Vapour Phase Reflow Soldering

VAC745 / VAC765

Leading in Vapour Phase Technology

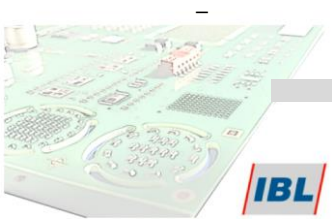
IBL-Löttechnik GmbH
Messerschmittring 61-63
86343 Königsbrunn
Germany

IBL VAC 745/765

Premium Line – Vacuum Reflow

The path to highest quality

高可靠真空汽相焊接系统



35 YEARS 1987-2022

Vapour Phase Reflow Soldering

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Our company

IBL-Löttechnik GmbH
Messerschmittring 61-63
86343 Königsbrunn
Germany

ISO 9001 2015 CERTIFIED

Founded 1987

IBL was founded 1987 by Helmut Leicht, since then IBL is fully focussing on the vapour phase reflow technology

1987

IBL Leading in **VAPOUR PHASE TECHNOLOGY**

U.S. location
IBL extended their availability and market position by adding a further subsidiary

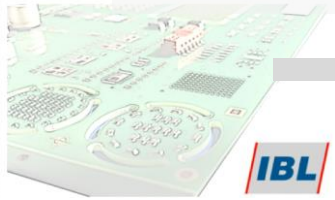
2009

Further extended
IBL has acquired R&D Vaportech LLC to further extend their range of services and products

2013

Next generation
Armin Leicht became General Manager and is today leading the company

2019



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Technologies

High-end process control and monitoring as well as maintenance friendly and long-lasting systems are the ongoing focus of IBL.

SVP Process — 1996
Patented solution for gradient regulation in the field of vapour phase reflow

InVapour Vacuum — 2001
IBL developed the InVapour Technology which enables the direct evacuation after the soldering

SVTC Process — 2008
IBL extended the SVP Process by a temperature and sensor regulated control

IPS — 2012
IBL developed the IPS Intelligent Profiling System, which includes the Pilot-Mode (PCB-temperature controlled process)

Traceability — 2013
IBL presented the 2nd generation of traceability system, including several hardware scanner solutions

Industry 4.0 — 2020
Introduction of further extended traceability software solutions, allowing the connection to the standarized IPC Hermes

International support 全球销售与技术支持

IBL-Löttechnik GmbH
Messerschmittring 61-63
86343 Königsbrunn

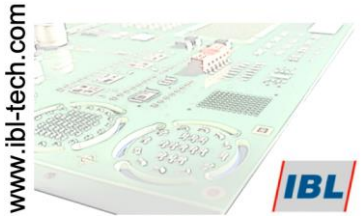
ISO 9001 2015 CERTIFIED

Sales & Service Locations and Support

Service & Support all
AROUND THE WORLD

LOCAL SUPPLY

> 100 distributor locations worldwide offering local sales- and service-support



Vapour Phase Reflow Soldering

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86343 Königsbrunn
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China

Sales & Service Locations and Suppor
中国销售与技术支持

JAMRON GROUP 杰龙电子
SALES BRANCH

LOCAL SUPPLY

ISO 9001 2015 CERTIFIED

35 YEARS 1987-2022

Vapour Phase Reflow Soldering

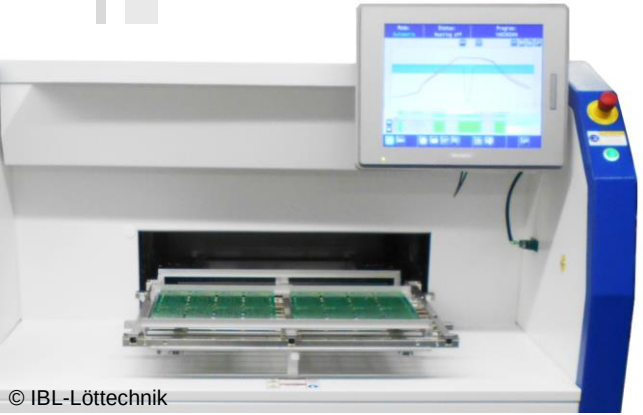
VAC745 / VAC765

Leading in Vapour Phase Technology

Innovative Technologies & Design Excellence **创新技术&卓越设计**

IBL Vapour Phase Machines
General Key Attributes **关键技术优势**

- 节能环保 → Eco-friendly & very low power consumption
- 高可靠设计&材料 → High-quality design & long-lasting materials
- 长期验证技术&过程控制 → Proven technologies & high-end process control
- 免维护&高兼容性 → Maintenance-friendly & maximum availability



Designed for soldering SMT- or other applications in the field of soft soldering

Vapour Phase Reflow Soldering

VAC745 / VAC765

Leading in Vapour Phase Technology

Innovative Technologies & Design Excellence 创新技术&卓越设计

IBL Löttechnik GmbH

Designed, developed & made in Germany

www.ibl-tech.com © 2021

自主软件开发应用 → Development of soft- and hardware in-house

RESEARCH & DEVELOPMENT — FOCUS ON INNOVATIVE TECHNOLOGIES

关键部件自主设计制造 → Parts and machine manufacturing in-house

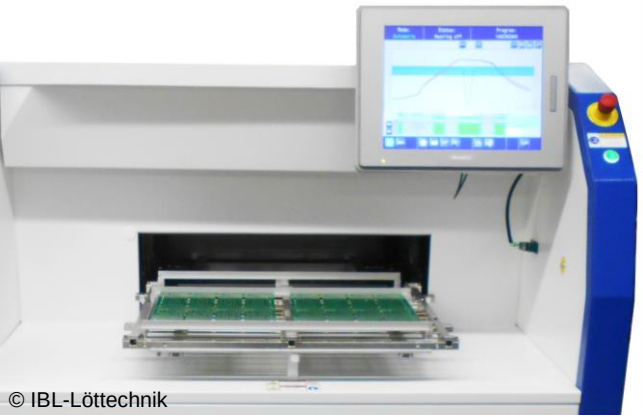
ISO 9001 2015 CERTIFIED — QUALITY IS THE PRIORITY

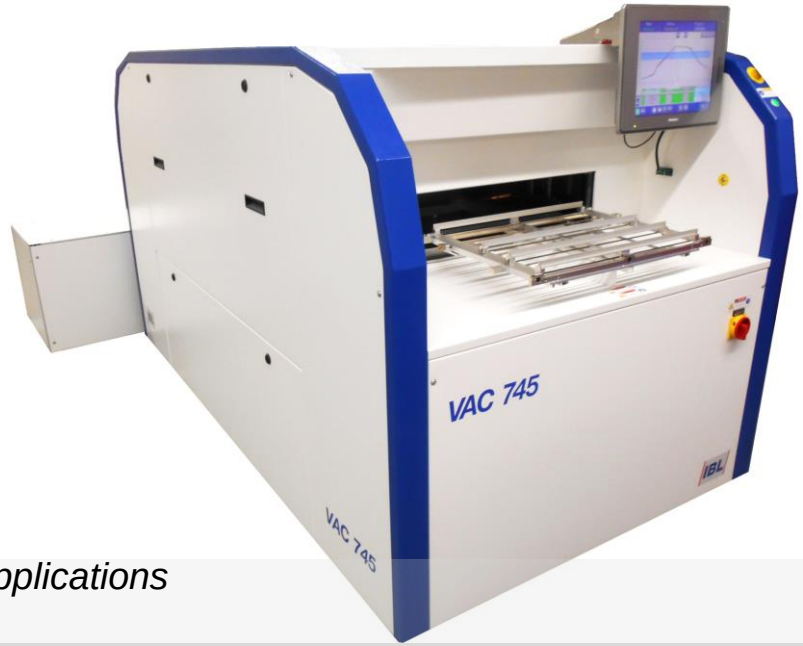
LOCAL SUPPLY — MAINTAINING THE FLEXIBILITY

Olaf Cieply
Global Sales Manager

Armin Leicht
General Manager

„We proudly look back to almost 20 years experience in the field of vacuum reflow soldering. We kept the focus on the development of high quality and best in technology soldering machines.“





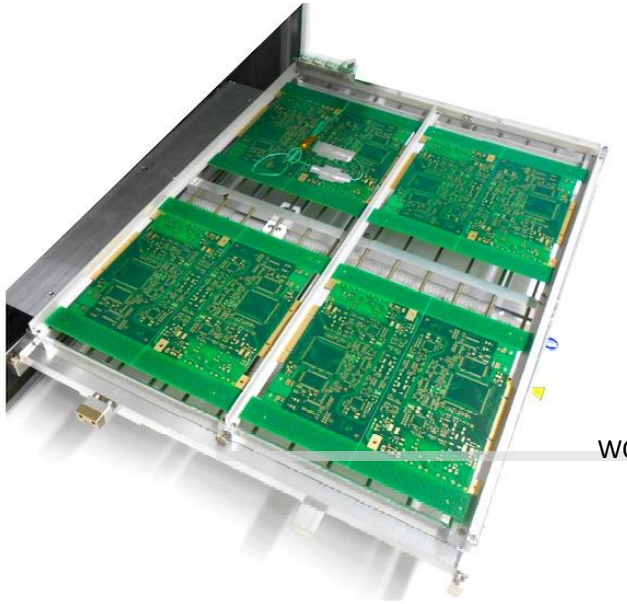
Designed for soldering SMT- or other applications in the field of soft soldering

Vapour Phase Reflow Soldering

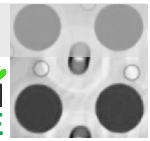
Machine basics and features

VAC745 / VAC765

Leading in Vapour Phase Technology



Vacuum Vapour Phase Soldering



VOID-FREE

MAX WORK SPACE最大工件面积

WORK PIECE CARRIER

VAC745
635x440x70mm

VAC765
635x640x70mm

Premium Line

- The path to highest quality 高质量，高可靠
- Line-up of 2 batch machine models 不同尺寸机型
- High-end thermal profile control 温度曲线控制
- Patented vacuum technology专利真空技术
- Process monitoring 过程监测控制
- High durability 耐久性

Vapour Phase Reflow Soldering

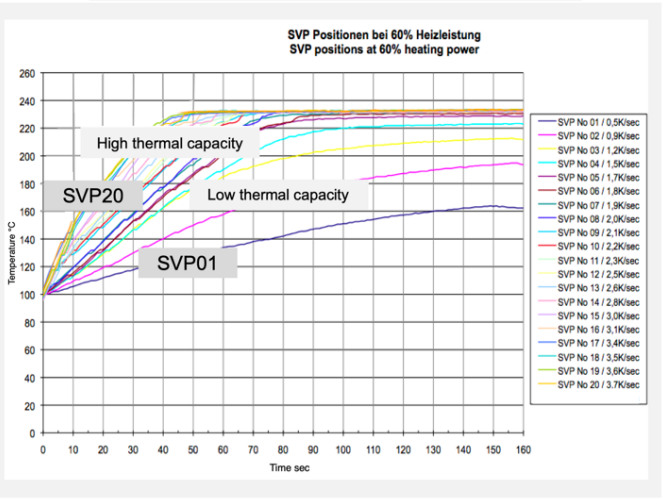
IPS thermal profiling智能温度曲线控制原理 VAC745 / VAC765

