



*Guill 812 Three Layer V  
Extrusion 03-Rework*

fied minimum tolerance and is economically produced. Dirty, neglected and improperly adjusted tools contribute to excessive compound applications, which in turn complicate maintenance of minimum thickness tolerance. Excess material results in unnecessary costs and these directly affect the profitability of your company and the relationships with your customers.

### **The Important Final Step – Reassembly**

Working from your dedicated tool cart, follow the manufacturer's instructions for reassembly. Give each component a final wipe down with a clean rag before installing. Even the smallest amount of grit, dirt and residual material must always be removed. Use mechanical or manual assistance for heavy and awkward components to avoid unnecessary mishaps. Reapply anti seize compound to all fasteners if required. Tighten fasteners to manufacturer's recommended specifications as well as in the recommended sequence. This fastening sequence should be specified in the manual and is generally in a star pattern. Tighten gradually until the proper torque is achieved to prevent distortion of the tooling. One of a die manufacturer's main goals is to form a concentric cone as quickly and accurately as possible in the primary section of the die – when the extrudate first emerges from the die's distribution capillaries. A properly designed and manufactured die has even distribution close to the extrudate entrance point, but this effort is negated once the die is adjusted, shifting the extrudate off to one side. An eccentric cone is formed in the primary area, and a concentric cone exists at only one point in the process, rather than a smooth, continuous flow path with decreasing volume. A properly manufactured and aligned extruded head, along with well-maintained tooling should require little or no adjustment. Another adverse affect of unnecessary die adjustment is the stress introduced to the extrudate caused by unbalanced flow. The net effect is the final product retains memory of this imbalance and unpredictable die swell occurs.

# 对卫生和食品安全的强烈需求增加了全世界对软包装薄膜的需求

## Film Extrusion: Desire for Hygiene and Food Safety Increases Worldwide Demand for Flexible Packaging Films

布鲁克纳机械有限公司总部位于德国西格斯多夫，是生产各种软性塑料薄膜的大型生产线的全球市场领导者，这些薄膜用于高质量的包装材料和技术应用。就接获订单量而言，过去的会计年度是公司历史上第二成功的年度。到2020年底售出超过45条生产线订单额将近8亿欧元，与上一年相比有着显著增长。由于新订单只会成为下一年度的销售营业额，预计2021年的销售营业额将大幅增长至5.5亿欧元。

*Brückner Maschinenbau, based in Siegsdorf, Germany, is the world market leader for large production lines for the manufacture of a wide variety of flexible plastic films, used as high-quality packaging materials and in technical applications. In terms of incoming orders, the past fiscal year was the second most successful in the company's history. More than 45 lines sold by the end of 2020 mean an order*

令人高兴的业务发展的原因之一当然是，卫生和食品安全等主题在全球包装行业（尤其是在亚洲）中变得越来越重要。此外，食品零售和邮购贸易也录得国际增长。这也增加了对生产最高质量包装膜的布鲁克纳薄膜拉伸生产线以及相应服务的需求。

未来几年的前景也令人乐观。Stefan Neumann：“我们的订单积压将持续到2023年。此外，我们目前对来自中国的两份大订单感到高兴。”



Stefan Neumann, 首席财务官

*Stefan Neumann, Chief Financial Officer*

与长期客户江苏恒力新材料科技有限公司、中国聚酯薄膜行业的质量领导者签订了总共多份为期五年的合同，订单量大大超过了布鲁克纳机械有限公司的每年平均订单量。



高效的薄膜拉伸生产线

*Highly efficient film stretching line*

*intake of almost 800 million euros, a significant increase compared to the previous year.*

全部的合同服务包括了数十条BOPET生产线，用于包装薄膜、光学和工业薄膜以及超薄特殊薄膜和特殊的BOPET厚膜生产线。框架协议共涵盖了总共15种不同的生产线类型，其中包括非常特殊的实验室生产线。

此外，领先的电池隔膜制造商之一，常州星源新能源材料有限公司，已经从布鲁克纳订购了8条特殊生产线。在这里，布鲁克纳能让客户信服这最新的技术将来也在欧洲的电池生产中使用。

无论如何，布鲁克纳机械有限公司确信，除了蓬勃发展的包装行业外，技术薄膜及其生产线也在崛起。未来的主题不仅包括电池隔膜，还包括医用和高温应用薄膜、太阳能电池板或有机和印刷电子产品。

Helmut Huber, 销售和项目管理  
首席运营官

*Helmut Huber, COO Sales & Project Management*



恰如其分，来自西格斯多夫的公司最近因其创新管理而获得了一个奖项：布鲁克纳机械有限公司对创新竞赛“百强”的科学评选过程现中坚信科学，已正式成为德国中型企业中最具创新力的100家公司之一。

谈到塑料和环境，布鲁克纳坚信，如果可持续性用和再利用塑料，未来将继续属于塑料。Helmut Huber，销售和项目管理的首席营运长：“作为循环经济的一部分，塑料无可否认的优势完全可以与现代社会的可持续发展目标完美地结合在一起。我们正在加紧工作，以确保我们的机器以尽可能低的资源利用率和尽可能高的可回收性生产薄膜。”在这样做的过程中，布鲁克纳还与从原材料制造商到品牌所有者的整个价值链的合作伙伴结成了各种联盟。例如R-Cycle或printcyc计划。

### 即使在疫情期间也进行生产线调试和服务

为了确保所销售生产线也能在世界各地如期安装和调试，布鲁克纳将协调所有行程，作为特殊新冠病毒危机管理系统的一部分。Helmut Huber：“在与我们公司医生和我们在各自国家的团队的密切协调下，我们确保遵守所有规则和预防措施：在出差前、期间和之后。员工安全始终高于短期业务成功。然而，在这个期间出差对我们的员工有很多要求——关键词是隔离。因此，我们十分感谢我们的同事仍然非常愿意出国差旅——这受到我们的客户的高度赞赏。”

同样位于西格斯多夫的薄膜拉伸技术服务提供商，布鲁克纳技术服务公司甚至能够增加其订单的60%，令人印象深刻的生产线升级订单。总的来说，收到的订单达到了创纪录的7000万欧元左右，与前一年相比再次大幅增长。这自然会对2021年的销售额产生积极影响。预计2021年的销售额将达到创纪录的7100万欧元。

一个主要的全球客户最近也与布鲁克纳技术服务公司签订了大量现代化订单，以显著提高生产的可持续性。这涉及到包装薄膜行业共有四条生产线，分布在三大洲。此外，工厂现代化将确保原材料加工，实现循环经济。

One reason for the very pleasing business development is certainly that topics such as hygiene and food safety have become much more important in the packaging sector worldwide – and particularly in Asia. In addition, food retailing and mail-order trade have recorded international growth. This also increased the demand for Brückner film stretching lines, on which the highest quality packaging films are produced, and also for the corresponding services.

The outlook for the next few years also gives cause for optimism. Stefan Neumann, Chief Financial Officer: "Our order backlog extends well into 2023. In addition, we are currently pleased about two major orders from China."

With the long-standing customer Jiangsu Hengli New Materials, the quality leader in the polyester film industry in China, multiple contracts with a term of five years were signed, with an order volume that significantly exceeds the average annual volume of Brückner Maschinenbau.

The complete package comprises dozens of BOPET lines for packaging films, optical and industrial films as well as ultra-thin



布吕克纳公司在锡格斯多夫的办公场所

### *Brückner company premises in Siegsdorf*

specialty films and special BOPET thick film lines. The framework agreement covers a total of 15 different line types, including a very special laboratory line.

In addition, one of the leading manufacturers of battery separator films, Shenzhen Senior Technology Material Co., Ltd., has now ordered eight further special lines from Brückner. Here, Brückner was able to convince with the latest technology, which will also be used in battery production in Europe in the future.

In any case, Brückner Maschinenbau is certain that, in addition to the booming packaging sector, technical films and their production lines are also on the rise. Future topics here include not only battery separator films but also films for medical and high-temperature applications, solar panels or organic and printed electronics.

Fittingly the company from Siegsdorf recently received an award for its innovation management: Brückner Maschinenbau convinced in a scientific selection process for the innovation competition "TOP 100" and is now officially one of the 100 most innovative companies in the German medium-sized businesses.

When it comes to plastics and the environment, Brückner is convinced that the future will continue to belong to plastics if they are used and reused sustainably. Helmut Huber, COO Sales & Project Management: "As part of a circular economy, the undeniable advantages of plastic can be combined absolutely well with the sustainability goals of a modern society. We are working intensively to ensure that films can be produced on our machines with the lowest possible use of resources and the highest possible recyclability." In doing so, Brückner also cooperates in various consortia with partners along the entire value chain, from raw material manufacturers to brand owners. Examples of this are the R-Cycle or PrintCYC initiatives.

### *Plant commissioning and service even during pandemics*

To ensure that the lines sold are also installed and commissioned on schedule all over the world, Brückner coordinates all trips as part of a special Corona crisis management system. Helmut

Huber: "In close coordination with our company doctor and our teams in the respective countries, we make sure that all rules and precautionary measures are observed: before, during and after the trip. Employee safety always takes precedence over short-term business success. Nevertheless, traveling in these times demands a lot from our employees – keyword quarantine. We are therefore more than grateful that the willingness of our colleagues to travel abroad remains high – this is extremely appreciated by our customers."

