



PVD coating for plastic applications

在塑料制品上的PVD涂层应用

1. Introduction

介绍

2. Typical applications of PVD

PVD经典应用

3. PVD process

PVD工艺

4. Concepts for coating on plastics

塑料制品的涂层概念

Introduction 介绍

Foundation: 成立:	January 1960 as VEB HOCHVAKUUM DRESDEN (HVD)
Owners: 所有人	since 2003 IST Metz Holding (94% of the shares)
Manager: 管理人	Klaus-Dieter Steinborn (6% of the shares)
Employees: 员工数	approx. 75
Turnover 2012:销售额	Approx. € 10 m
Quality standard: 认证:	Certificated DIN EN ISO 9001



Market Segments 市场细分

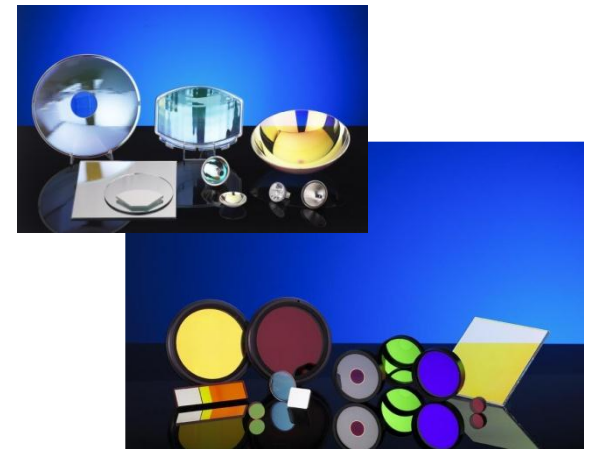
Metallization systems 金属镀系统



Hard material coating systems 硬涂层系统



Optical coating system 光学涂层系统



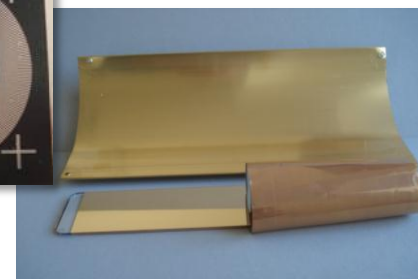
Applications 应用

- Automotive 汽车
 - Headlamps, reflectors 车灯, 反光罩
 - Interior parts 内饰件
- Lighting 照明
 - Light units 照明设备
 - decorative components 装饰件
 - Reflectors 反射杯
- Daily use parts 日用品
 - Cosmetic packaging 化妆品
 - Furniture fittings 家具
 - Souvenirs 礼品