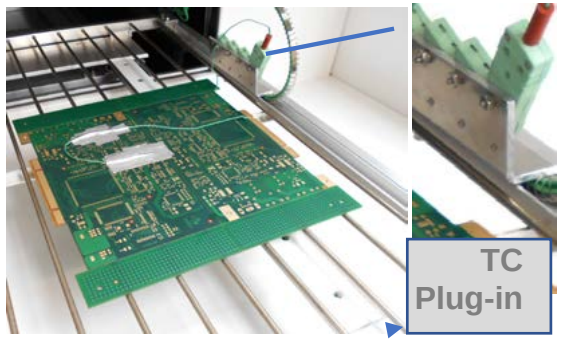
Leading in Vapour Phase Technology

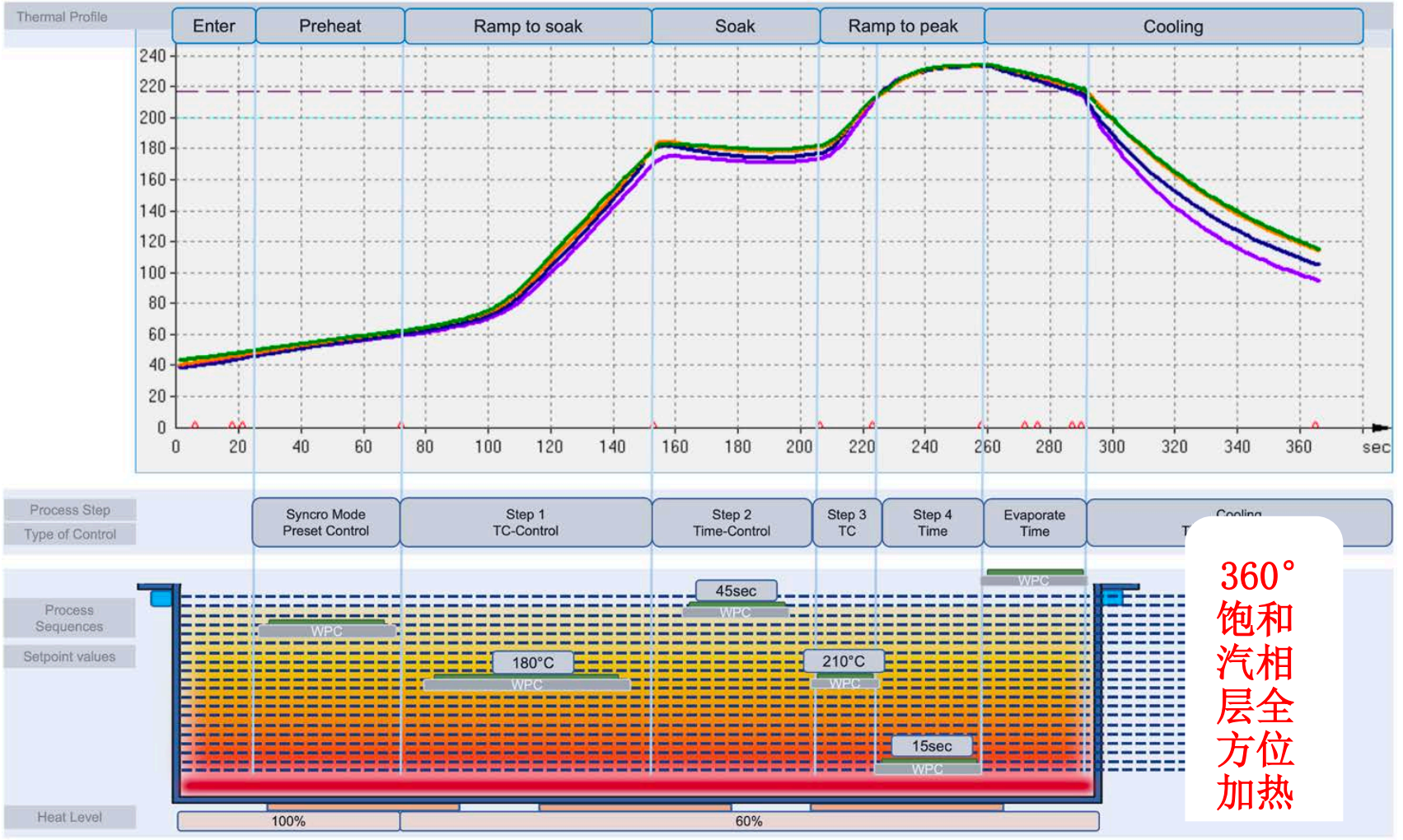
IPS Intelligent Profiling System – SVP Process and TC Control: 饱和汽相层焊接原理

Soak type profile
温度曲线与托盘位置对应

Broad variety of achievable temperature gradients







360°饱和汽相层全方位加热

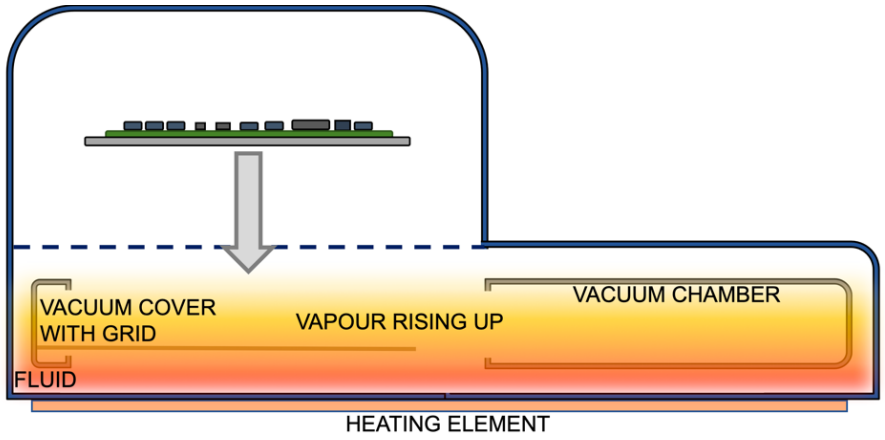
Vapour Phase Reflow Soldering

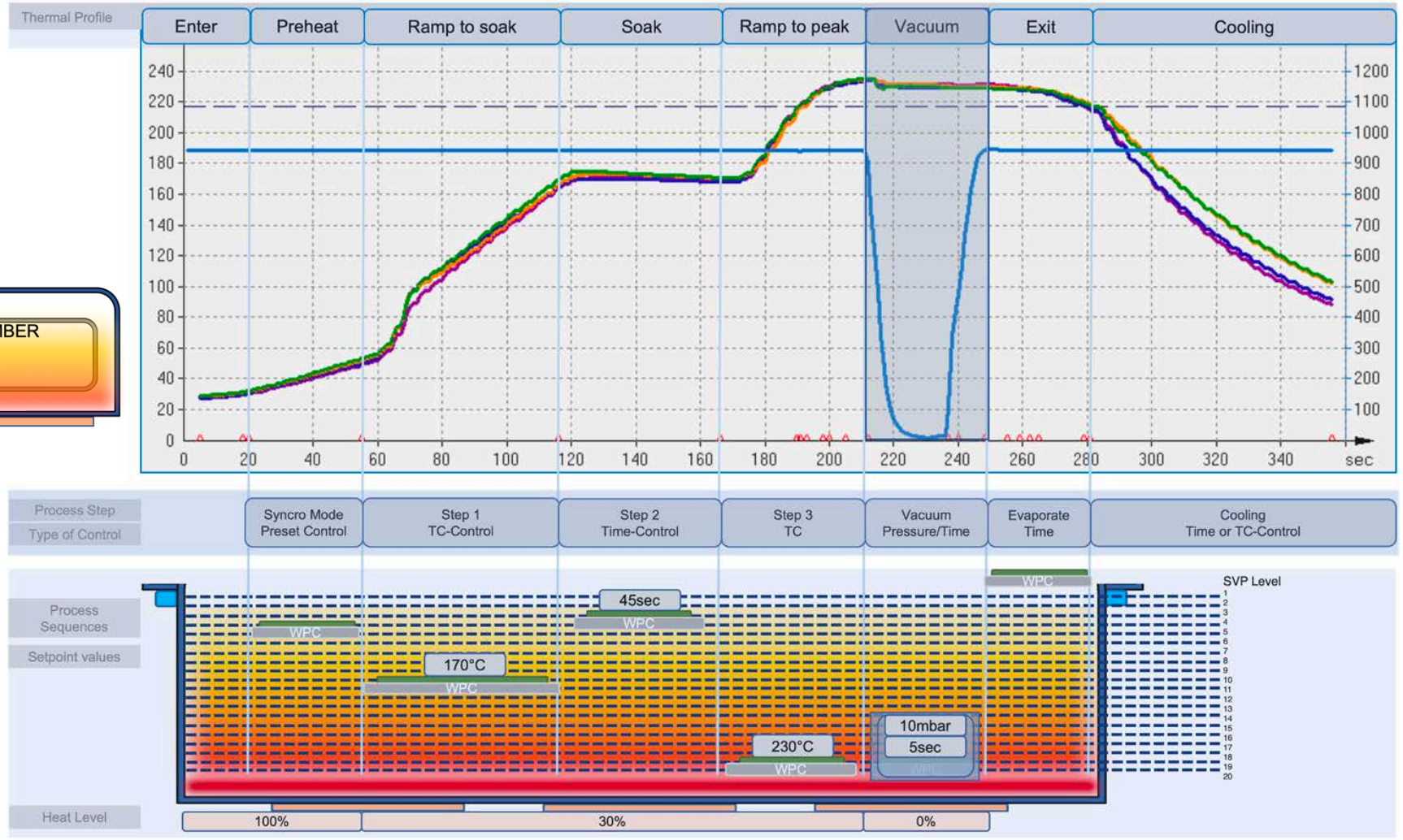
IPS thermal profiling 智能温度曲线控制原理 VAC745 / VAC765

Leading in Vapour Phase Technology

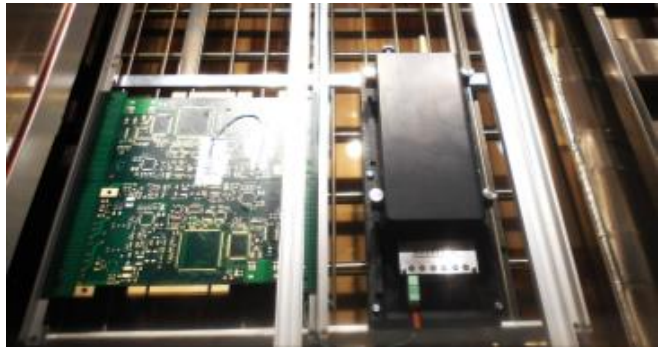
In Vapour Vacuum Technology - Process attributes 汽相层内真空焊接原理