The service provider for film stretching technology, Brückner Servtec, also based in Siegsdorf, was even able to increase its order intake by an impressive 60% in orders for line upgrades. Overall, incoming orders are at a record level of around 70 mil-

lion euros, again a significant increase on the previous year. This naturally has a positive impact on sales in 2021, for which a record figure of around 71 million euros is expected.

A major global customer has also recently placed extensive modernization orders with Brückner Servtec, to significantly increase the sustainability of production. This involves a total of four production lines in the packaging film sector, spread over three continents. In addition, the plant modernization will ensure the processing of raw materials, enabling a circular economy.

► **Brückner Group**  
www.brueckner.com

## 在波纹管挤出生产中conEX NG证明了其优异质量

### *Case Study: conEX NG Proves its Quality in Corrugated Pipe Extrusion*

在全球范围内，波纹管用于水管理和排水系统，以及用作电缆导管，在挤出过程中要求熔体质量高，均匀性好。因此，FRÄNKISCHE Rohrwerke Gebr. Kirchner公司（位于巴伐利亚州Königsberg）最近决定从巴顿菲尔辛辛那提奥地利公司（维也纳）购买新一代conEX挤出机。该管材制造商使用新挤出机替换现有挤出生产线中的旧型号，能立即满足所有质量标准和产量方面的要求。



锥形双螺杆挤出机conEX NG 65

Conical twin screw extruder conEX NG 65



*Corrugated pipes, which are used worldwide in water management and drainage systems and as cable conduits, require high melt quality and perfect homogeneity during extrusion. For this very reason, Fränkische Rohrwerke Gebr. Kirchner GmbH & Co. KG, based in Königsberg/Bavaria/Germany, recently decided to purchase a new-*

FRÄNKISCHE 是一家家族企业，创立于 100 多年前，如今共有22家生产厂，4500多名员工，以其在建筑施工和土木工程、汽车和工业领域的创新系统解决方案而闻名于世。该公司的核心产品系列之一是PVC波纹管，用于水管理和排水管道，以及电缆导管。虽然电缆导管的标称直径范围为 DN 40 到 DN 200，但该管材制造商生产用于道路建设、农业排水、建筑排水、景观美化和体育设施建设，以及污水系统的水管理和排水管材，直径可达 800 mm。根据应用场合和客户的需求，这些管材可满足承载能力和铺设特性方面的所有要求。

FRÄNKISCHE公司使用巴顿菲尔辛辛那提公司的多台挤出机生产波纹管材。该管材制造商与巴顿菲尔辛辛那提在相互信任的基础上已保持了超过25年的客户-供应商关系。巴顿菲尔辛辛那提公司过去几年对其机器和设备进行了现代化改造，现在 FRÄNKISCHE 决定购买 con-EX NG 65 型号锥形双螺杆挤出机，取代现有生产线中使用了大约18年的挤出机，结果非常满意。FRÄNKISCHE公司建筑行业运营和供应链总监Frank Beck 表示：“挤出机针对应用场合，配置了经优化的螺杆。在熔体均匀性和产品质量方面，我们对这项高精度工作充满期待。” FRÄNKISCHE公司对其性能非常满意，采购该设备后，成为约100家运行conEX NG挤出机的客户之一。

巴顿菲尔辛辛那提推出 conEX NG 挤出机已经5年了，该系列锥形双螺杆挤出机共有3个型号，与之前型号相比，其经过全面改进，并优化了加工单元。它们的特点是，能够加工范围广泛的不同 PVC 类型，可以承受高达 520 bar的高挤出压力。挤出机配置加长的预热区和经过优化的螺杆设计，可实现高产量和最佳熔体质量。此外，较conEX 型号挤出机，还具有占地面积小、与产量相关的投资成本低，能耗低等优点。

**F**RÄNKISCHE is a family-owned company founded more than 100 years ago, today employing more than 4,500 associates at a total of 22 production plants, and it is famous for its innovative system solutions in building construction and civil engineering as well as the automotive and industrial sectors. One of the company's core product lines are corrugated pipes made of PVC, which serve as water management and drainage pipes, as well as cable conduits. While the cable conduit pipes range from DN 40 to DN 200 in nominal width, the pipe manufacturer makes water management and drainage pipes for road

*generation conEX from battenfeld-cincinnati Austria GmbH, located in Vienna. The pipe manufacturer used this extruder to replace an older model in an existing extrusion line and was then immediately able to meet all requirements in terms of quality standards and output.*

construction, agricultural drainage, drainage of buildings, landscaping and construction of sports facilities, as well as sewerage systems, which reach up to 800 mm in diameter. Depending on the application and on customers' wishes, these pipes meet all demands in terms of load capacity and laying attributes.

For its corrugated pipe production, FRÄNKISCHE uses several extruders from battenfeld-cincinnati. The pipe manufacturer has already maintained a customer-supplier relationship based on mutual trust for more than 25 years. Following a modernization of its machinery and equipment already implemented by battenfeld-cincinnati over the last few years, FRÄNKISCHE now decided to acquire the conical twin screw extruder model conEX NG 65. It has replaced an extruder in an existing line which was about 18 years old, with very satisfying results. Frank Beck, Head of Operations und Supply Chain Building Construction at FRÄNKISCHE, expresses this as follows: "The extruder is equipped with a screw optimized for the application. We are really enthusiastic about this high-precision job in terms of melt homogeneity and product quality." With this acquisition, FRÄNKISCHE is now one of some 100 customers who are operating a conEX NG and are very satisfied with its performance.

Five years have now passed since battenfeld-cincinnati launched conEX NG, a series of three conical twin screw extruder models setting themselves apart from their predecessor versions by a completely revised and optimized processing unit. Their characteristics include the ability to process an enormous range of different PVC types as well as to withstand high tooling pressures of up to 520 bar. The extruders come with a lengthened preheating zone and an optimized screw design to provide high output rates combined with optimal melt quality. Additional advantages of this conEX version are a reduced footprint, lower investment costs in relation to output rates, and a lower energy consumption than the predecessor model.

► **battenfeld-cincinnati Austria GmbH**  
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► **FRÄNKISCHE Rohrwerke Gebr. Kirchner GmbH & Co. KG**  
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# PE-内部回收：旋转过滤器使之成为现实

## Recycling – Case Study: PE-Inhouse Recycling – the Rotary Filter Makes it Happen

改造熔体过滤器使德国 PE 包装薄膜制造商奥尔登堡 Oldenburg 能够处理其生产废料。

*Retrofitting its melt filter enables the German PE packaging film manufacturer Oldenburg to process its production waste.*

采用全自动自清洁旋转式过滤系统 RSFgenius 回收 PE 包装膜

*PE-packaging film recycling with fully-automatic and self-cleaning Rotary Filtrationsystem RSFgenius*

Oldenburg 是一家生产 PE 包装膜的制造商，例如气泡膜、拉伸膜和泡沫板。该公司提供各种不同格式的高质量薄膜。在启动、关闭、产品更换等过程中产生的薄膜废料被收集并在中央回收挤出机上重新造粒。

这台中央回收挤出机配备了传统的换网器。使用这种换网器，实际上不可能过滤得足够细，因此在该生产线上回收的材料可用于吹塑薄膜挤出生产线上的更薄的薄膜规格。如果回收材料没有经过足够精细的过滤，吹膜生产线上的简单、不连续的换网器会很快堵塞。

在多家不同的熔体过滤系统潜在供应商进行试验，不仅评估了换网器的性能，还评估了试验期间处理的回收材料的质量后，奥尔登堡决定采用 Gneuss RSFgenius，其拥有专利的自清洁系统。

Oldenburg 将一台 Gneuss RSFgenius 175 过滤器 改装到他们现有的回收挤出机上，从那时起，Oldenburg 能够过滤足够细的 (75  $\mu\text{m}$ )，这样由废料制成的颗粒可以放回他们的吹膜挤出机中（而不是像以前那样出售）以前大多是这种情况）。这些吹膜挤出机配备了不连续的换网器。

使用已使用 Gneuss RSFgenius 预过滤的再造粒材料时，吹膜生产线上的不连续换网器上更换网片的间隔实际上与处理原始材料时相同，且再造粒材料的质量如下它最多可以 100% 用于代替原始材料。

得益于中央回收线上的 RSFgenius 175 极其高效、独特的自清洁系统，无需频繁更换滤芯，反冲洗造成的材料损失量保持在最低水平。

公司董事 Michael Oldenburg 先生证实，格诺斯熔体过滤系统达到或超过了事先承诺的所有性能特征，尽管现有回收线的空间要求非常紧张，格诺斯还是能够量身定制安装这样就可以安装它而无需移动现有设备的位置。



Oldenburg is a manufacturer of PE packaging film such as bubble film, stretch and foam sheet. The company offers a wide range of high-quality films in different formats. The film waste which occurs during start up, shut down, product changes etc. is collected and repelletised on a central recycling extruder.