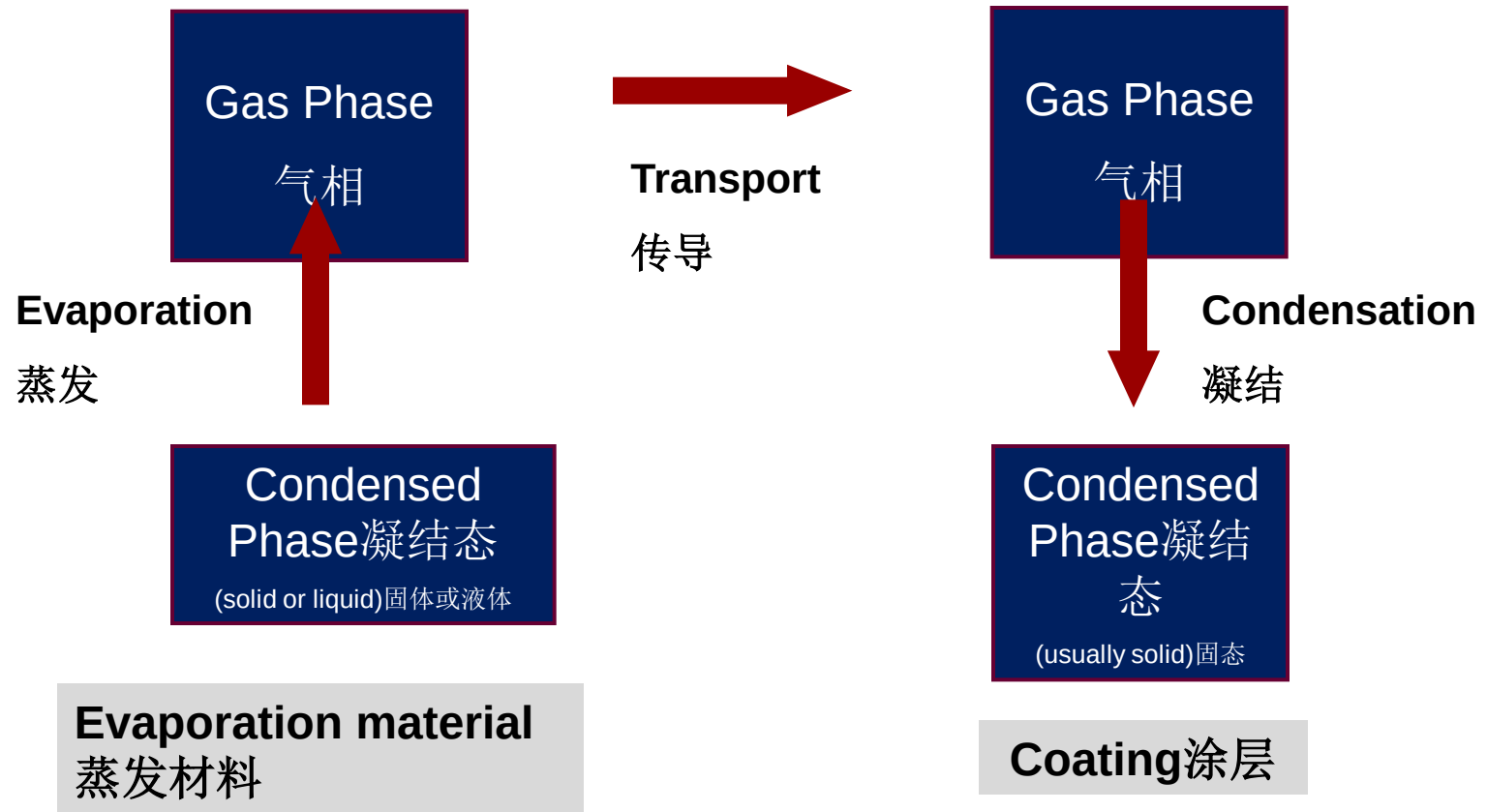


Applications 应用

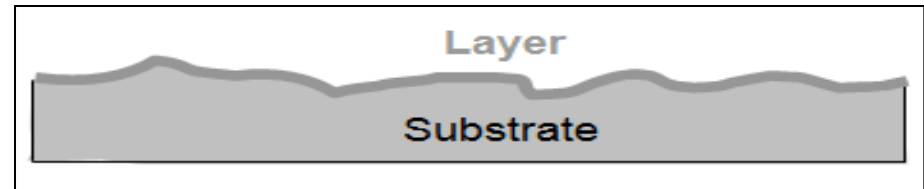
- EMV (Electro magnetic shielding 电磁屏蔽)
 - Plastic cases (mobiles, computer, connecting parts)
 - 塑料外壳（手机，电脑，连接件）
- Technical 高科技零件
 - Sensors, polymeric films 传感器，聚合膜
 - Heat reflectors 热反射器
 - Bar coated signal tracks 条状信号轨道涂层
- Sanitary components 卫浴部件
 - Shower and bathroom articles 淋浴器
 - Valve handles 阀门把手
 - Sanitary articles 卫浴件