Soak type profile with Vacuum
温度曲线与托盘位置对应





In Vacuum Chamber汽相层内真空腔



Profiler unit on Carrier 炉温曲线测试

Vapour Phase Reflow Soldering

Machine basics and features

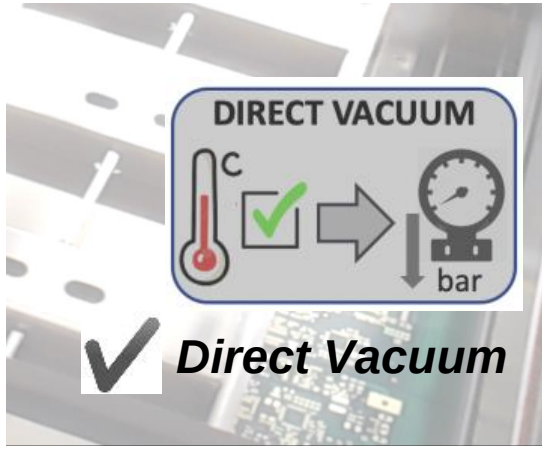
VAC745 / VAC765

Leading in Vapour Phase Technology

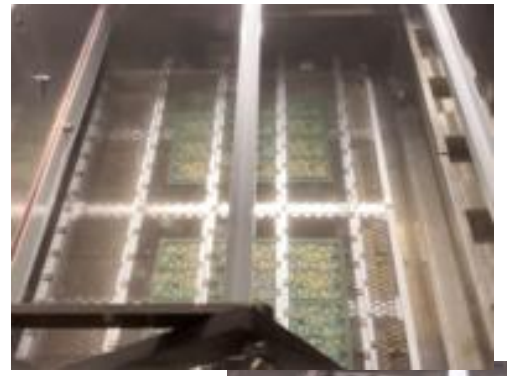
Unique system attributes: 独特技术性能

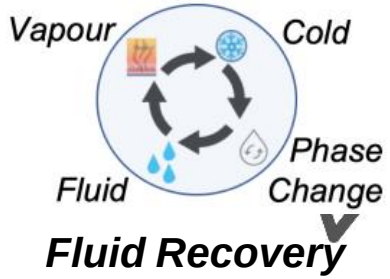
PATENTED

Patented Vacuum Technology
专利汽相层真空技术



- ✓ InVapour Technology, enables product evacuation within the reflow area 汽相层真空技术，工件不离开焊接区域
- ✓ Premium design, long-lasting materials 高可靠耐久性设计
- ✓ Integrated fluid recovery through recondensing system 内置汽相液多级水冷风冷冷凝回收
- ✓ Fully inert (oxygen-free) process 氮气防氧化接口选项
- ✓ Flexible vacuum parameters 灵活真空参数设置



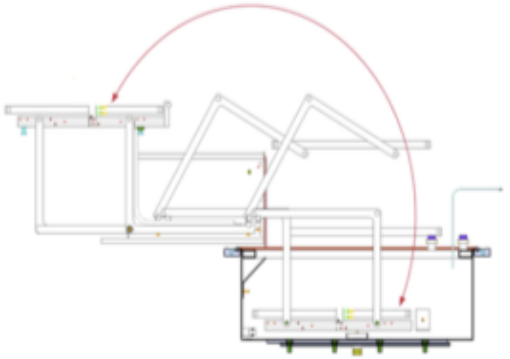


InVapour Vacuum Techology

PATENTED

Patented Transportsystem
专利水平垂直双轴传输系统

- ✓ Maintenance- and vibration-free system 无震动免维护系统
- ✓ Durable solid design, high quality materials 高强度钢双杆驱动
- ✓ Low wear due to Cool Handling Technology 低磨损低温运行环境 (all parts installed outside from the process chamber)
- ✓ Simplifying the access to the process chamber, e.g. for maintenance / cleaning 易于清洁保养



Vapour Phase Reflow Soldering

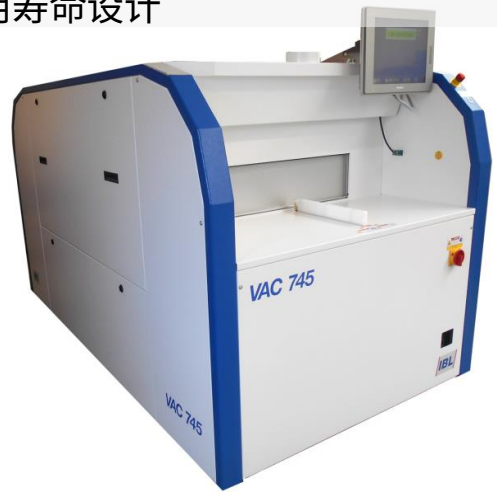
Hardware attributes and units

VAC745 / VAC765

Leading in Vapour Phase Technology

Construction: 结构设计特性

- Robust high-quality 2-chamber design, durable design and solid materials
  双腔体设计，高强度结构
- Integrated fluid recovery by internal cooling coils
  内置汽相液冷凝回收水冷管路
- Stainless-steel process tank with integrated cooling coil to enable vapour re-condensing
  不锈钢汽相焊接腔体及冷凝管路
- Designed to maximize the life-time
  超长使用寿命设计



PCB handling: 可调双面PCB支架

- Grid-type base carrier
  网格工件支架
- Rail-type adapter for double sided PCBs
  可调轨道双面PCB架
- Automatic slider carrier movement
  托盘自动进出滑轨
- Simple placement of solder assemblies (e.g. PCBs) 工件快速放置更换

Vapour Phase Reflow Soldering
Hardware attributes and units

VAC745 / VAC765

Leading in Vapour Phase Technology

Fluid filter system: 多重汽相液过滤回收系统

- Fluid filter system with easy accessable filter unit 快速更换汽相液过滤器系统
- Regular filtering during production
  生产过程自动间隙过滤设计
- Filtering active during heat-up, stand-by and cool-down
  开机加热、焊接等待、冷水过程自动激活过滤

Top view
Process chamber

透明观察窗设计，内置照明，实时观察焊接过程

Smart maintenance concept:

- Easy access to process chamber through removable window
  可徒手开启腔体盖，便于快速维护保养
- Ergonomic access to machine chambers, resulting in a user-friendly cleaning and maintenance process
  易于清洁汽相腔体，降低维护人工和成本
- Low wear and tear due to Cool Handling Technology (parts and devices external from process chamber) 低磨损运动部件，低温运行环境设计

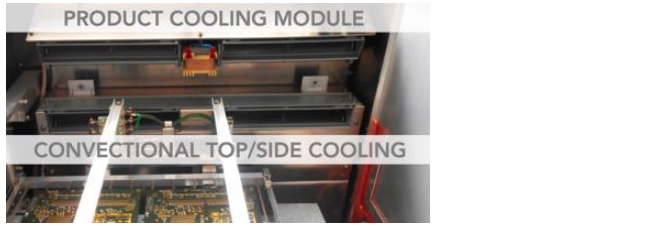
Vapour Phase Reflow Soldering
Hardware attributes and units

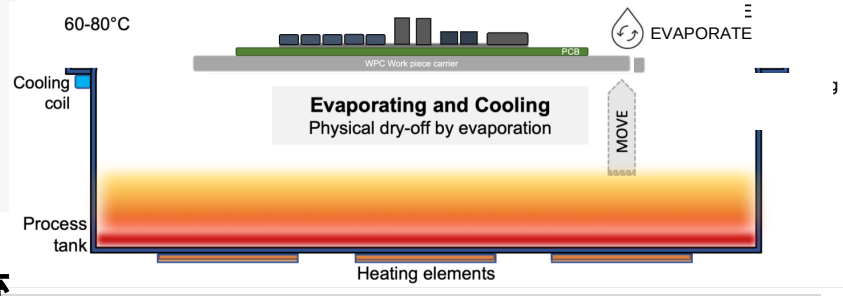
VAC745 / VAC765

Leading in Vapour Phase Technology

Product cooling module:工件冷却模块

- Seperate cooling chamber with cooling coils
  独立带冷凝管路冷却腔体
- Two integrated product cooling modules (extension by heat exchanger optional)
  侧面强风轴流冷却风机（可扩展）
- Convectional cooling to reduce the product temperature before unloading
  底部对流冷却风扇

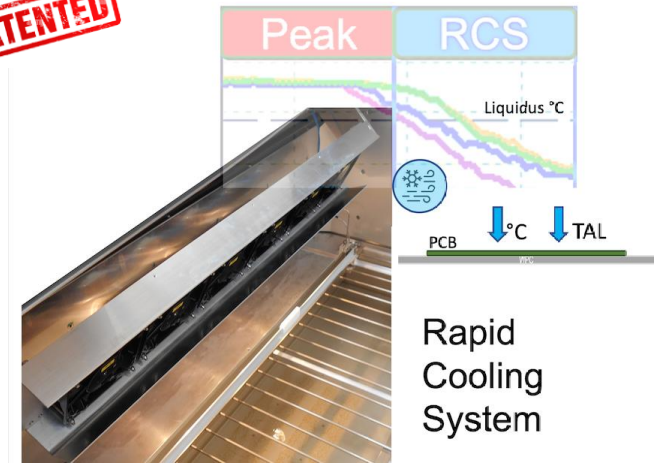




Rapid cooling system (SRC):快速冷却系统

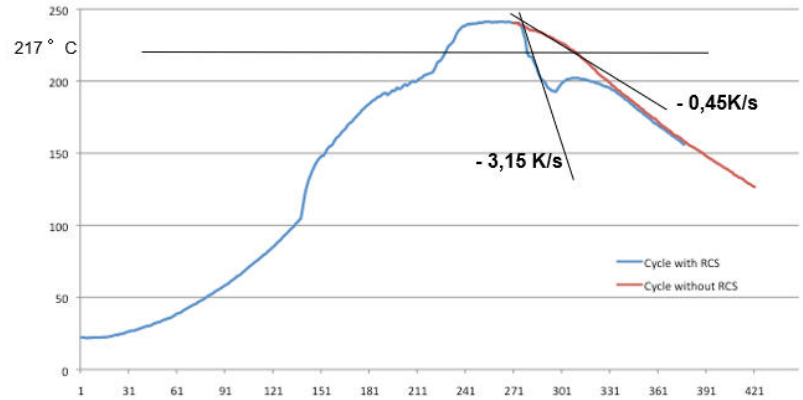
- Patented optional system to allow fast product cooling to cross the liquidus temperature 专利的快速冷却系统，利用汽相液挥发带走温度原理，快速冷却工件
- To reduce the TAL (time above liquidus)
  缩短TAL液相时间
- Installed in process chamber