This central recycling extruder was equipped with a conventional screen changer. With this screen changer, it was practically not possible to filter sufficiently fine, that the material recycled on this line could be used for thinner film gauges on the blown film extrusion lines. If the recycled material was not filtered finely enough, the simple, discontinuous screen changers on the blown film lines would block up quickly.

After running trials at several different potential suppliers of melt filtration systems and evaluating not only the performance of the screen changers but the quality of the recycled material processed during the trials, Oldenburg decided in favour of the Gneuss RSFgenius, with its patented self-cleaning system.

Oldenburg retrofitted a Gneuss RSFgenius 175 to their existing recycling extruder and since then, Oldenburg has been able to filter sufficiently fine (75  $\mu\text{m}$ ) that pellets made from their scrap

can be put back into their blown film extruders (instead of being sold off as was mostly previously the case). These blown film extruders are equipped with discontinuous screen changers. When using the repelletised material which has been pre-filtered using the Gneuss RSFgenius, the intervals between changing screens on the discontinuous screen changers on the blown film lines is practically the same as when processing virgin material and the quality of the repelletised material is such that it can be used up to 100 % in place of virgin material. Thanks to the extremely efficient, unique self-cleaning system of the RSFgenius 175 on the central recycling line, the filter elements on the do not need frequent replacement and the quantity of material lost through back-flushing is kept to an absolute minimum. The company director, Mr. Michael Oldenburg confirmed that the Gneuss Melt Filtration System met or exceeded all the performance characteristics which were promised in advance and that in spite of the tight space requirements on the existing recycling line, Gneuss were able to tailor make the installation so that it was possible to install it without needing to move the positions of the existing equipment.

➔ **Gneuss Kunststofftechnik GmbH**  
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## 因 LDPE / LLDPE 废薄膜再造粒新工艺技术而获奖 *Recycling: Awarded for New Process Technology in Regranulating LDPE / LLDPE Waste Films*

自 2013 年以来，奥地利挤出和回收技术公司 MAS ( Maschinen- und Anlagenbau Schulz GmbH ) 和荷兰薄膜回收公司 Caroda BV 一直在薄膜回收系统的技术开发方面开展合作。这些系统专注于具有更高 LLDPE 含量的 LDPE 工业薄膜以及农用薄膜。

*Since 2013, Austrian extrusion and recycling technology company MAS-Maschinen- und Anlagenbau Schulz GmbH and Dutch film recycling company Caroda BV have been cooperating in the technological development of film recycling systems. These systems focus on LDPE industrial films, with a higher LLDPE content, as well as agricultural films.*

图2:MAS授权签署人及销售经理Stefan Lehner展示了与Caroda共同开发的LDPE/LLDPE回收再生薄膜。薄膜的质量性能有了显著的提高(图片:MAS)



*Picture 2: MAS authorized signatory and sales manager Ing. Stefan Lehner demonstrates the significantly improved quality properties of the LDPE/LLDPE recycling film developed jointly with Caroda (Picture: MAS)*

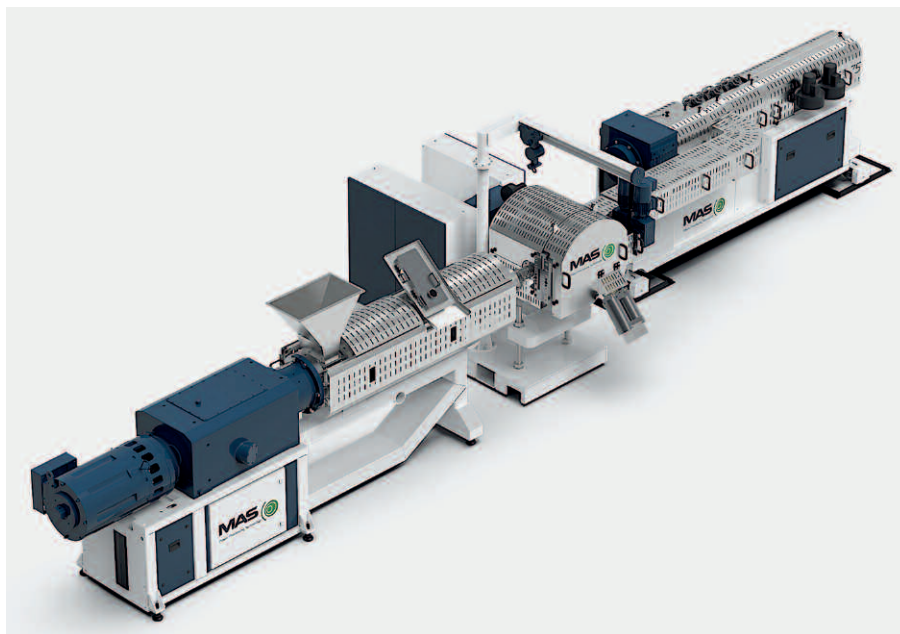


图1:用于薄膜回收的MAS串联挤出生产线(图:MAS)

Picture 1: MAS cascade extrusion line for film recycling (Picture: MAS)

用于这方面的 MAS 组件包括 DRD (双转盘) 薄膜薄片清洁系统和下游挤出系统。挤出系统由 MAS 专用同向旋转锥形双螺杆挤出机、连续式 MAS 熔体过滤器和单螺杆串联式排气装置组成(图 1)。

DRD 干洗机的突出特点在于完全无需使用水作为洗涤介质,采用空气式旋风分离器的原理进行工作。在设备中,薄膜薄片在加热的空气涡流中通过摩擦进行干燥。在此过程中,附着的沙子、灰尘和土壤等污染物被离心力分离并排出。无水操作的优势主要在于清洁过程的能量消耗较低,从而显著地减少了二氧化碳的排放量。

关于下游的挤出设备, MAS 的双螺杆挤出机采用较大的进料口,非常适合于低堆息密度物料的进料。由于采用了模块化设计、同向旋转的双螺杆以及较短的加 工 长度,挤出机对物料的塑化加工具有良好的机械效率,同时加工过程十分温和。

联合开发工作的一个关键目标,就是通过最大限度地减少回收薄膜中仍残留的斑点(灰尘和污垢颗粒以及交联聚合物团块)来提高表面质量,从而提升薄膜的可印刷性。

#### MAS 挤出机的功能原理是其成功的关键

该系统的基础是同向旋转 MAS 双螺杆挤出机,旨在优化整个挤出过程。MAS 挤出机中短暂而温和的熔融阶段将聚合物交联的形成降至最低。有针对性开发的螺杆几何形状适合于加工LLDPE 含量更高的LDPE 薄膜,加上螺杆转速可调节,能够以精确的方式施加超细均质所需的剪切力。这样,熔体中包含的异物以及已经存在的交联被分解、破碎并均匀结合。这就显著地减少了对薄膜光滑度和光学性能有影响的斑点。从而能够显著改善薄膜的可印刷性,显著改善印刷图像的质量,并能够减少所需要的墨水用量(图 2)。

#### 工艺技术荣获“2020年塑料回收奖”

这项由 MAS 和 Caroda BV 共同开发的工艺技术,获得了“2020 年欧洲塑料回收奖”。在这一传统上在阿姆斯特丹举行的活动中,两家公司都获得了“回收机械创新”类别的主要奖项(图 3)。

#### 总结

通过制造商工厂和运营商工厂之间的合作, MAS 和 Caroda BV 开发出了一种工艺技术,可显著提高回收薄膜的表

图3:MAS-Austria, Stefan Lehner(左)和Caroda BV的管理合伙人 Peter Daalder(右)赢得了“2020年回收机械创新奖”的奖杯(图:Caroda BV)

Picture 3: The trophy for the category "Recycling Machinery Innovation Awards 2020" went to MAS-Austria, Stefan Lehner (left) and the managing partner of Caroda BV, Peter Daalder (right) (Picture: Caroda BV)



面质量。它由 MAS 锥形双螺杆挤出机、高效熔体过滤器和下游挤出设备中串联式最佳的熔体脱气装置组成。在循环经济中，这种技术显著地扩大了回收再生薄膜的应用范围。

The MAS components used for this include the DRD (Double Rotary Disc) film flake cleaning system and a downstream extrusion system. The latter consists of the MAS-specific co-rotating conical twin-screw extruder, a continuous MAS melt filter and a single-screw degassing cascade (Picture 1). Incorporated special features of the DRD dry cleaner include elements that completely dispense with the use of water as a washing medium operating via the principle of an air cyclone. In it, film flakes are dried by friction in a heated air vortex. In the process, adhering contaminants such as sand, dust and soil are separated and discharged by centrifugal forces. The advantage of waterless operation includes lower energy input for the cleaning process, resulting in a significantly smaller CO<sub>2</sub>-footprint. For subsequent extrusion, the MAS twin-screw extruder is also well suited to low-bulk-density feed materials thanks to its conceptually large feed opening. Due to modular, co-rotating screws and short processing length, plasticizing is designed to be mechanically efficient and simultaneously as gentle as possible. A key goal of the joint development work was to increase the surface quality and thus, the printability of the film by minimizing the specks (dust and dirt particles, as well as cross-linked polymer agglomerations) still contained in the recycling film.