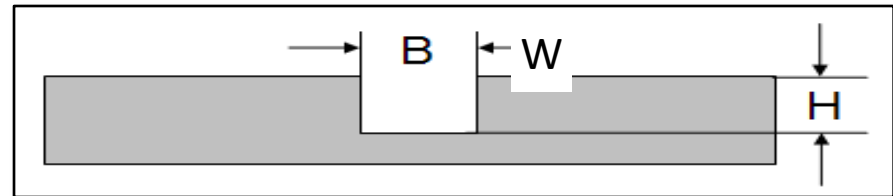
PVD = Physical Vapour Deposition 物理蒸发沉积



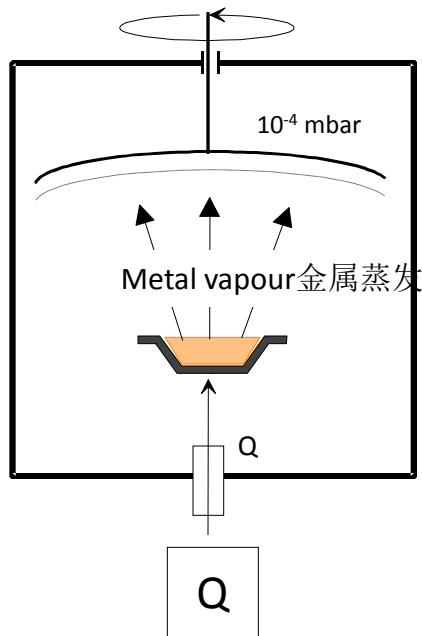
- Deposition of layer on substrate surface, **but** without a levelling effect
- 在器件表面涂层，
但不起补平效果



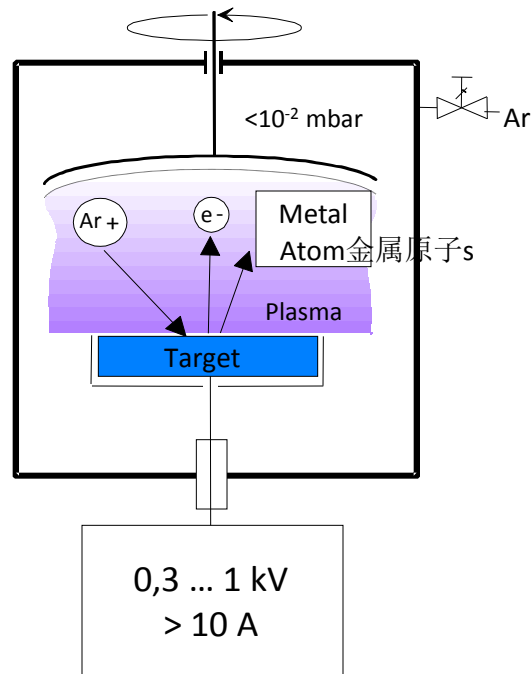
- Holes ... recesses can be coated at a ratio of 1:1 between height and width
- 空洞和凹陷可以在高度和宽度
上以1: 1比率涂层



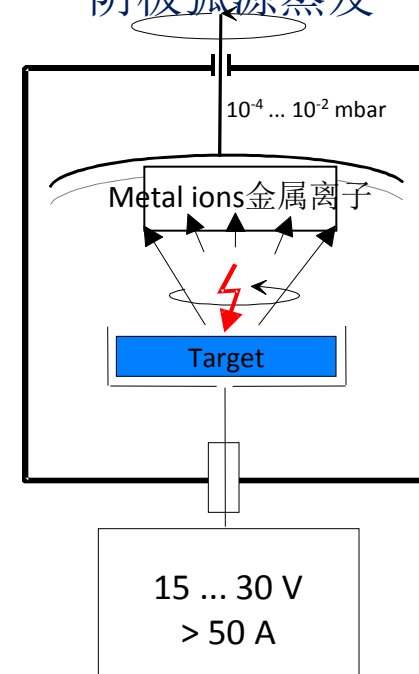
Evaporation蒸发



Sputtering磁控溅射



Cathodic arc deposition 阴极弧源蒸发



Coating materials涂层靶材

Al, Cu, Ag, Au, NiCr

Al, Cu, Ni, Ti, Cr, stainless steel 不锈钢 Cr, Ti, stainless steel 不锈钢

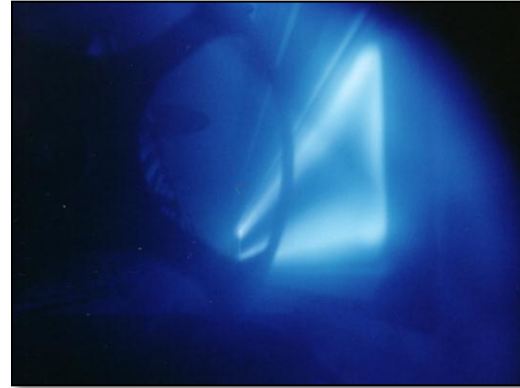
Thermal Evaporation 热蒸发



- Demand:需求
 - Movement of vapour particles from the source to the substrate without collisions and chemical reactions 从蒸发源到基板之间的蒸发颗粒运动需没有碰撞，没有化学反应
 - No incorporation of undesired atoms in the layer 在涂层中没有不理想的原子混合