PATENTED



Rapid Cooling System

RCS快速冷却系统 – 快速冷却以提高焊点质量



RCS 系统提供的降温速率可达普通降温速率的7倍以达到更高的焊点质量

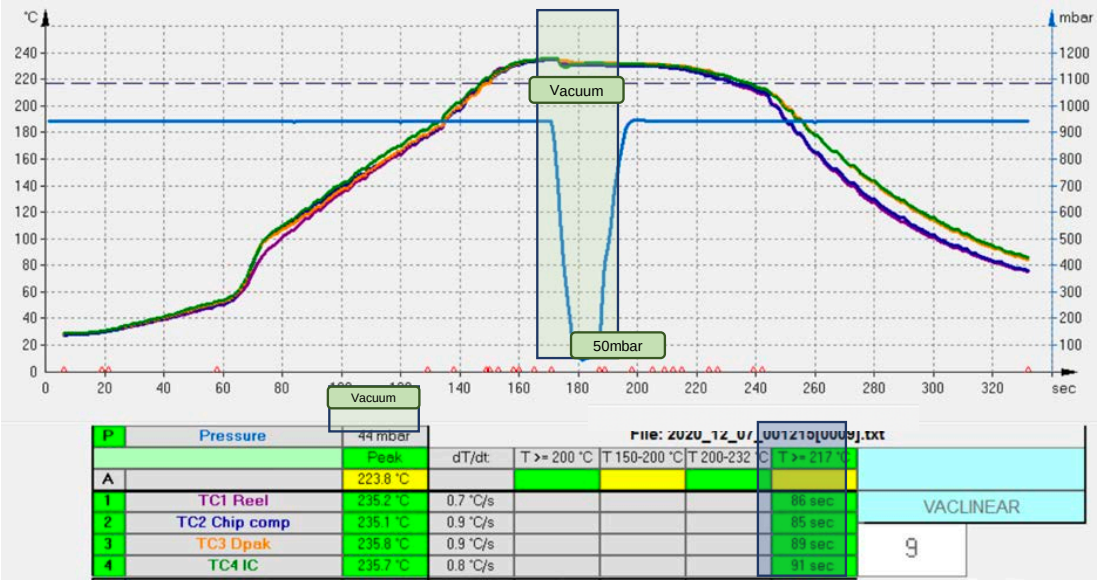
Vapour Phase Reflow Soldering

Rapid cooling system (SRC):快速冷却系统

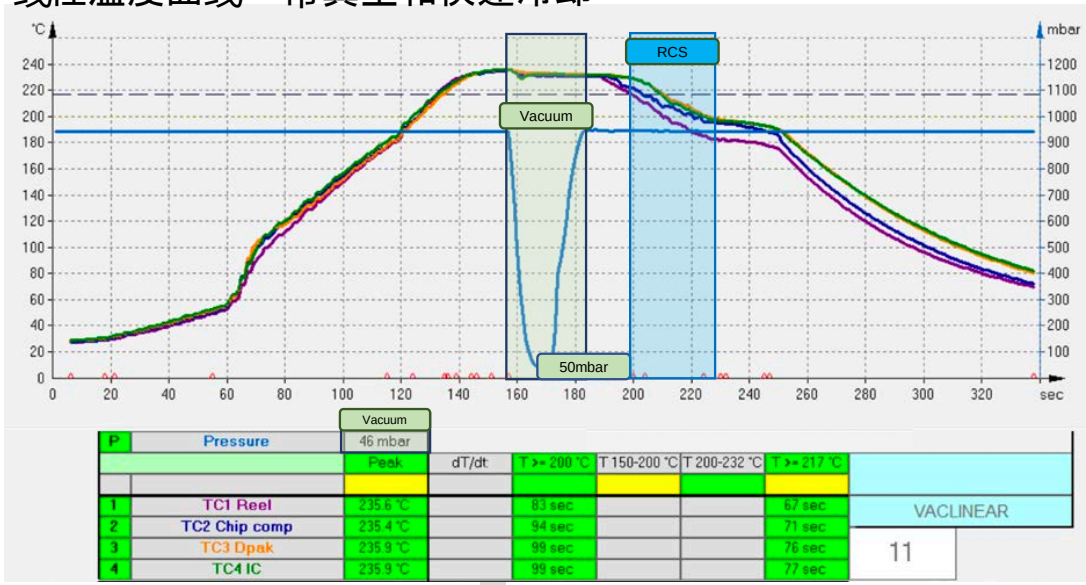
VAC745 / VAC765

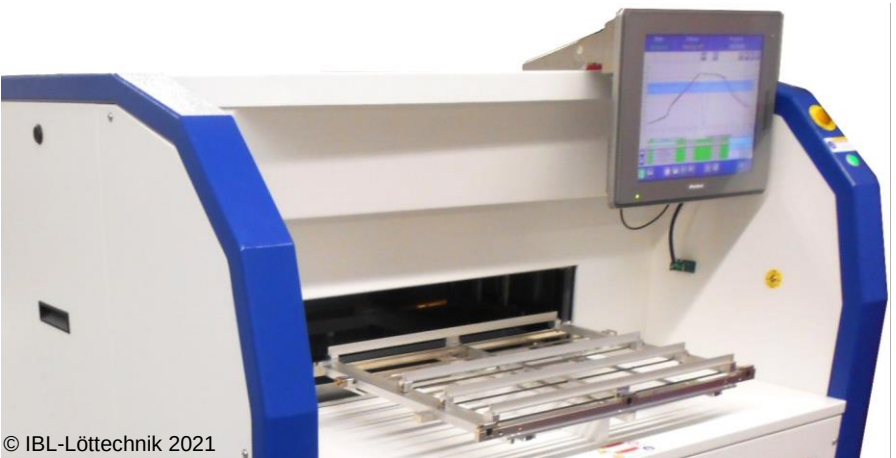
Leading in Vapour Phase Technology

Linear type profile with Vacuum
线性温度曲线—带真空



Linear type profile with Vacuum and RCS
线性温度曲线—带真空和快速冷却





Process monitoring and indication extensions:过程监控

- UPS Uninterruptable Power Supply
  UPS电源（选配）
- Heat Level Monitoring
  Permanent current flow check
  加热功率、驱动电流监控
- Light Tower 三色灯指示
  3-color status indication

Vapour Phase Reflow Soldering

Controller and software 控制器和软件

VAC745 / VAC765

Leading in Vapour Phase Technology

Standard equipment:

- 15“ HMI Multitouch Monitor
  15"触摸控制显示器
- Industrial-PC incl. Software-PLC
  工控电脑 & 软件 & PLC
- Operating system: Windows10 IoT Enterprise
  Windows 10 IoT Enterprise 操作系统

15“ HMI

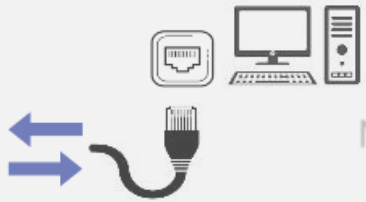
Windows IoT

PC

4x 1.66GHz CPU

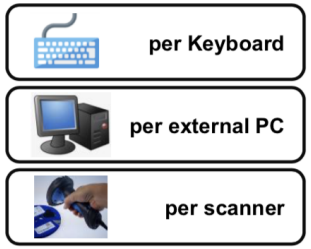
128+64GB Harddisc

ETH Network Connection



Data input

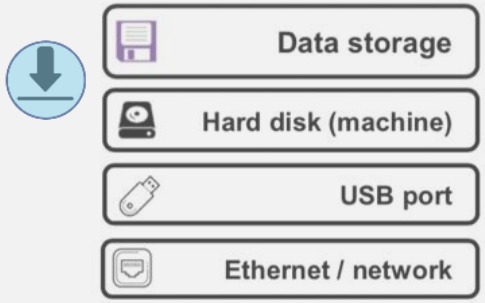
Options



Function bar

Keyboard

Scanner



Interface capability

Interface and data transfer: 接口界面和数据传输

- Industry 4.0 工业4.0
- Network connection网络连接
- Ethernet and USB
  网络接口和USB接口
- USB-Port for data
  USB系统参数及生产数据存储

USB Port

Vapour Phase Reflow Soldering

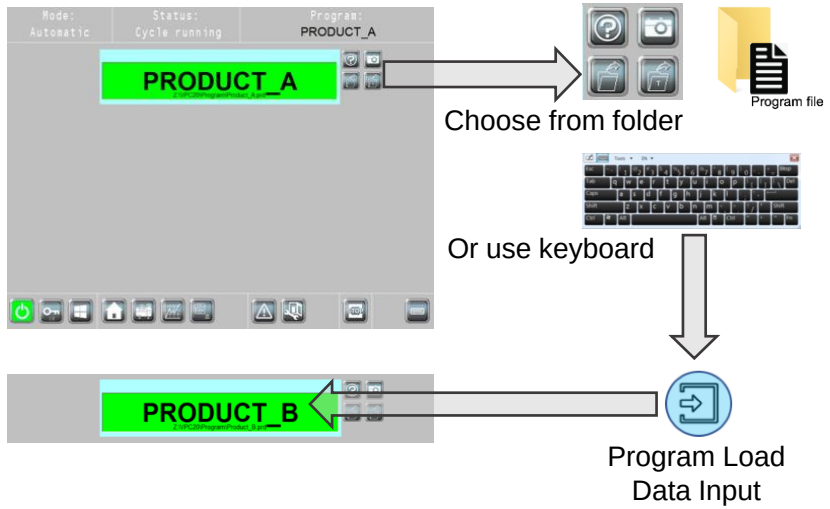
Controller and software 控制器和软件

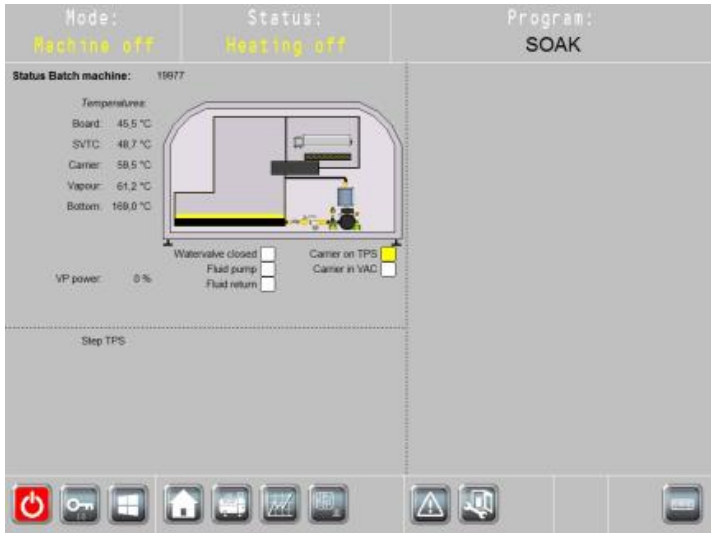
VAC745 / VAC765

Leading in Vapour Phase Technology

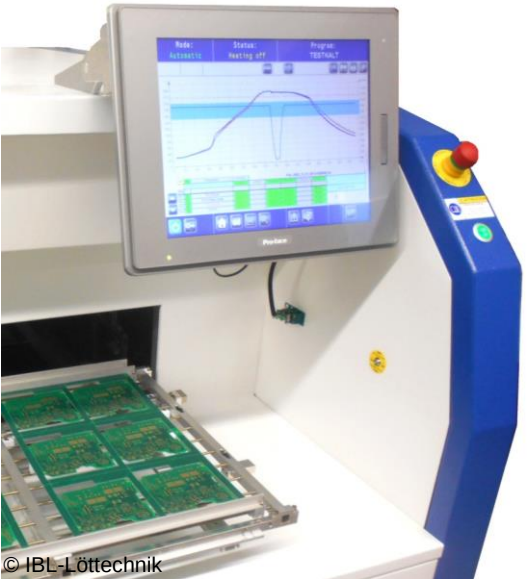
Controller features:

- Structured data management, product related program identification
  结构化数据管理，产品相关程序标识
- User and login manager
  用户操作登录管理
- Maintenance manager
  维护保养管理
- Service menues I/O-status
  服务状态管理，输入/输出接口状态





Status screen



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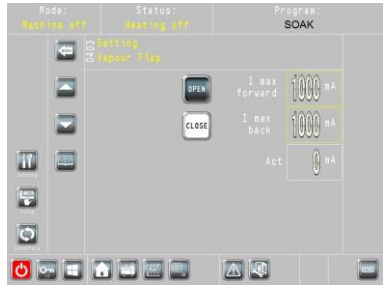
User and login manager

Service menues



Process status and report: 过程状态显示和报告

- Status and function report screen
  功能状态显示，屏幕报告
- Status of actual process step and values
  实时进程状态、数据显示
- Thermal graph screen
  实时温度曲线显示
- Live temperature and pressure monitoring
  实时温度、压力数据监测