**The functional principle of the MAS extruder are the keys to its success**

The basis of this system is a co-rotating MAS twin-screw extruder designed to optimize the entire extrusion process. The short and gentle melting phase in the MAS extruder reduces the for-

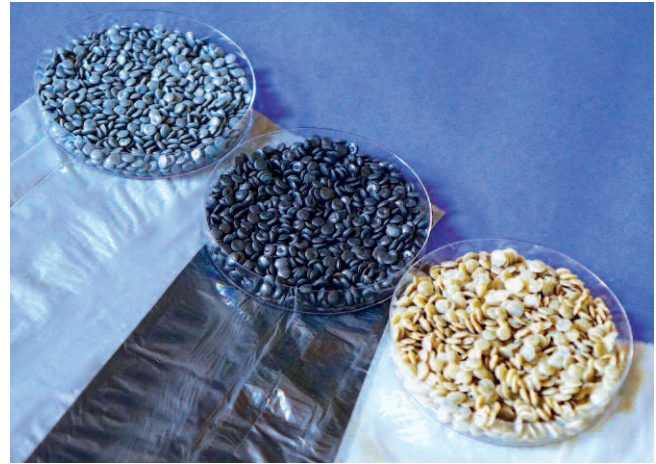


图4: 来自MAS的设备安装在Caroda B.V.，生产回收再生产品 (图片:Caroda BV)

Picture 4: From Caroda B.V. with the MAS equipment recycling goods (Picture: Caroda BV)

mation of polymer cross-links to a minimum. A screw geometry developed directly for processing LDPE films with an increased LLDPE content, together with an adjustable screw speed, enables the shear forces required for ultra-fine homogenization to be applied with pinpoint accuracy. With this, the foreign bodies contained in the melt, as well as already existing cross-linkages, are broken up, crushed and evenly incorporated. This significantly minimizes the effect of specks on the smoothness and optical properties of the film. This results in substantially improved printability of the film, a significant improvement in the print image and a reduction in the amount of ink required (Picture 2).

**Process technology honored with "Plastics Recycling Award 2020"**

This process technology, developed by MAS and Caroda BV, received an award at the "Plastics Recycling Awards Europe 2020". During this event, which traditionally takes place in Amsterdam, both companies were awarded the main prize in the category "Recycling Machinery Innovation" (Picture 3).

**Summary**

Through cooperation between plant manufacturer and plant operator, MAS and Caroda BV have developed a process technology that significantly increases the surface quality of recycled films. It consists of the MAS conical twin-screw extruder, efficient melt filtration and optimum melt degassing in the downstream extrusion cascade. In a circular economy, this opens up significantly expanded application possibilities for recycling films.

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图5: 回收再生技术获奖 (图片:MAS)

Picture 5: Recycling-Technology-Award (Picture: MAS)

# 经济实惠且可立即使用 – 新的小型化系统

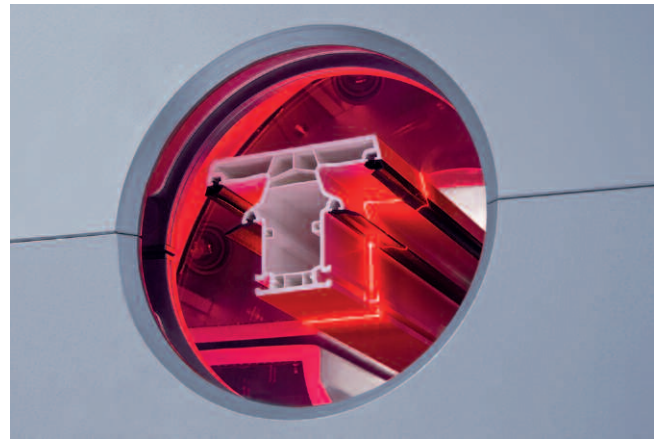
## Measuring Technology for Plastics & Rubber: Affordable and Ready to Start in Virtually no Time – New Downsized Systems

测量技术专家 PIXARGUS 一向以提供技术上具有挑战性的质量检测任务的高端解决方案而闻名。现在，PIXARGUS 也在低预算领域占据了一席之地。这里有一个神奇词：缩小规模。销售主管 Michael Frohn 总结道：“我们以实惠的价格提供高超的性能。”

*Measuring technology specialist PIXARGUS is notable especially as a supplier of high-end solutions for technologically challenging quality inspection tasks. Now, PIXARGUS is setting a strong foot also in the lower-budget segment. The magic word here is: downsizing. Head of Sales, Michael Frohn, summarizes: “We offer high performance at an affordable price.”*

iProfilControl可以在几秒钟内检测简单甚至高度复杂的轮廓的几何形状和表面。传感器头的铰接布置保证测量不受任何寄生光效应的影响

*iProfilControl inspects the geometry and surface of simple and even highly complex profiles in a matter of seconds. The hinged arrangement of the sensor head guarantees that the measurement is not influenced by any parasitic light effects*



iProfilControl:效率，这是非常重要的。iProfilControl系统使用与它的大哥ProfilControl 7相同的经过验证的检测技术，但在尺寸上要小得多。这使得系统集成到生产线上更加方便

*iProfilControl: Efficiency where it's really essential. The iProfilControl system uses the same proven inspection technology as its bigger brother, ProfilControl 7, but is much smaller in size. This makes the integration of the system into production lines even more convenient*

新的小型化系统已经在合适的时间面世。与许多其他行业一样，塑料行业一年多来一直受到 COVID-19 大流行的影响，市场变得越来越犹豫。现在，需要灵活且高效的解决方案，也就是在节省预算的同时，对您的生产产生最大影响的解决方案。这恰好就是用于圆形产品的智能检测系统 All-Roundia DualVision (DV) 和用于型材的 iProfilControl 检测系统的用武之地。

虽然非常紧凑，但这些新的 PIXARGUS 系统能够根据手头的检测任务自行调整——几乎无需操作人员干预。这些系统的设计目的是在任何生产环境中只需最少的设置工作即可开始使用。由于所需的重新设置工作最少，它们可以轻松集成到生产线中，并在生产线之间快速切换 - 我们在系统设计中特别强调了这两个好处。该技术基于其大哥 ProfilControl 7 的技术，该技术以其创新的 LED 和传感器技术以及独特的多区域功能而著称。PIXARGUS 承诺以实惠的价格提供高超的性能。例如，AllRounDia DV 的价格仅为 20,000 欧元。

即使在今天，PIXARGUS 设计其检测系统的目的是在生产过程中实现直观的用户友好性和轻松的数字网络化。但这并不是 PIXARGUS 团队满足于现状的理由。“我们的目标是即插即用”，Michael Frohn 补充道。他认为，在不久的将来，他们的系统将能够在没有技术人员支持的情况下进行测试。

The new downsized systems have become available just at the right time. The plastics industry, like many other sectors, has been feeling the impact of the COVID-19 pandemic for more than a year, with markets becoming increasingly hesitant. Now, flexible and efficient solutions are needed – solutions that achieve maximum effects on your production while sparing low budgets. This is where the smart inspection systems AllRoundia DualVision (DV) for round products and iProfilControl for profiles come in.

While being very compact, these new PIXARGUS systems are able to adjust themselves – virtually without operator intervention – to the inspection task on hand. The systems have been designed to be ready to start with only minimum set-up effort in any production environment. They can be easily integrated into a line and swiftly switched between lines, thanks to the minimum resetting effort required – two benefits which we placed special emphasis on in the design of the systems. The technology is based on that of their bigger brother, ProfilControl 7, which scores with its innovative LED and sensor technology and its unique multi-area functionality. PIXARGUS promises high performance at an affordable price. AllRoundia DV, for example, is available from only 20,000 Euros.

Even today, PIXARGUS designs its inspection systems with a view to intuitive user-friendliness and easy digital networkabili-



尺寸更小，更灵活，几乎不用花费时间就可以启动: PIXARGUS 的AllRoundia DualVision -有史以来第一次实现采用单一装置完成对圆形产品的360°轮廓测量和表面测量

*Smaller in size, more flexibility, and ready to start in almost no time: AllRoundia DualVision from PIXARGUS – the first ever system performing complete 360° contour measurements and surface inspection of round product in a single unit*

ty within the production process. But this is no reason for the PIXARGUS team to rest on their laurels. “Our goal is Plug & Play”, adds Michael Frohn. He holds out the prospect that, not too far into the future, their systems will be able to be commissioned without the support of a technician.