Magnetron Sputtering

磁控溅射



Typical dependencies: 典型变化

- Depending on distance between Target and substrate
- 根据靶材和器件距离变化
- Deposition rate equal to power of sputtering source
- 镀率和磁控溅射溅射源功率成正比
- Deposition rate depending on Target material
- 根据靶材不同镀率也不同

Typical coating layers

典型涂层

Industrial branch 工业分支	Substrate基材	Basic layer 基本层	Metallization 金属镀	Protection layer 保护层
				
Automotive industry 汽车行业	PC, ABS, PES	HMDS (if required若需要)	Al or Cr, stainless steel不 锈钢	HMDS(O), MgF ₂ , SiO _x
	BMC (bulk mould compound)团状塑料材	Base coat 底涂	Al	HMDS(O), MgF ₂ , SiO _x
Packaging and cosmetic industry 包装和化妆品行业	PP, PBT, PET	Base coat底涂	Al	Top coat面涂



Benefits of short-cycle coating systems:短周期涂层系统的益处

- Integration in fully automatic production lines
- 整合入全自动生产线
- Direct linking to an injection moulding or painting process possible可直接连入注塑模或涂装线
- Optimising of logistic flows (reduction of material buffer, transport volume and manual work)
- 优化物流（减少物料缓冲，传送量和人工）

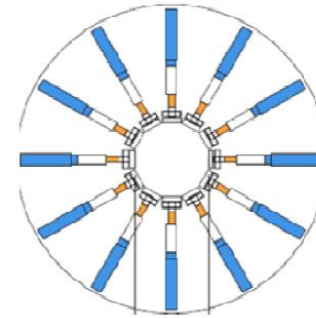
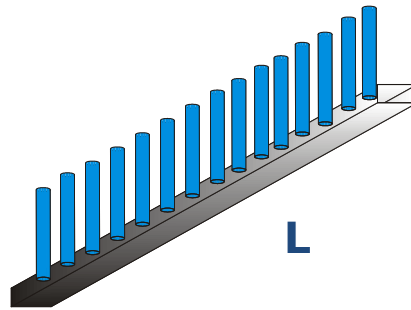
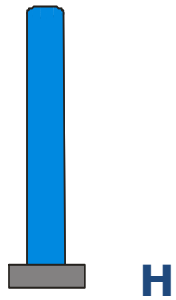


- Fully-automated Metallization system
全自动金属镀系统
- Process time: 130 ... 190 s
- 工艺周期: 130 ... 190 s
- Carrier size: 850 x 930 mm²
- 托盘尺寸: 850 x 930 mm²
- Coatable area: ~ 45 m² / h
- 产量: :~ 45 m² / h