Thermal graph screen

Vapour Phase Reflow Soldering

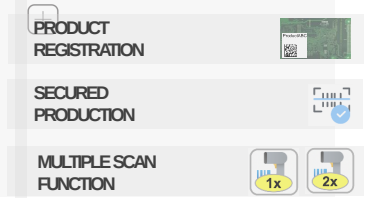
Controller and software 控制器和软件

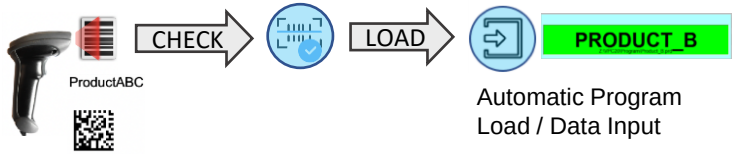
VAC745 / VAC765

Leading in Vapour Phase Technology

Traceability System: 可追溯性系统

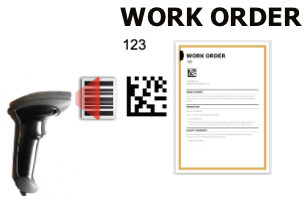
- Product Identification
  产品标识
- Lot- or work-order traceability
  批次或工单可追溯性
- Extendable by handheld barcode scanner
  可外接手持式条形码阅读器
- Automatic data verification
  自动数据验证
- Single-piece traceability
  单件可追溯性





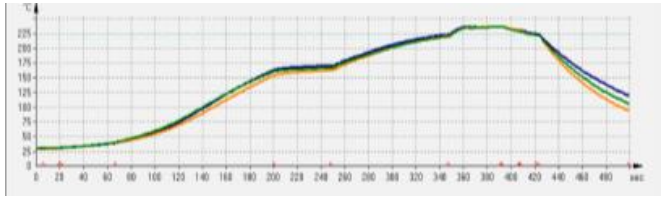
Automatic Program Load / Data Input

Product Identification



Lot- or work-order traceability

Single-piece traceability



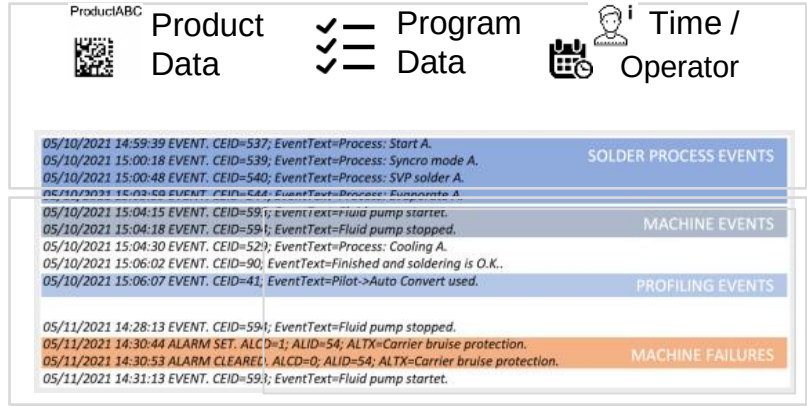
Profile Data

Process File

Alarm/

Traceability / Production data collection: 生产数据可追溯性记录

- Process documentation
  工艺文件
- Automatic process file generation
  自动生成流程文件
- Daily alarm- and event-file-storage
  每日报警和事件文件存储



EventFile

Vapour Phase Reflow Soldering

IPS thermal profiling 智能温度曲线编程

VAC745 / VAC765

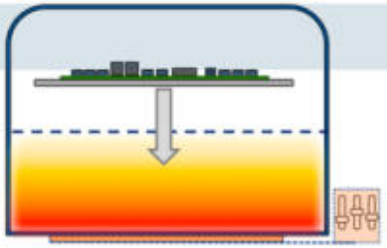
Leading in Vapour Phase Technology

多种温度控制模式

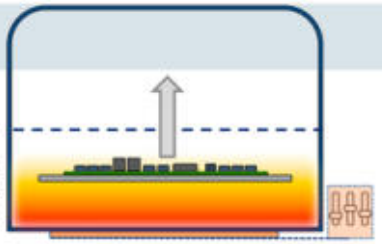
PROCESS TECHNOLOGY DEVELOPMENT PHASES

HL Mode

VP+HL HEAT LEVEL CONTROL
Adjustable heat level to allow modification of the heat transfer



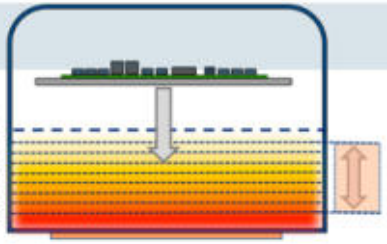
VP+HL HEAT LEVEL CONTROL
3-4 time steps available to adjust the heat level and influence the thermal energy



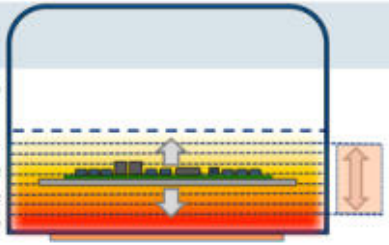
SVP Mode

PATENTED

SVP SOFT VAPOUR PHASE
Up to 20 vertical positions available to effectively control the heat transfer



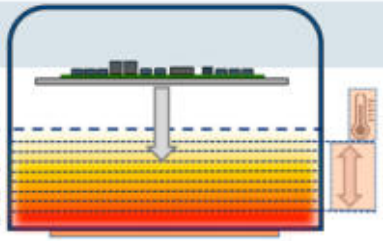
SVP SOFT VAPOUR PHASE
The position can be changed during the cycle to adjust the thermal energy rate also during the soldering cycle



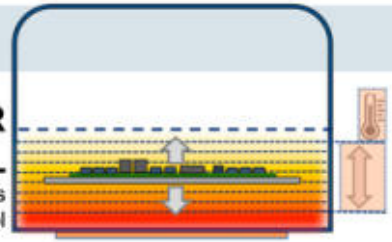
SVTC Mode

PATENTED

SVTC SOFT VAPOUR TEMPERATURE CONTROL
In addition to the vertical positioning a sensor controlled regulation is available



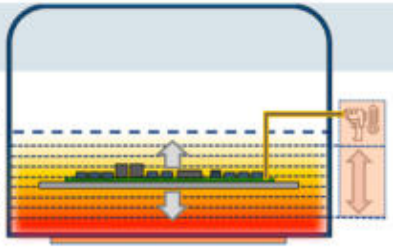
SVTC SOFT VAPOUR TEMPERATURE CONTROL
The temperature controlled steps allow more precise thermal profile control



Pilot Mode

- ✓ PCB-temperature controlled thermal profile set-up
- ✓ Simple thermocouple plug-in at the work piece carrier
- ✓ Allows fast and simple thermal profile creation

PILOT MODE TEMPERATURE CONTROL
PCB-temperature controlled process regulation



Vapour Phase Reflow Soldering

IPS thermal profiling智能温度曲线编程

VAC745 / VAC765

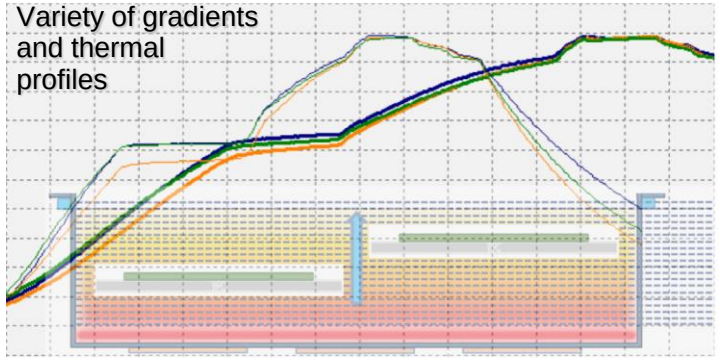
Leading in Vapour Phase Technology

IPS Intelligent Profiling System – SVP Process and TC Control: 智能编程系统--闭环温度曲线控制

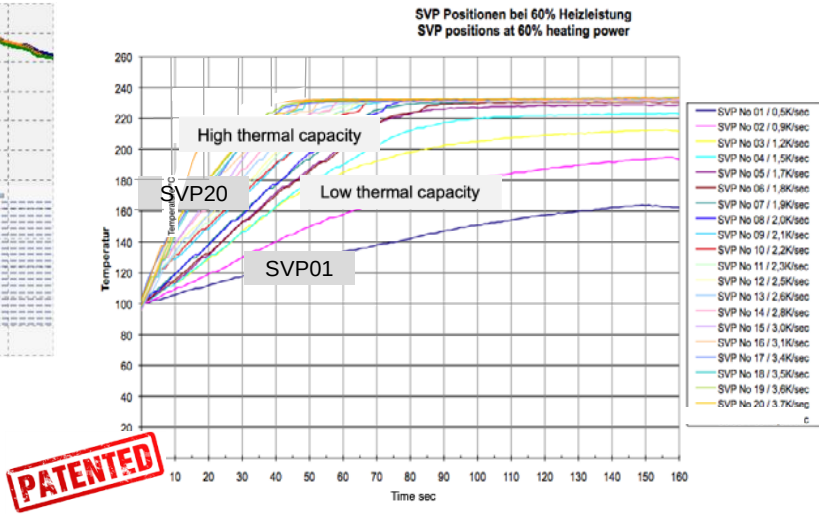
- Soft Vapour Phase Process (patented)
  - Precise and efficient thermal energy control by vertical adjustment of solder applications inside the saturated vapor blanket通过垂直方向精确高度控制有效地控制汽相层中的热交换速率
  - 20 vertical positions available (20 SVP-Level)
    20个垂直高度分区 (柔性气相升温控制)
  - The change to a different height position in the vapor is immediately influencing the thermal energy and thus the gradient as well as the thermal profile of the soldering application will change without reaction time
    汽相层不同高度位置的变化为直接影响热能交换速率以及焊接温度曲线控制应用

- Thermocouple and Temperature Controlled Process
  - Automatic process regulation, ensuring the highest possible repeatability and reliability beside targeted and precise process and thermal profile control
    自动温度曲线闭环控制，提高温度可靠性和可重复性

  Pilot Mode : PCB-temperature controlled process
  PCB温度闭环控制模式



Flexible vertical positioning system to achieve immediate change of thermal energy and thermal profile



Pilot Mode
PCB-temperature controlled process

PCB thermocouple

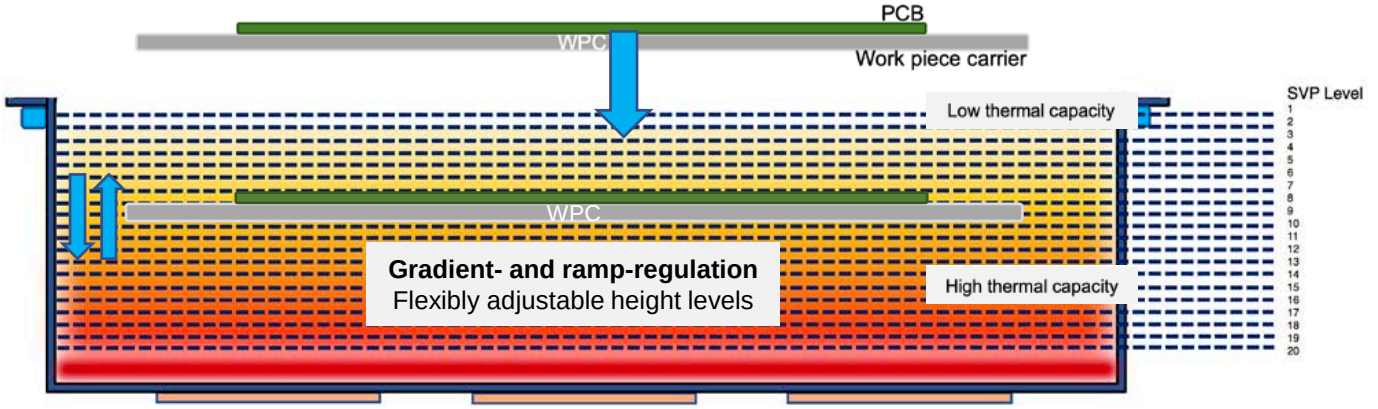
IPS Intelligent Profiling System – SVP Process and TC Control: 智能编程系统--闭环温度曲线控制(无需人工干预)

SVP Process

Soft Vapour Phase (SVP) 柔性气相升温控制

The SVP Process assures maximum processing accuracy and process stability.