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Laboratory & quality control in plastics processing

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## 联合国已批准采用优质回收材料制成的中型散货容器和塑料桶

### *Biofunctionalized Materials – From Research: UN-Approved IBCs and Plastic Drums Made With High Quality Recyclate*

作为工业包装循环经济的先锋，舒驰 (Schütz) 几十年来一直通过节省、再利用以及回收材料和组件来制定保护自然资源的标准。该公司的塑料桶有着最出色的质量、安全性和性能，同时具有较低的工作重量。

*As a pioneer of the circular economy in industrial packaging, Schütz has for decades been setting standards in the conservation of natural resources by saving, reusing and recycling materials and components. The company's Plastic drums offer the highest quality, safety and performance – while at the same time providing a low operating weight.*

中型散货容器由舒驰公司自主研发，并在世界各地制造，其全球领先地位归功于可重复使用和一次性系统的高效环保组合。在新的舒驰绿色计划设计版本中，两种包装类型的生态平衡都达到了一个新的水平。在多层挤出工艺中，中型散货容器内胆和桶身采用 40% 的优质塑料回收料生产。该回收料来源于舒驰的全球收集和再生计划。另一个关键特性是“环保层”系列的中型散货容器也获得了联合国的批准。

#### 生态包装是一种综合概念

多次使用和回收利用是循环经济的两个核心因素，也一直是舒驰制造中型散货容器的核心理念。其目标是确保在包装物的整个生命周期内实现最大程度的环保。作为舒驰预定服务的一部分，在容器进行翻新期间，将收集来的中型散货容器的内胆从钢格网中取出，并通过复杂的回收工艺进行处理，在此过程中，这些物料被研磨、清洁并最终重新造粒。特殊的脱气挤出机确保物料异味低且质量均匀。该公司使用在闭循环的工艺中获得的 HDPE 回收物料，100% 回流到内部塑料包装组件的生产中，包括护角器和塑料托盘。这就是为什么舒驰中型散货容器的回收材料比例一直非常高的原因。根据托盘的类型不同，整个中型散货容器中塑料的比例在 36% 到 55% 之间。

#### 额外的二氧化碳减排：每个中型散货容器减排超过 8 公斤

凭借新的“环保层”中型散货容器，舒驰进一步提高了减排比例，将资源保护提升到了一个新的水平。特别是对于这些容器，高质量的回收材料也用于生产内胆。采用创新“环保



根据循环经济的原则，舒驰的 F1 闭口桶和 S-DS1 开口桶现在也可提供“环保层”版本 (照片：舒茨)

*In keeping with the principle of the circular economy, Schütz's F1 tight-head drum and S-DS1 open-head drum are now also available as Green Layer versions (Photo: SCHÜTZ)*

层”设计的中型散货容器，包含 40% 的回收材料。这相当于每个中型散货容器额外减少不低于 8 公斤的二氧化碳排放量。回收的 HDPE 物料仅仅被挤出到容器的中间层。内层和外层均由全新 HDPE 材料制成。通过这种方式，舒驰确保灌装的产品只与全新材料直接接触，为保护灌装产品的质量做出了重大贡献。配备了全塑料托盘，该特定型号的中型散货容器中，再生塑料的总含量高达 73%。

#### 获得联合国批准的可持续中型散货容器和 PE 桶

凭借其生态包装和低二氧化碳排放量，舒驰支持其客户实现其可持续发展目标。还有另一个好处：新型舒驰中型散货容器已获得联合国批准，因此也适用于各种危险品应用。新容器的统一外观也给人留下了深刻的印象。外层完全为黑色，从而避免了颜色变化，这种变色在中型散货容器内胆中使用回收材料时会经常发生的。透明的可视条纹使用户能够



始终观察带“环保层”中型散货容器中的填充水平。舒驰还使用多层挤出方式生产出的桶，将最大的安全性与最大的再生塑料含量相结合。220升的 F1 闭口桶和 30升至 220升的 S-DS1 开口桶也作为“环保层”型号使用三层挤出中空吹塑工艺生产，中间层为回收的 HDPE。这里的再生料成分占桶身的 40%，整个产品系列都通过了危险品认证。

#### 通过试点项目在欧洲市场推出

欧盟通过《欧洲绿色协议》和《循环经济行动计划》，明确了资源节约型经济增长的目标和框架条件。新的“环保层”产品已经满足了在包装中使用回收材料的未来法律要求。为了确保使用再生塑料材料的中型散货容器和桶的持续供应，舒驰强调了客户和旧工业包装回收者积极合作的重要性。只有在舒驰预订服务（舒驰用于翻新和回收工业包装的全球系统）有足够的回收材料供应时，才能保证相应的供应安全。因此，向市场推出绿色层的产品需要与客户密切配合，最初仅限于欧洲，在那里成功启动了试点项目。得益于舒驰的全球生产网络以及最先进的多层挤出吹塑设备，未来扩展到其他地区是可能的。

The IBCs, which are developed in-house and manufactured around the world, owe their leading global position to the highly efficient and environmentally friendly combination of reusable and disposable systems. In the new Schütz Green Layer versions, the eco-balance of both types of packaging has been taken to a new level. In the multi-layer extrusion process, the IBC inner bottles and drum bodies are produced with 40 per cent high-quality plastic recycle. This material is generated by Schütz through its worldwide collection and reconditioning programme. Another key feature is that the IBCs of the Green Layer series also have UN approval.

#### Ecological Packaging as a comprehensive concept

Multiple use and recycling, the two factors that sit at the heart of the circular economy, have always been a core concept of Schütz IBCs. The entire life cycle of the packaging is geared towards ensuring maximum environmental friendliness. During reconditioning as part of the Schütz Ticket Service, the inner bottles of collected IBCs are removed from the steel grid and treated in a complex recycling process during which they are ground, cleaned and finally regranulated. Special degassing extruders ensure a low-odour, homogeneous quality. The company uses the HDPE recycle obtained in a closed cycle: 100 per cent flows back into the internal production of plastic packaging components, including corner protectors and plastic pallets. This is why Schütz IBCs have always had an exceptionally high proportion of recycled material. Depending on the type of pallet, the proportion is between 36 and 55 per cent of the plastic in the entire IBC.

#### Additional CO<sub>2</sub> saving: more than eight kilograms per IBC

With the new Green Layer IBCs, Schütz has increased this proportion even further, taking resource preservation to a new

level. For these containers in particular, high-quality recycled material is also used for the production of the inner bottle. The IBC container in the innovative Green Layer design contains 40 per cent recycled material alone. This corresponds to an additional CO<sub>2</sub> saving of at least eight kilograms per IBC. The recycled HDPE is extruded only into the middle layer of the container. The inner and outer layers are made of virgin HDPE material. This way, Schütz ensures that both the filling product and the environment only come into direct contact with virgin material, making a significant contribution to protecting the quality of the filling product. Equipped with a full-plastic pallet, the total content of recycled plastic in this particular IBC model is as high as 73 per cent.

#### Sustainable IBCs and PE drums with UN approvals

With its ecological packaging and low CO<sub>2</sub> footprint, Schütz supports its customers in achieving their sustainability goals. And there is another benefit: the new Schütz IBCs have UN approval and are therefore also suitable for a wide range of dangerous goods applications. The new containers also impress with their uniform appearance. The outer layer is completely black, thus avoiding colour variations that often occur when recycled material is used in IBC inner bottles. Transparent view stripes enable the user to monitor the filling level in Green Layer IBCs at all times. Schütz also uses multi-layer extrusion for the production of drums, combining maximum safety with a maximum content of recycled plastic. The F1 tight-head drum in 220l and the S-DS1 open-head drums in sizes 30l to 220l are also produced as Green Layer models using the three-layer extrusion blow-moulding process with recycled HDPE in the middle layer. The recycled content here accounts for 40 per cent of the drum body and the entire product range has dangerous goods approvals.

#### Market launch in Europe with pilot projects

With the European Green Deal and the Action Plan for the Circular Economy, the European Union has defined the goals and framework conditions for resource-saving economic growth. The future legal requirements for the use of recycle in packaging are already met by the new Green Layer products. In order to ensure a constant supply of IBCs and drums with recycled plastic material, Schütz emphasises how important it is for customers and returners of used industrial packaging to actively cooperate. A corresponding supply security can only be guaranteed, if there is a sufficient supply of recycle from the Schütz Ticket Service, the global system for the reconditioning and recycling of industrial packaging by Schütz. The market launch of the Green Layer products therefore requires close coordination with customers and is initially limited to Europe, where pilot projects have been successfully launched. Future expansion into other regions is possible and intended thanks to the global production network of Schütz with state-of-the-art multilayer extrusion blow moulding equipment.