META ROT

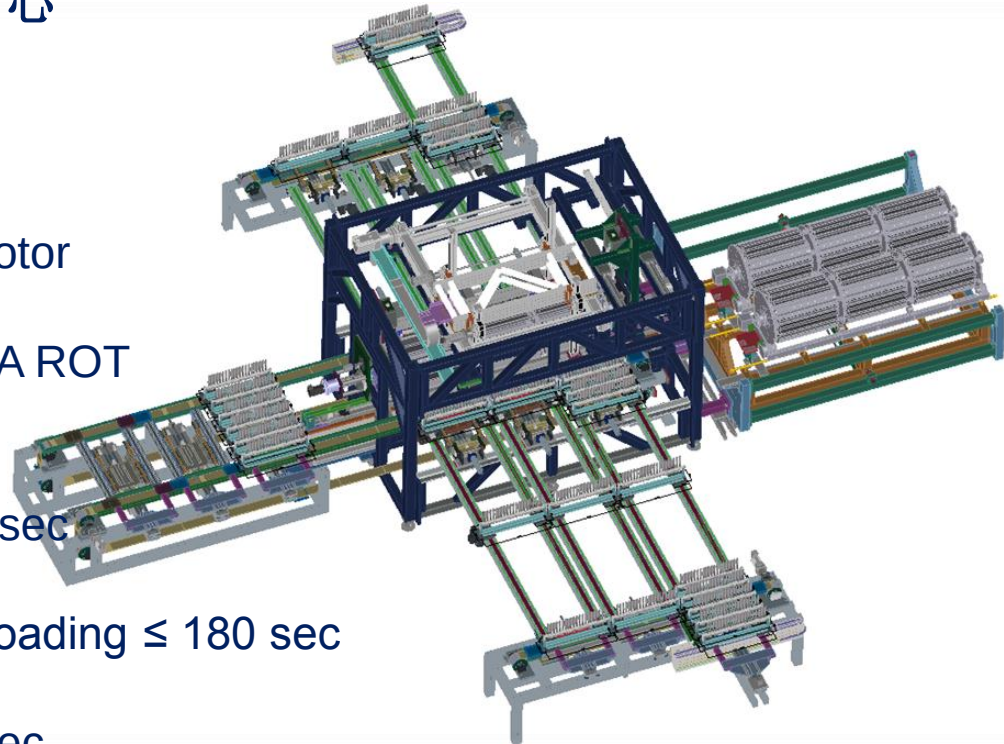
Substrate器件	Bar整条	Type of Rotor集成中心类型
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Height 高度[mm]	Length 长度[mm]	Type of rotor旋转 器类型	No. of bars/batch 每炉整条数 量	No. of bars/hour 每小时批次	Time/bar 每整条[时 间s]	Speed 速度 [m/min]
115	670	3 x 12	36	540	6,7	6,3
80	670	3 x 18	54	810	4,4	9,4
50	670	3 x 24	72	1080	3,3	12,6

Fully automatic loading/unloading station for META ROT rotors: META ROT全自动上料/下料集成中心

- Function:功能
 - Transfer of bars批次转换
 - Loading and unloading of the rotor
 - 集成中心上下料
 - Loading and unloading of META ROT
 - 配合META ROT上下料
- Technical data:技术数据
 - Complete cycle time max. 240 sec
 - 完整生产周期：最多240秒
 - Cycle time for rotor loading/unloading ≤ 180 sec
 - 集成中心上下料周期 ≤ 180 sec
 - Rotor charging time max. 60 sec
 - 集成中心转换时间：最多60秒