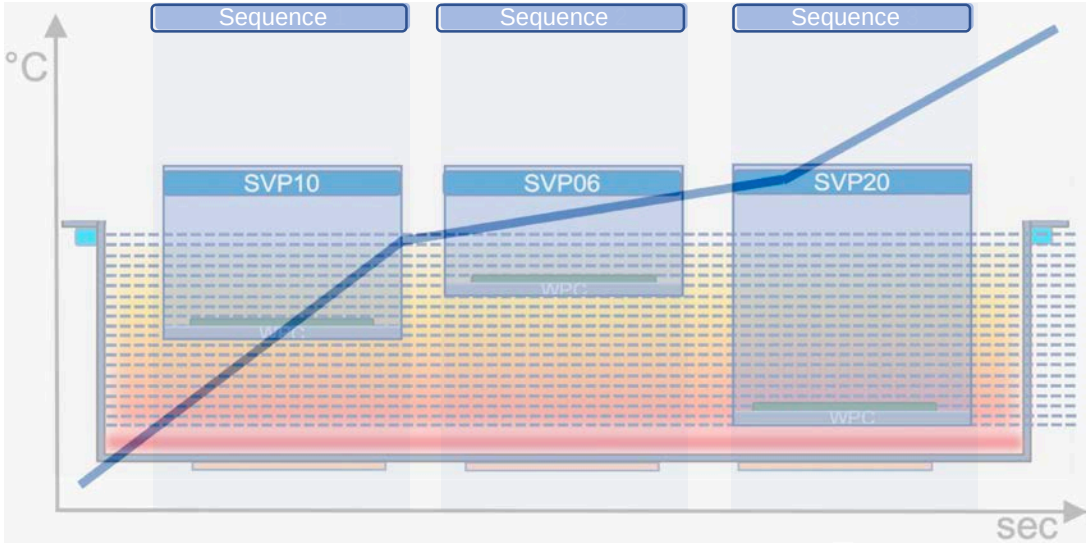
The risk of external influences which could negatively affect the system performance are minimized due to the sustainable design and concept.



Sequence programming 顺序温区编程控制

The program configuration is made by convenient sequence program set-up.

The SVP-Level can be set per program sequence.



Vapour Phase Reflow Soldering

IPS thermal profiling智能温度曲线编程

VAC745 / VAC765

Leading in Vapour Phase Technology

IPS Intelligent Profiling System – SVP Process and TC Control: 智能编程系统--闭环温度曲线控制(无需人工干预)

Patented Transportsystem (TPS) IBL专利的托盘传送系统

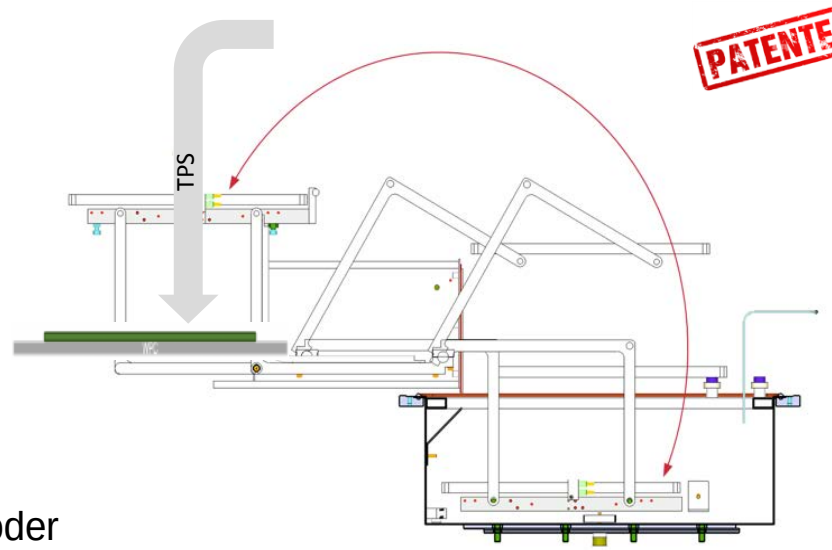
For the vertical movement the machine is using a patented system, so called TPS, which is a vibration- and maintenance-free rotary movement transport system.
The position monitoring is done by an encoder.

Therefore the TPS combines excellent wear resistance and highest possible durability with product reliability

The mechanical parts of the TPS are mounted in the cooling chamber of the machines. This leads no lowest possible wear during the use of the machines.
In addition the risk of external influences towards the system performance are minimized.

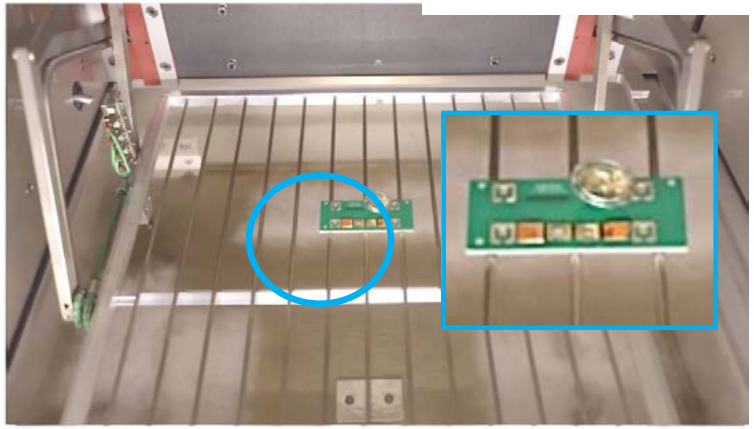
The vibration-free movement and exact positioning are crucially increasing the product safety and ensuring highest possible product quality

Encoder



Sensitive Function 敏感器件焊接功能

It is possible to change the speed of the transportsystem during the preheating and soldering process.
If the sensitive function is activated the system will move with low speed



WPC Work piece carrier on TPS Transportsystem

controlled process

Vibration

Transporting a coin on the edge on the PCB

Vapour Phase Reflow Soldering

IPS thermal profiling 智能温度曲线编程

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Leading in Vapour Phase Technology

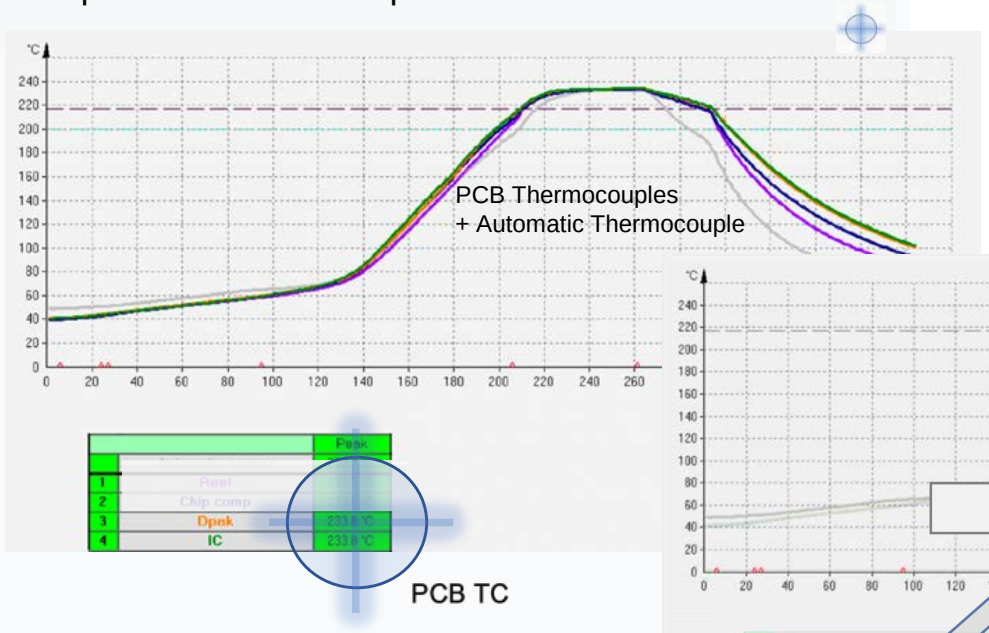
IPS Intelligent Profiling System – SVP Process and TC Control: 智能编程系统--闭环温度曲线控制(无需人工干预)

Pilot Mode

PATENTED

PCB-temperature controlled process,
for fast and simple set-up of solder profiles and programs

Responsible thermocouple: PCB TC



AutoConvert Function

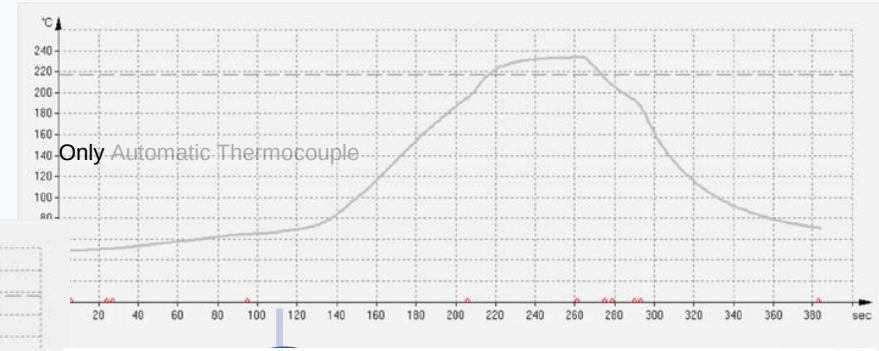
Mode to simplify the set-up of thermal solder profiles
Process regulation by PCB sensor

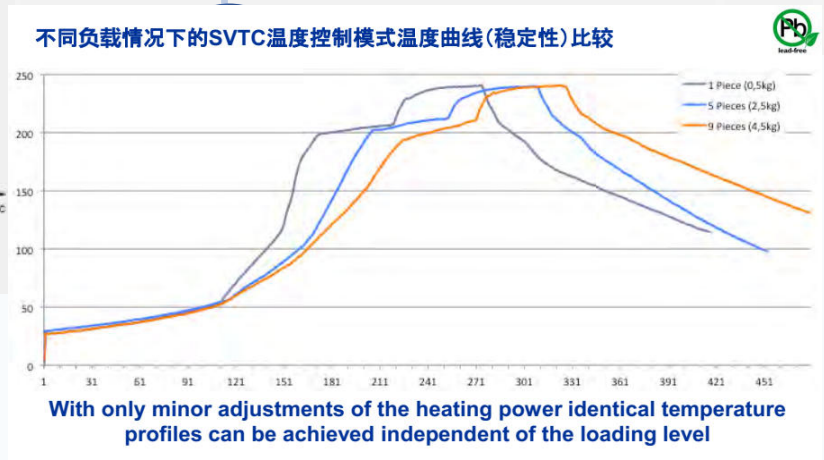
SVTC Sensor Controlled Process

Sensor controlled process regulation during soldering process

Responsible thermocouple: Automatic TC

Production mode
Process regulation and monitoring by built-in machine sensor





With only minor adjustments of the heating power identical temperature profiles can be achieved independent of the loading level