# 在线质量控制有效地优化LDPE的生产工艺

## Quality Control: Effective Process Optimisation in the Production of LDPE by Means of Online Quality Control

David Cerra González, 西班牙TDE ( Transformadora de Etileno A.I.E. ) 的质量协调员说道：“质量控制对我们来说一直很重要。但我们一开始并没有真正意识到：我们还可以通过 OP5测量装置 的方式进行成效显著的工艺优化。起初，测量设备提供的结果对我们来说似乎是非现实的。这完全是因为：即使每天进行几次实验室测量，也无法充分反映生产中的动态变化。这些变化只有通过自动化 OP5 在线测量的短测量间隔才变得可见。使用 OP5 进行持续的质量控制使我们能够随时优化生产工艺，同时对我们各批次物料进行最终分类。与手动 ISO1133 测量相比，OP5具有全自动测量、减少了过渡时间从而可节省大量时间，通过OCS公司 ( 光学控制系统有限公司 ) 的设备实现精确重复性等优点，有助于有效的工艺优化和减少消耗。”

*"Quality control has always been important to us. But we were not really aware at the beginning that we could also ensure a considerable process optimisation by means of the OP5. At first, the measuring device delivered results that seemed unreal to us. This was solely due to the fact that even several daily laboratory measurements could not adequately reflect the dynamic changes in production. These variations only became visible through the short measuring interval of the automated OP5 online measurement. The continuous quality control with the use of the OP5 allows us to optimise the*

如今，塑料的种类不可胜数，最常见的是聚乙烯。现代工艺意味着今天这种材料也有了不同的变化。使用高压工艺生产的低密度聚乙烯或 LDPE 就是其中之一。

TDE 在西班牙拥有三个生产低密度聚乙烯的工厂。LDPE 的年产能约为 160,000 吨/年。TDE 专注于在连续的生产过程中进行不间断的质量控制和保证，以便在早期和相对较短的时间段内对生产中的波动进行动态检测和优化。出于这个原因，三条生产线中已有两条在使用 OP5 测量系统。生产中的各种偏差都会影响到粘度，因此可以通过使用 OP5 在线粘度测量系统进行监控。聚合物样品的熔体指数 (MI) 被连续测量，也允许对各批次物料进行最终分类。



OP5 在线测量装置在客户西班牙 TDE工厂使用

*OP5 Online Measurement at customer site TDE, Spain*

*production process at any time and at the same time to finally classify our batch material. The advantages such as the fully automated measurement, the considerable time savings through the reduction of transition times and the high reproducibility through the OCS equipment, in comparison to the manual ISO1133 measurement, contribute to an effective process optimisation and reduction." David Cerra González, Quality Coordinator at Transformadora de Etileno A.I.E. (TDE), Spain.*

节省时间并降低成本：

由于连续测量，实时结果可以在触摸屏上在 5 到 10 分钟内显示出来，并具有 24/7 全天候运行的动态数据。与手动 ISO 1133 测量相比，OP5测量系统可以节省大量时间。永久的数据记录可以帮助调节生产工艺并节省成本。

通过 OP-MFR 测量装置实现精准的可重复性：OP5 MFR 测量装置通过精确控制熔体流动同时与高精度自主开发的熔体压力测量装置相结合的方法。与具有 +/- 5-10 % 偏差的手动 ISO 1133 测量相比，此方法实现了 +/- 1 % 的典型可重复性。

Plastics are produced in countless variants today. The most common is polyethylene. Modern processes mean that there are also different variations of this material today. Low-density polyethylene, or LDPE, produced using a high-pressure process, is one of them.

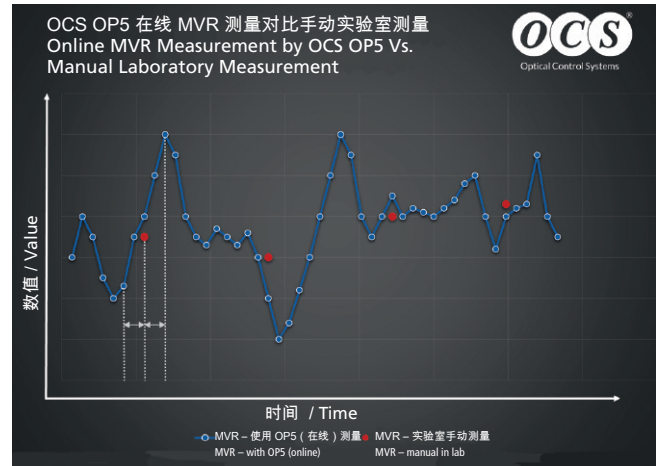
Transformadora de Etileno A.I.E. (TDE) has three plants for the production of low density polyethylene (LDPE) in Spain. The annual capacity of LDPE is approximately 160,000 t/year. TDE focuses on continuous quality control and assurance in the ongoing production process in order to detect and optimise dynamic production fluctuations at an early stage and in a relatively short sequence. For this reason, two OP5 measuring systems are already in use in two of three production lines. Various deviations in production have an impact on viscosity and can therefore be monitored by online viscosity measurement using OP5. The continuous measurement of the Melt Index (MI) of polymer samples also allows a final classification of the batch material.

**Save time and reduce costs**

Due to the continuous measurement, real-time results can be visualised in 5 to 10 minutes via the touch panel with a data trend in 24/7 operation. This leads to considerable time savings compared to a manual ISO 1133 measurement. The permanent data logging makes it possible to intervene significantly in the production process and save costs.

**High reproducibility through OP-MFR measurement**

The OP5 MFR measurement is a method carried out by means of exact control of the melt flow in combination with a high-precision and self-developed melt pressure measurement. This method achieves a typical reproducibility of +/- 1 % in comparison to the manual ISO 1133 measurement with +/- 5 to 10 % deviation.



使用 OP5进行MVR在线测量，与手动测量对比  
 注意：如果 MFR 值在生产中动态地变化，OP5 采样和实验室测量之间的时间差异足以导致数据的大差别。OP5 在线测量的高测量速率现在显示了高波动 (©OCS)

*Online MVR Measurement with OP5 vs. Manual.  
 Note: If the MFR value changes dynamically in production, small time intervals between the sampling of OP5 and laboratory measurement are sufficient to result high differences. The high fluctuations are now shown by the high measuring rate of the online measurement of the OP5 (© OCS)*

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Laboratory & quality control in plastics processing

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## 经过认证的可堆肥、生物基食品容器

### Thermoforming: Certified Compostable, Bio-Based Food Containers

SÜDPACK Verpackungen 和 ILLIG Maschinenbau 在合作项目中开发出了热成型食品包装材料，其产品经过可堆肥认证且主要基于生物材料。带有热封盖的托盘可用于包装素食和纯素食品，以及酸奶或奶酪等乳制品。它由经过认证的可堆肥 (DIN EN 13432) 和部分生物基塑料 ecovio® 制成，用于这种用途的塑料被染成绿色。

*In a cooperative project, SÜDPACK Verpackungen and ILLIG Maschinenbau have developed thermoformed food packaging with components that are certified compostable and predominantly bio-based. The tray with heat-sealable lid can be used to package vegetarian and vegan foods, as well as dairy products such as yogurt or cheese. It is made of a certified compostable (DIN EN 13432) and partially bio-based plastic ecovio®, which was dyed green for this application.*

SÜDPACK 采用挤出工艺生产薄膜，并开发出了覆盖盖膜，这种薄膜也可用于工业堆肥。ILLIG 设计了热成型模具，用片材热成型生产出托盘和密封盖子，这样就形成了一个薄壁的食品容器，它完全地再现了模具的形状，并且可以采用与传统塑料制成的类似包装材料相同的速度生产。

该合作项目表明，在当前市场条件下，基于经认证的可堆肥材料的热成型包装是可以实现的。越来越多国家对可堆肥和生物基包装解决方案的需求有增长趋势，这种材料顺应了新的需求。特别是带有有机残留物的食品包装，在传统的机械回收工艺中难以处理。在此类应用中，如果存在适当的堆肥基础设施，工业可堆肥容器是可行的替代方案。通过这种方式，包括包装在内的食物残渣可以进行有机回收，而不是热回收。本案例研究中使用的 ecovio® 生物塑料已针对片材挤出和后续热成型进行了专门优化。它可以在标准的单台挤出机或共挤出机上加工成具备或不具备氧气阻隔性能的片材。这种生物塑料具有高达 95°C 的高热变形温度，获准与食品接触，并具有与聚丙烯 (PP) 相似的机械性能。

#### 技术上完美的解决方案

“与全球领先的热成型和模具系统制造商 ILLIG 一起，我



带有可热封盖的工业可堆肥热成型容器，特别适合于素食和纯素食品和乳制品 (图片: ILLIG)

*Industrial compostable thermoformed containers with heat-sealable lids, especially suitable for vegetarian and vegan foods and dairy products (Pictures: ILLIG)*

们能够证明由 ecovio® 材料制成的片材不仅可以在普通挤出线上有效地生产，而且在热成型线上加工时也表现出优异的性能。”SÜDPACK 负责挤出研发的 Jürgen Betz 博士说。由 SÜDPACK 开发的用于盖膜的柔性薄膜是由基于聚乳酸 (PLA) 和牛皮纸的多层材料复合形成的，有部分层是透明层。根据 DIN EN 13432，所有材料成分均可工业堆肥。该薄膜可与其他 PLA 基材料进行热封，也可选用阻隔层。“通过我们的联合项目，我们展示了经过认证的可堆肥和生物基塑料如何在标准机器上轻松热成型和进一步加工。”位于海尔布隆的 ILLIG 公司技术中心 ITC 和包装开发负责人 Sven Engelmann 说道。“我们能够以与聚丙烯相同的生产速度运行。特别是，我们的热成型模具非常精细地再现了嵌入托盘底部的“素食汉堡”字样。这为热成型的工业可堆肥包装开辟了许多设计可能性。”通过合作项目，ILLIG 和 SÜDPACK 正在向包装制造商展示生态的且有吸引力的解决方案，从而可持续地塑造未来。

注意：ecovio® 是巴斯夫的一个注册和保护商标。

**S**ÜDPACK produced the film in an extrusion process and developed the laminate lidding film, which is also industrially compostable. ILLIG designed the thermoforming tool, thermoformed the trays from the film and sealed the lid. The result is a thin-walled food container that replicates the mold's shape in detail and can be produced at the same speed as similar packaging made from conventional plastics.