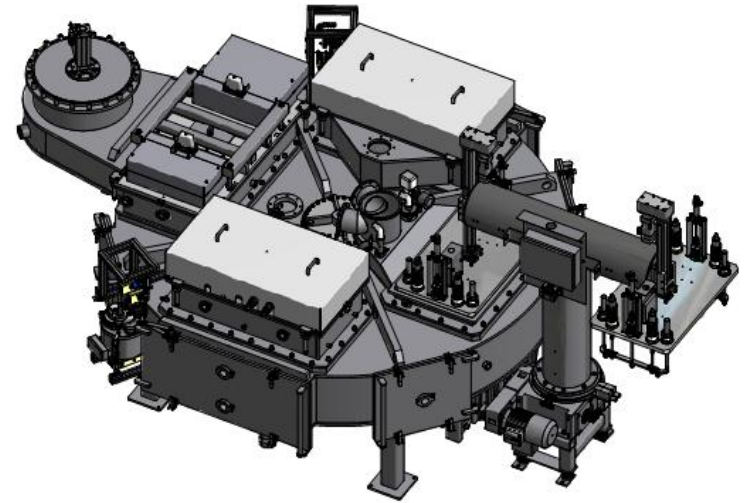
META ROT



META CIRCLE 850

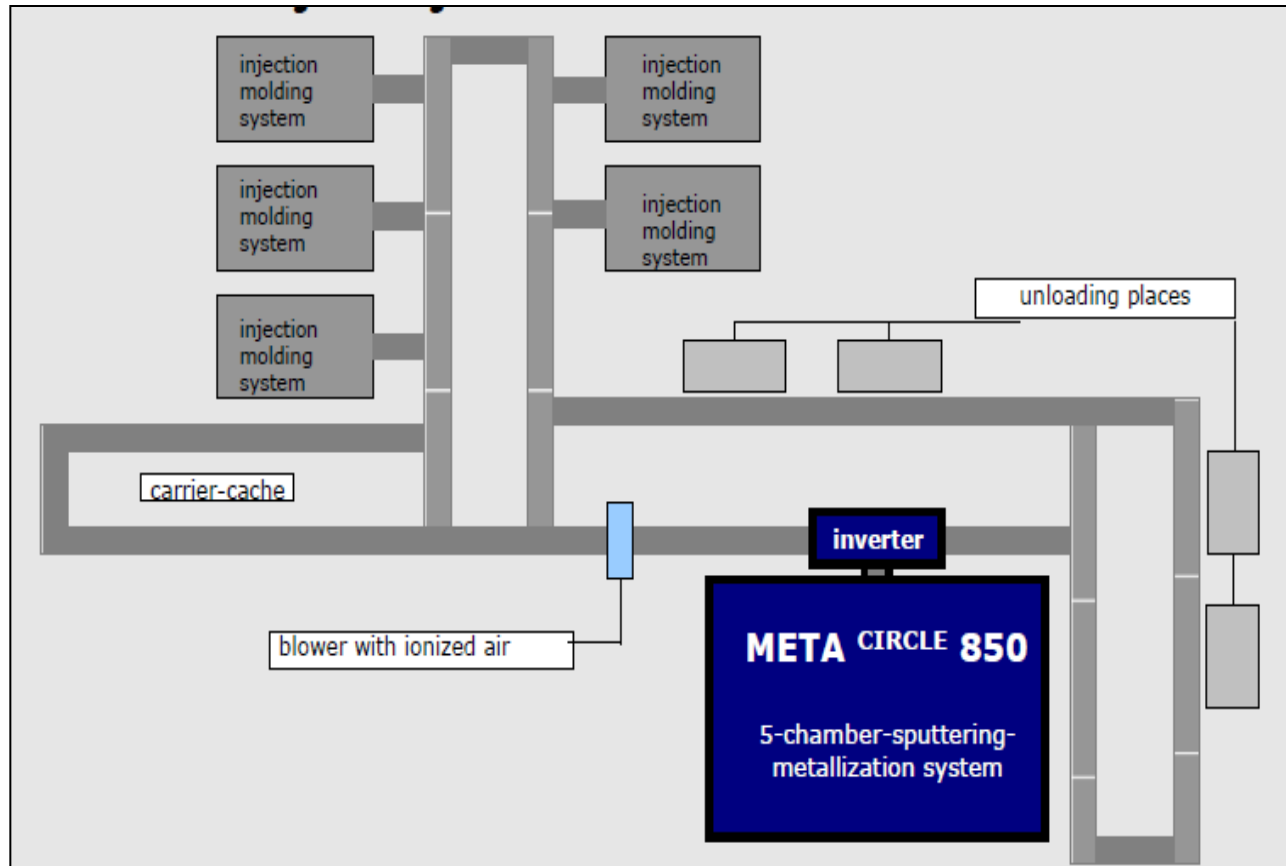


- Fully-automated multi-chamber-sputtering system
- 全自动多腔体溅射系统
- Process time: approx. **36 s**
- 加工时间：大致**36秒**
- Carrier size: 850 x 460 mm²
- 托盘尺寸：850 x 460 mm²
- Coatable area: ~40 m² / h
- 生产能力：~40 m² / h