Vapour Phase Reflow Soldering

IPS thermal profiling智能温度曲线编程

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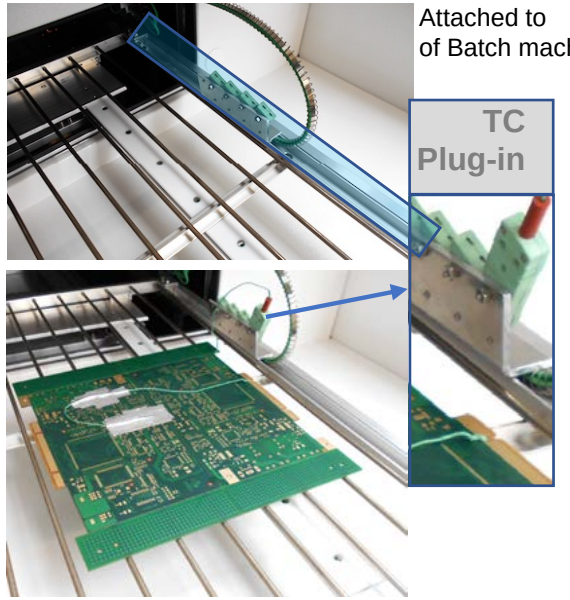
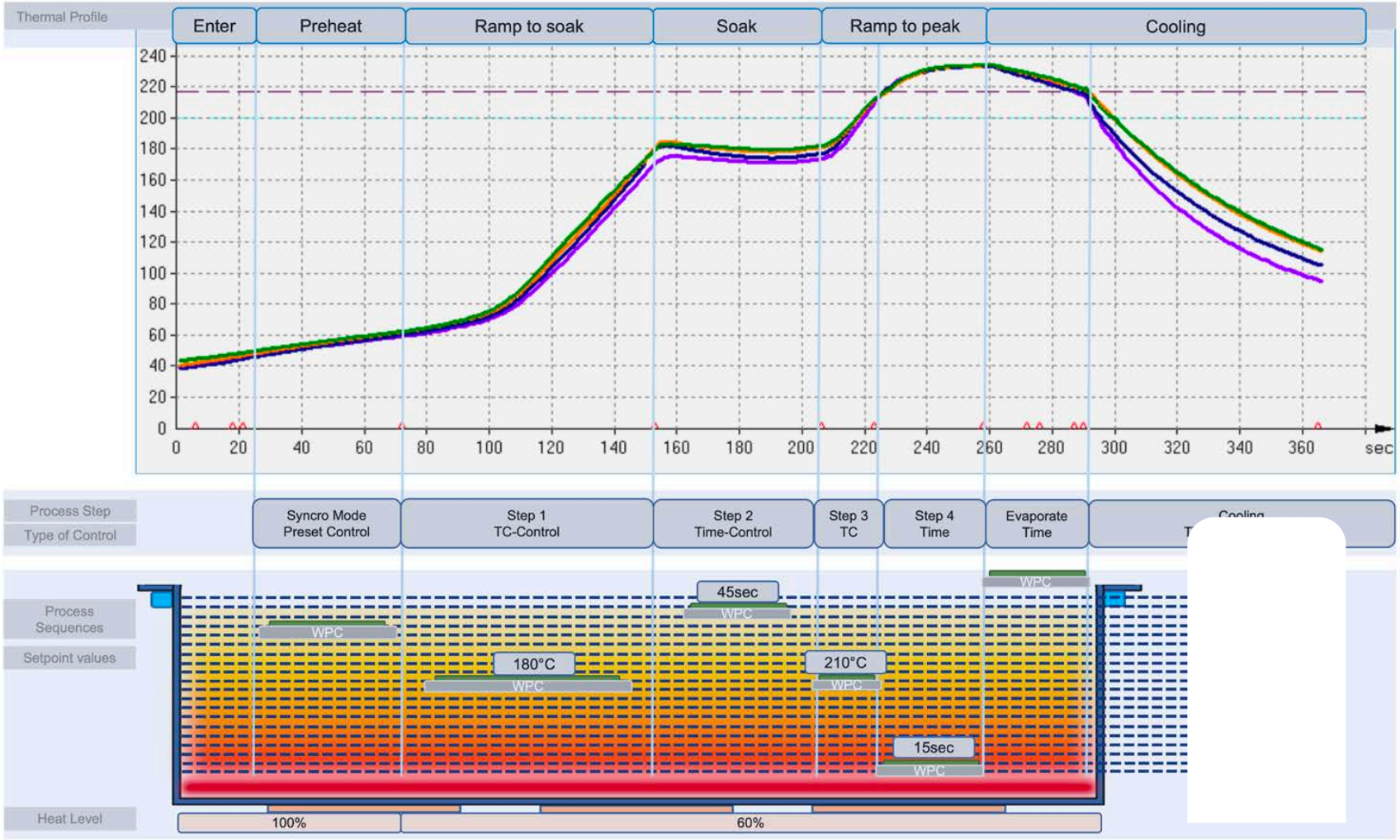
IPS Intelligent Profiling System – SVP Process and TC Control: 智能编程系统--闭环温度曲线控制(无需人工干预)

Soak type profile

温度曲线与托盘位置对应



Attached to
of Batch machine



Vapour Phase Reflow Soldering

IPS thermal profiling智能温度曲线编程

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Leading in Vapour Phase Technology

IPS Intelligent Profiling System – Thermal profile recording:温度曲线记录

- Thermocouple Plug-in 温度传感器接口
  - Simple and ergonomic plug-in of PCB thermocouples for thermal profile recording
  - The TE-Adapter is attached to the work piece carrier and offers convenient handling during the thermal profiling processes

  1-4通道托盘温度传感器转接口

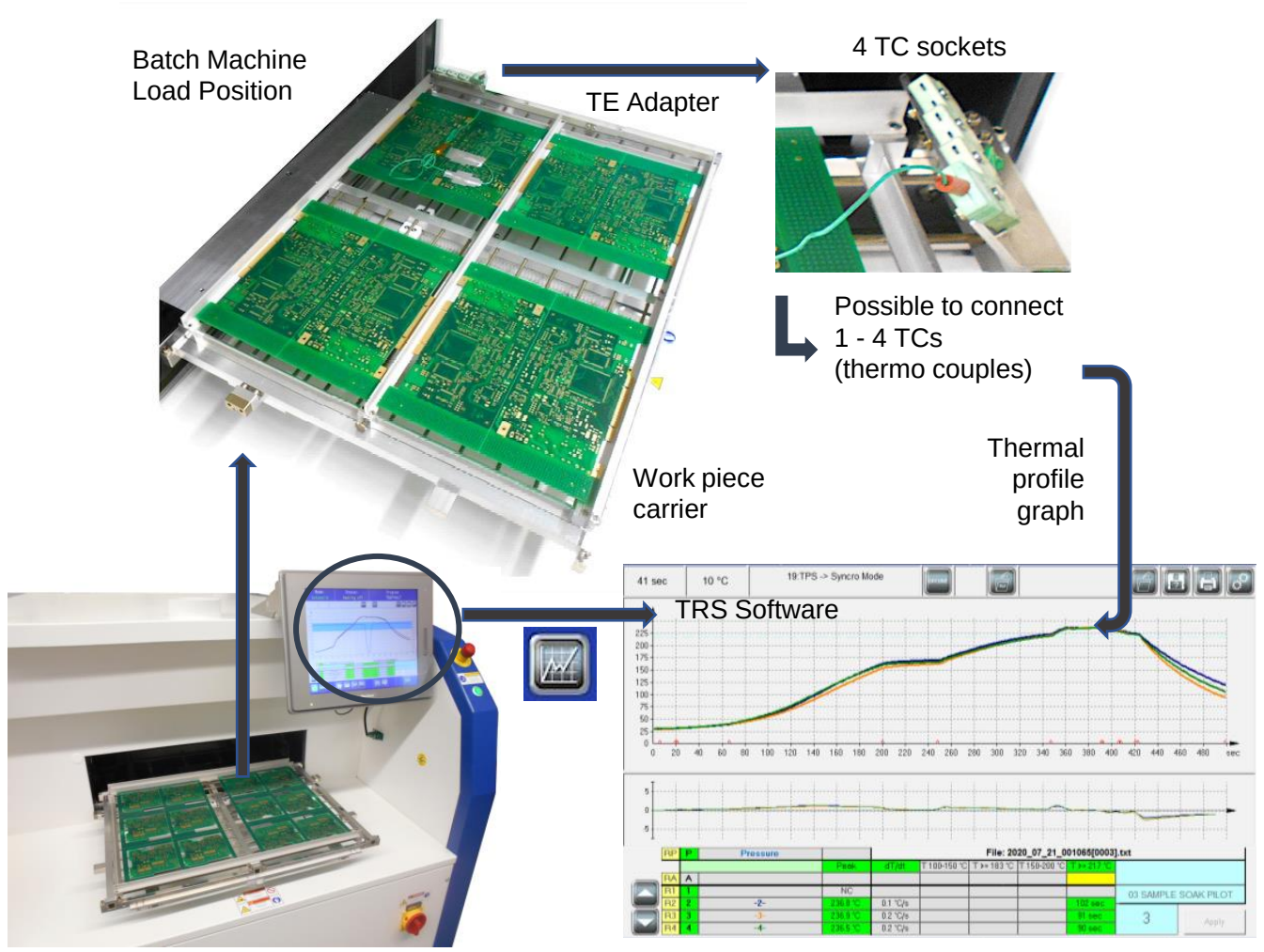
- Thermal Profile Recording温度曲线记录

- The machines can be equipped with 1 to 4 pcs of measurement channels for thermal profile recording, the thermal graph will be shown in real time at the HMI operator panel

  可选配1-4个通道温度曲线实时显示、记录和分析

- One channel can be used as Pilot Mode, the PCB temperature will then control the soldering cycle -

  其中任意一个通道温度可用于闭环控制，完成焊接流程



Vapour Phase Reflow Soldering

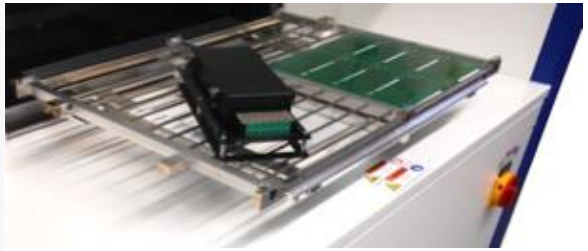
IPS thermal profiling 智能温度曲线编程

VAC745 / VAC765

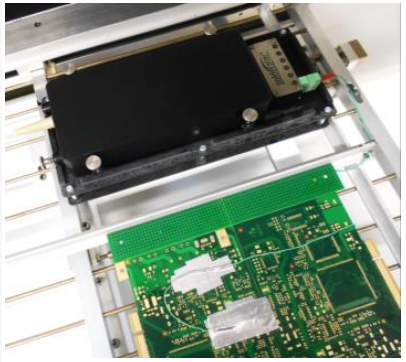
Leading in Vapour Phase Technology

IPS Intelligent Profiling System – Profile recording during vacuum phase: 真空汽相温度曲线