This collaborative project demonstrates that thermoformed packaging based on certified compostable materials is possible under current market conditions. It follows the increasing trend and demand for compostable and bio-based packaging solutions in more and more countries. In particular, food packaging with organic remnants is difficult to process in conventional mechanical recycling processes. In such applications, industrially compostable containers are a viable alternative where the appropriate infrastructure for composting exists. In this way, the food scraps, including the packaging, can be sent for organic recycling instead of thermal recycling. The ecovio® bioplastic used for this case study has been specially optimized for film extrusion with subsequent thermoforming. It can be processed on standard mono- or co-extrusion machines into films with or without an additional oxygen barrier. The bioplastic has a high heat deflection temperature up to 95° C, is approved for contact with foodstuffs and has mechanical properties similar to those of polypropylene (PP).

#### **Technically flawless solution**

"Together with ILLIG, a leading global manufacturer of thermoforming and tooling systems, we were able to demonstrate that films made from ecovio® material can not only be produced effectively on common extrusion lines, but also show excellent properties when processed on thermoforming lines," says Dr. Jürgen Betz, responsible for R&D Extrusion at SÜDPACK. The flexible film developed by SÜDPACK for the lid consists of a multilayer, partially transparent laminate based on polylactic acid (PLA) and brown paper. All components are industrially compostable according to DIN EN 13432. The film is heat-sealable with other PLA-based materials and can also be optionally equipped with a barrier layer.

"With our joint project approach, we demonstrate how certified compostable and bio-based plastics can be easily thermo-



formed and further processed on standard machines," says Sven Engelmann, head of the ILLIG Technology Center ITC and packaging development at ILLIG in Heilbronn. "We were able to run the same machine speed as with polypropylene. In particular, our thermoforming tool reproduces the lettering 'Vegan Burger' embedded in the bottom of the tray with great detail. This opens up numerous design possibilities for thermoformed, industrially compostable packaging."

With the cooperation project, ILLIG and SÜDPACK are demonstrating ecologically interesting solutions for packaging manufacturers and thus shaping the future sustainably.

*Note: ecovio® is a registered and protected trademark of BASF.*

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## 泰国用PET瓶对瓶回收线解决塑料垃圾问题

### Recycling: Plastic Waste Problem in Thailand tackled with PET Bottle-to-Bottle Recycling Line

泰国第一家瓶到瓶回收商EcoBlue有限公司投资2500万美元，建立了一个新的PET和聚烯烃回收设施，新型史太林格PET瓶到瓶回收线将是扩建的一部分。

*EcoBlue Ltd., Thailand's first bottle-to-bottle recycler, has invested 25 million US Dollars to set up a new recycling facility for PET and polyolefins. A new Starlinger PET bottle-to-bottle recycling line is going to be part of the expansion.*

史太林格recoSTAR PET 215 iV+瓶到瓶回收线

*Starlinger recoSTAR PET 215 iV+ bottle-to-bottle recycling line*



EcoBlue有限公司的创始人兼董事总经理Pranay Jain解释道：“我们的目标是将消费后和工业后的废弃材料转变成一种可持续的新料替代品，我们预计各组织对可持续性的承诺将增加，EcoBlue投资建立了一个新的世界级回收设施，该设施具有最佳的PET和聚烯烃回收技术。通过让史太林格作为技术合作伙伴，我们将确保我们能够为客户提供一致的高品质瓶级rPET。”

史太林格的recoSTAR PET 215 iV+瓶到瓶回收系统将于2021年7月交付至泰国罗勇省的EcoBlue生产现场，并在接下来的几周内由史太林格当地技术人员在史太林格奥地利总部的远程支持下进行组装。该生产线达到每小时2500公斤的产量，相当于年产2万吨瓶级rPET的总生产能力。

**高品质食品级rPET由经认证的100%消费后回收废料制成**

EcoBlue是泰国第一家收到美国FDA无异议函（LNO）的回收公司，该公司的“3D纯”rPET用于食品接触应用。史太林格技术将使EcoBlue为瓶子应用提供优质的rPET材料。EcoBlue的“3D纯”rPET可通过其全球回收标准认证过程追溯到100%消费后PET废料。

**为品牌所有者提供可持续的再生料，以减少他们的碳排放**

“我们的目标是通过将消费后和工业废料从垃圾填埋场转移到回收线，从而实现资源循环，”PranayJain解释说，这是推动公司发展的动力。EcoBlue成立于2013年，已开发出独特的能力，从消费后和工业废料中生产高质量的rPET、rPP和rHDPE，为原始新料提供可持续的替代品。EcoBlue对可

EcoBlue 3D纯rPET用于瓶子

*EcoBlue's 3D Pure rPET for Bottles*



EcoBlue 3D纯rPET用于PET薄膜

*EcoBlue's 3D Pure rPET for PET Films*



持续性的承诺不仅包括提供高质量的可回收料，以帮助环保组织减少碳足迹，而且还包括确保在安全和公平的工作条件下生产，不会对人和环境产生有害影响。Pranay Jain说：“我们的回收产品组合为那些希望减少对环境影响的公司提供一种可持续的原材料的选择。”

### 更大的挤出机尺寸满足客户需求

史太林格PET回收生产线的独特特点是其特殊的挤出机尺寸：215 mm的螺杆使生产线的产量达到每小时2500 kg。史太林格回收技术公司总经理Andreas Pechhacker解释说：“我们在2019年售出了第一条具有这些挤出机尺寸的PET回收生产线，自那时以来，对该产能的需求不断增长。它是目前市场上最流行的挤出机尺寸之一，完全符合现有的更高挤出能力的趋势。215 mm挤出机用于瓶到瓶应用的新订单甚至超出了我们的预期。”

### 疫情期间的远程安装

史太林格和世界上其他许多机器和技术供应商一样，在任何情况下都会尽力为客户提供支持。Andreas Pechhacker说道：“在这个时代，机器的安装和调试无疑是一个挑战。现有的旅行限制和各国各地的隔离期，使得我们很庆幸我们在世界各地有当地的技术人员。这有助于我们在疫情的2020年尽快启动和运行新设备。就EcoBlue而言，史太林格泰国办事处的技术人员将负责安装新的PET回收线，如有必要，他在奥地利的同事将提供远程支持。所有设备在装运前都经过测试和调试。基于史太林格的即插即用原理，可在客户现场快速顺利地进行回收系统的安装和调试。通过这种方式，我们确保EcoBlue能够尽快投产。”

“Our aim is to turn post-consumer and post-industrial waste materials into a sustainable substitute of virgin resin”, explains Pranay Jain, founder and Managing Director of EcoBlue Ltd. “In anticipation of the increased commitment of organisations towards sustainability, EcoBlue has invested in setting up a new world-class recycling facility with the very best technologies for PET and polyolefins recycling. By having Starlinger as a technology partner, we will ensure that we are able to provide consistent and high-quality bottle-grade rPET to our customers.” Starlinger’s recoSTAR PET 215 iV+ bottle-to-bottle recycling system will be delivered to EcoBlue’s production site in Rayong Province, Thailand, in July 2021 and within the following weeks be assembled by the local Starlinger technician with remote support from Starlinger’s headquarters in Austria. The line reaches an output of 2,500 kg per hour, equalling a total production capacity of about 20,000 tons of bottle-grade rPET per year.

### High quality food-grade rPET made from certified 100 % post-consumer recycled waste

EcoBlue is Thailand’s first recycling company to receive the Letter of No-Objection (LNO) by the US FDA for its “3D Pure” rPET for use in food-contact applications. The Starlinger technology will enable EcoBlue to provide superior quality rPET resin for bottle applications. EcoBlue’s “3D Pure” rPET can be traced

back to 100 % Post-Consumer PET waste material through its Global Recycled Standard Certification process.

### Providing sustainable recycled resin to brand owners for reducing their carbon footprint

“We aim to work towards a circularity of resources by diverting post-consumer and post-industrial waste materials from landfills to the recycling stream”, explains Pranay Jain the motivation that drives the company. EcoBlue was founded in 2013 and has developed unique capabilities to produce high-quality rPET, rPP and rHDPE from post-consumer and industrial waste, providing a sustainable substitute to virgin resin. EcoBlue’s commitment towards sustainability does not only consist in providing high-quality recycled resin that can help reduce the carbon footprint of environmentally conscious organisations, but also in ensuring that it is produced in safe and equitable working conditions with no harmful impact on people and the environment. “With our portfolio of recycled products we provide a choice of sustainable raw materials for companies which look to reduce their impact on the environment”, says Pranay Jain.

### Bigger extruder sizes meet customer demands

A unique feature of the Starlinger PET recycling line is its special extruder size: With the 215 mm screw the line reaches an output of 2,500 kg per hour. “We sold the first PET recycling line with these extruder dimensions in 2019 and have witnessed a growing demand for this capacity since then. It is currently one of the most popular extruder sizes on the market and meets the existing trend towards higher extrusion capacities perfectly. The incoming orders for 215 mm extruders for bottle-to-bottle applications exceed even our expectations”, explains Andreas Pechhacker, General Manager of Starlinger recycling technology.