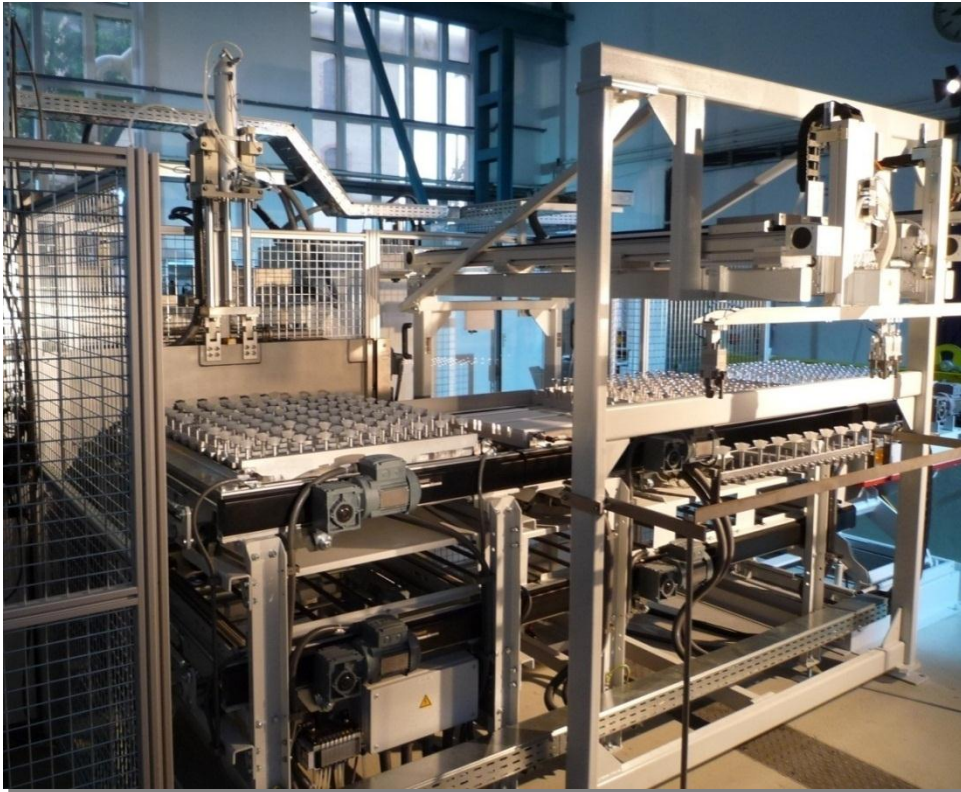


META CIRCLE 850

Example for linking 整合实例:



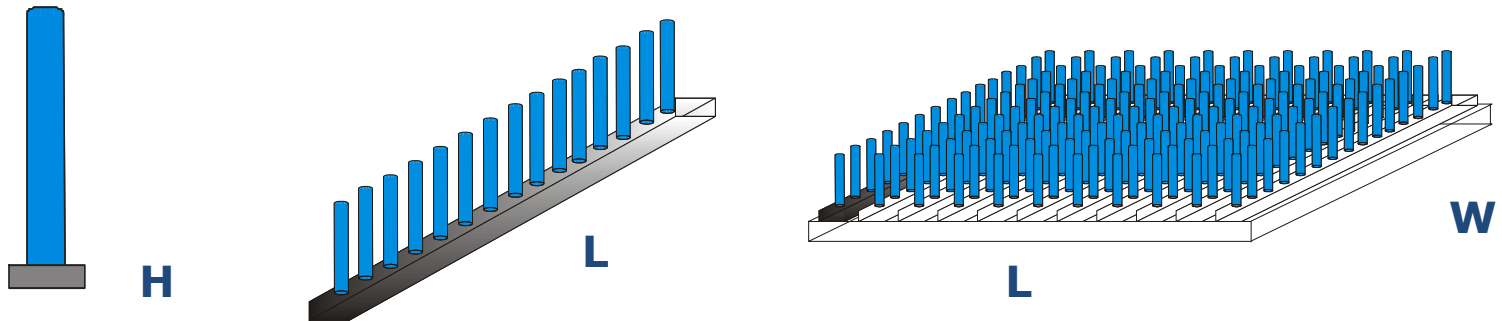
META TABLE C



- Fully-automated metallization system
- 全自动金属镀系统
- Process time: approx. 180 s
- 工艺周期：大致180秒
- Carrier size: 460 x 850 mm²
- 托盘尺寸： 460 x 850 mm²
- Coatable area: ~8 m² / h
- 镀膜能力: ~8 m² / h

META TABLE C

Substrate 器件	Bar 整条	Substrate carrier 器件载盘
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max. height 最大高度 [mm]	Length 长度 [mm]	Carrier 载盘 L x W [mm]	No. of bars/batch 每炉整条数量	No. of bars/hour 每小时整条数量	Time/bar 整条时间[s]	Speed 速度 [m/min]
50	850	930 x 850	11	264	13,6	3,7
90	850	930 x 850	7	168	21,4	2,4

META TABLE C





Thank you for your kind attention.