### Remote installation during the global pandemic

Starlinger, like so many other machine and technology providers all over the world, tries to support its customers in every situation. “Machine installations and commissioning are definitely a challenge in these times”, continues Andreas Pechhacker. “With travel restrictions and quarantine periods in place in many countries we are glad that we have local technicians based all over the world. This helped us already in the pandemic year of 2020 to get new equipment up and running as quickly as possible. In the case of EcoBlue, the technician from our Starlinger Thailand Office will be in charge for the installation of the new PET recycling line, with remote support from his colleagues in Austria, if necessary. All equipment has been tested and commissioned before shipment. Based on Starlinger’s plug & play principle, installation and commissioning of the recycling system at the customer’s site can be carried out quickly and smoothly. This way we ensure that EcoBlue can take up production as soon as possible.”

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## 一次性口罩回收试点项目

# Circular Economy for Plastics: Recycling Pilot Project for Single-Use Face-Masks

弗劳恩霍夫卓越循环塑料经济集群 CCPE 及其环境、安全和能源技术研究所 UMSICHT 开发了一种先进的废塑料回收工艺。与 SABIC (沙特基础工业公司) 和 Procter & Gamble (宝洁公司) 的试点项目旨在证明一次性口罩闭环回收的可行性。

*The Fraunhofer Cluster of Excellence Circular Plastics Economy CCPE and its Institute for Environmental, Safety and Energy Technology UMSICHT have developed an advanced recycling process for used plastics. The pilot project with SABIC and Procter & Gamble serves to demonstrate the feasibility of closed-loop recycling for single-use facemasks.*



图片：在一个创新的循环经济试点项目中，弗劳恩霍夫、SABIC 和宝洁证明了口罩封闭式循环的可行性，可有利于减少塑料垃圾并缓解化石资源枯竭

*In an innovative circular economy pilot project, Fraunhofer, SABIC and Procter & Gamble have demonstrated the feasibility of closing the loop on facemasks to help reduce plastic waste and mitigate fossil resources depletion*

弗劳恩霍夫研究所 (UMSICHT) 和宝洁公司(P&G) 宣布合作开展创新循环经济试点项目，旨在证明一次性口罩闭环回收的可行性。

由于 COVID-19，数十亿个一次性口罩的使用引发了环境问题，尤其是当它们被随意丢弃在公共场所，包括公园、露天场所和海滩时。唯有以可持续的方式应对如此大量的个人基本医疗用品的挑战，如果只是简单地将用过的口罩扔到垃圾填埋场或焚化厂进行处理，就意味着对于新原料而言是有价值的物料的损失。

宝洁公司研发部开放式创新总监 Peter Dziezok 博士说：“认识到这一挑战，我们开始探索如何将使用过的口罩以可实现方式重新加入到新口罩生产的价值链中。”但是从可持续和经济可行的角度创建真正的循环方式解决方案需要合作伙伴。因此，我们与弗劳恩霍夫 CCPE 和弗劳恩霍夫 UMSICHT 的专家、科学家以及 SABIC 的技术和创新部门的专家合作，研究可实现的解决方案。”

作为试点的一部分，宝洁在德国的制造和研究基地收集了员工佩戴过或赠送给访客的用过的口罩。尽管这些口罩总是得到负责任的处理，但没有理想的途径来有效地回收它们。为了帮助演示在这种情况下可能发生的变化，设立了特

殊的收集箱，并将收集到的用过的口罩送到弗劳恩霍夫，在专门研究热解的工厂进行进一步处理。

弗劳恩霍夫 UMSICHT 回收管理部门负责人 Alexander Hofmann 博士解释说：“一次性使用的医疗产品（例如口罩）在处置和生产方面都具有很高的卫生要求，机械回收无法完成这项工作。因此，在我们的解决方案中，口罩首先被自动切碎，然后通过热化学方式转化为裂解油。通过压力和热量进行高温分解，将塑料分解成分子碎片，这也会摧毁任何残留的污染物或病原体，例如冠状病毒。通过这种方式，可以生产出符合医疗产品要求的原始质量的新塑料原料。”Hofmann 也是弗劳恩霍夫 CCPE “高级回收”研究部门的负责人。

然后裂解油被送到 SABIC，用作生产新 PP 树脂的原料。这些树脂是使用被广泛认可的质量平衡原理生产的，即在生产过程中将替代原料与化石基原料相结合。质量平衡被认为是当今线性经济与未来更可持续的循环经济之间的重要桥梁。

“在该试点中获得的高质量循环利用 PP 聚合物清楚地表明，通过价值链上的参与者的积极合作，可以实现闭环回收，”SABIC 全球循环经济负责人 Mark Vester 强调说。“这种循环材料是我们 TRUCIRCLE™ 产品组合的一部分，旨在



防止有价值的废旧塑料变成废物，并减缓化石资源的枯竭。”

最后，为了实现循环，PP 聚合物被提供给 P&G，在那里它被加工成无纺纤维材料。“这个试点项目帮助我们评估了闭环方法是否适用于卫生和医疗级塑料，”宝洁开放式创新高级总监 Hansjörg Reick 说。“当然，还需要进一步的工作，但迄今为止的结果非常令人鼓舞。”

从口罩收集到生产的整个闭环试点项目仅在七个月内就实现了开发和实施。弗劳恩霍夫 CCPE 正在进一步研究先进的回收技术对于其它原料和化学产品的通用性。

**F**raunhofer Institute UMSICHT, SABIC and Procter & Gamble (P&G) announced their collaboration in an innovative circular economy pilot project which aimed to demonstrate the feasibility of closed-loop recycling of single-use facemasks.

Due to COVID-19, use of billions of disposable facemasks is raising environmental concerns especially when they are thoughtlessly discarded in public spaces, including – parks, open-air venues and beaches. Apart from the challenge of dealing with such huge volumes of essential personal healthcare items in a sustainable way, simply throwing the used masks away for disposal on landfill sites or in incineration plants represents a loss of valuable feedstock for new material.

„Recognizing the challenge, we set out to explore how used facemasks could potentially be returned into the value chain of new facemask production,” says Dr. Peter Dziezok, Director R&D Open Innovation at P&G. „But creating a true circular solution from both a sustainable and an economically feasible perspective takes partners. Therefore, we teamed up with Fraunhofer CCPE and Fraunhofer UMSICHT’s expert scientists and SABIC’s T&I specialists to investigate potential solutions.”

As part of the pilot, P&G collected used facemasks worn by employees or given to visitors at its manufacturing and research sites in Germany. Although those masks are always disposed of responsibly, there was no ideal route in place to recycle them efficiently. To help demonstrate a potential step change in this scenario, special collection bins were set up, and the collected used masks were sent to Fraunhofer for further processing in a dedicated research pyrolysis plant.

„A single-use medical product such as a face mask has high hygiene requirements, both in terms of disposal and production. Mechanical recycling, would have not done the job,” explains Dr. Alexander Hofmann, Head of Department Recycling Ma-

agement at Fraunhofer UMSICHT. „In our solution, therefore, the masks were first automatically shredded and then thermochemically converted to pyrolysis oil. Pyrolysis breaks the plastic down into molecular fragments under pressure and heat, which will also destroy any residual pollutants or pathogens, such as the Coronavirus. In this way it is possible to produce feedstock for new plastics in virgin quality that can also meet the requirements for medical products,” adds Hofmann, who is also Head of Research Department „Advanced Recycling” at Fraunhofer CCPE.

The pyrolysis oil was then sent to SABIC to be used as feedstock for the production of new PP resin. The resins were produced using the widely recognized principle of mass balance to combine the alternative feedstock with fossil-based feedstock in the production process. Mass balance is considered a crucial bridge between today’s linear economy and the more sustainable circular economy of the future.

„The high-quality circular PP polymer obtained in this pilot clearly demonstrates that closed-loop recycling is achievable through active collaboration of players from across the value chain,” emphasizes Mark Vester, Global Circular Economy Leader at SABIC. „The circular material is part of our TRUCIRCLE™ portfolio, aimed at preventing valuable used plastic from becoming waste and at mitigating the depletion of fossil resources.”

Finally, to close the loop, the PP polymer was supplied to P&G, where it was processed into non-woven fibers material. „This pilot project has helped us to assess if the close loop approach could work for hygienic and medical grade plastics,” says Hansjörg Reick, P&G Senior Director Open Innovation. „Of course, further work is needed but the results so far have been very encouraging.”

The entire closed loop pilot project from facemask collection to production was developed and implemented within only seven months. The transferability of advanced recycling to other feedstocks and chemical products is being further researched at Fraunhofer CCPE.

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- ▶ recycling extrusion lines
- ▶ inline recycling into finished products
- ▶ compounding of secondary polymers
- ▶ PET crystallinity enhancers
- ▶ peripheral and auxiliary equipment
- ▶ special-purpose additives and fillers
- ▶ quality control of material and end products
- ▶ choosing laboratory equipment
- ▶ designing products suitable for recycling

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