- Thermal Profiling during vacuum phase
  - Wireless profiling system
    无线炉温测试系统
  - 6-channel system
    6通道温度传感器
  - Vapour phase and vacuum compatible
    汽相环境与真空环境兼容
  - Data interface to IBL controller to visualize the data graphs on the machine screen (HMI)
    数据集成处理和显示到控制软件



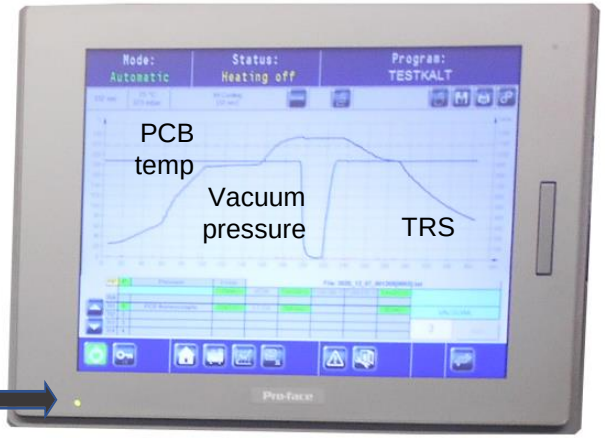
Latest generation vapour phase and vacuum compatible system

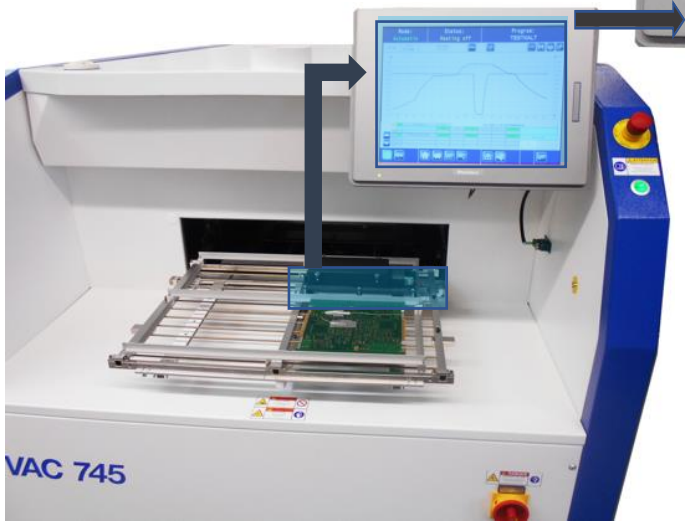


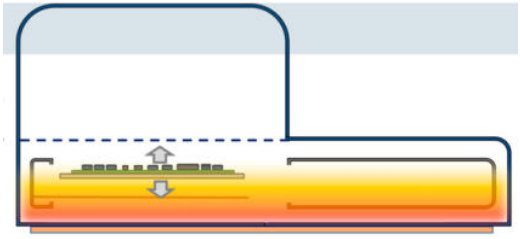
Sender unit on work piece carrier

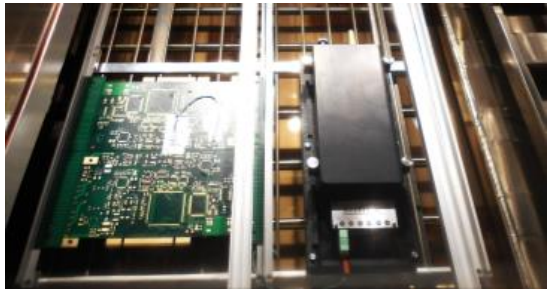
TC from PCB connected

Machine HMI

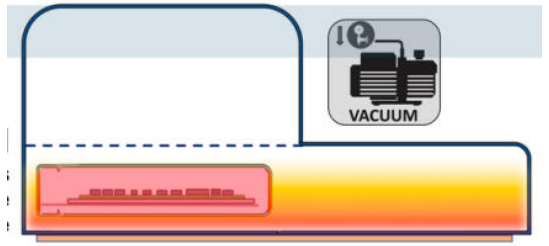








Work piece carrier in process area



Vapour Phase Reflow Soldering

IPS thermal profiling 智能温度曲线编程

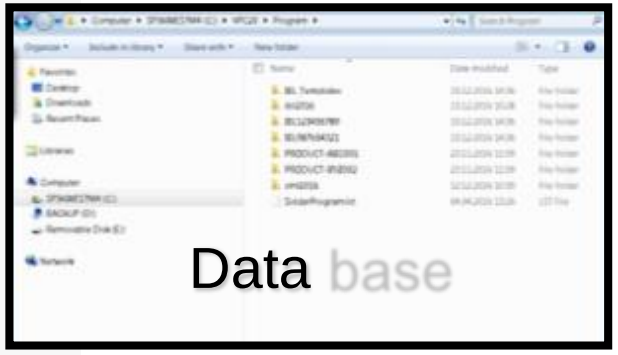
VAC745 / VAC765

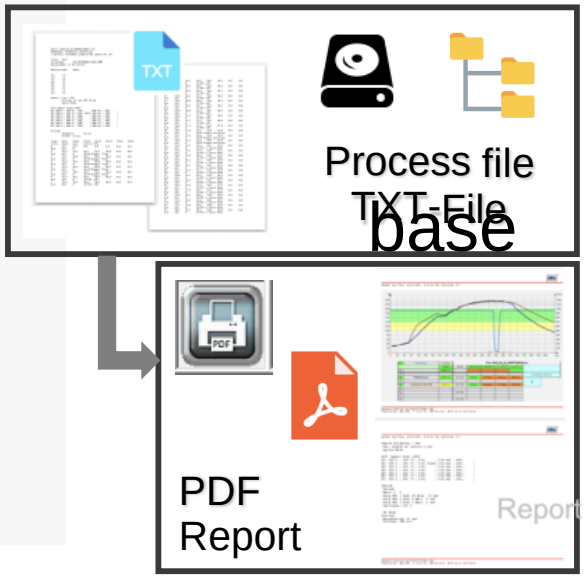
Leading in Vapour Phase Technology

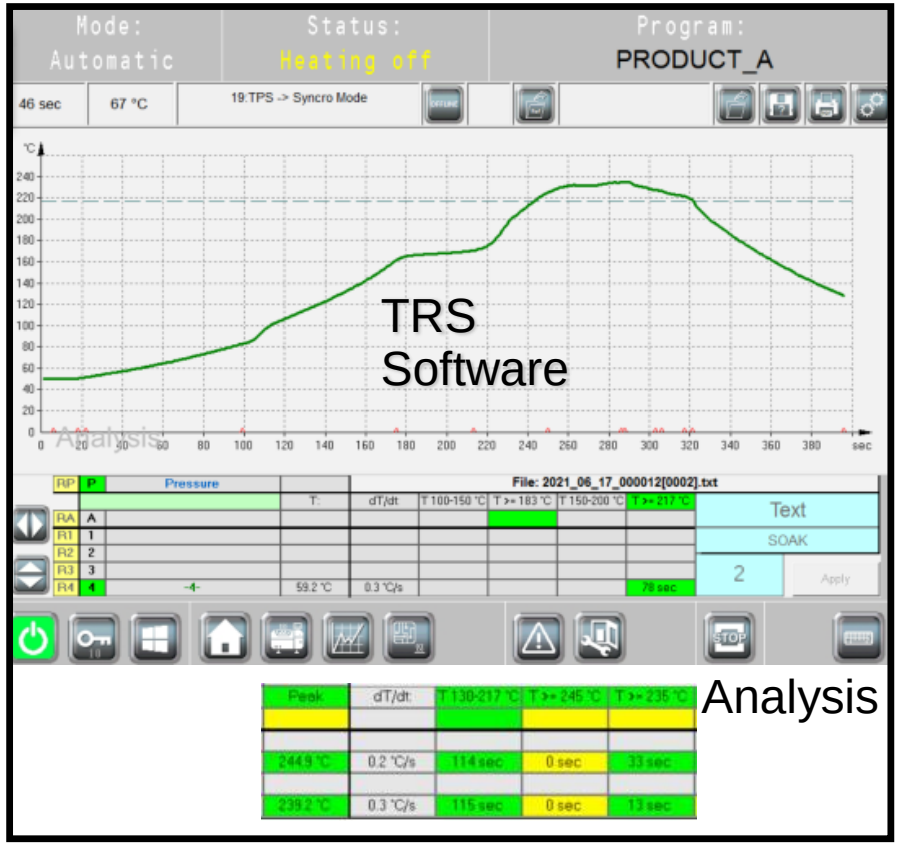
IPS Intelligent Profiling System – Profile analysis and report: 温度曲线分析和记录软件

- TRS Temperature Recording and Analysis Software
  - Thermal profile analysis and documentation
    温度曲线分析数据文件
  - PSF Program step feedback
    PSF程序步骤反馈
- Advanced process monitoring by reference thermocouple recording and process file generation
  通过实时温度记录实现过程监控和工艺数据文件生成
- Extended traceability by machine event protocol
  可扩展机器历史事件跟踪

- Process and thermal profile data report
  - Process file in txt-format, automatically generated per machine cycle 每一个焊接循环自动生成记录文件
  - PDF report function PDF文档格式
  - Data export via USB- or Ethernet-Port
    可通过网络或USB输出报告







Vapour Phase Reflow Soldering

IPS thermal profiling 智能温度曲线编程

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Leading in Vapour Phase Technology

Vacuum process description: 汽相层真空焊接流程

- Voids can have negative effects on the reliability of the electronic board assemblies and influence electric integrity as well as mechanical and thermal performance
  气泡影响焊点可靠性、机械强度、散热性能

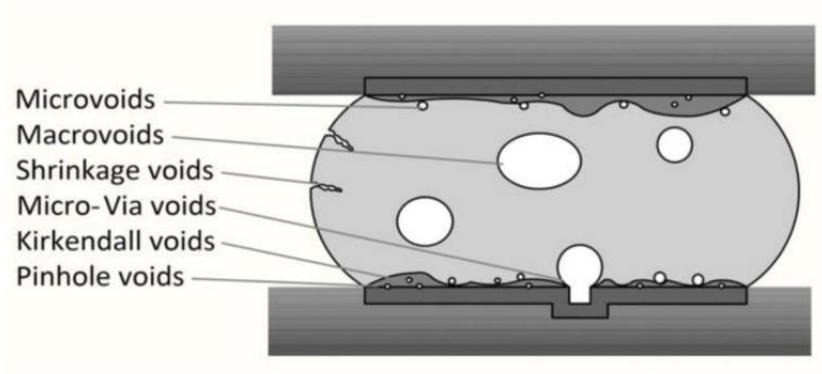
气泡危害:

- Some known negative effects and consequences of voiding 降低机械强度
  - limited dissipation of components or solder joint structures 降低机械强度
  - reduced capacitance of components 降低元件电容量
  - reduced stability against vibration 降低振动可靠性
  - limitation on the thermal transfer characteristics 降低散热性能

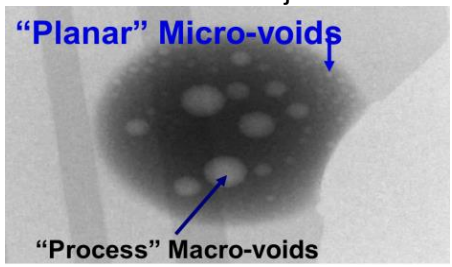
Some possible causes for voiding 气泡产生机理:

- outgasing solvents and humidity 过量溶剂及湿度
- crystalline inclusions of flux 助焊剂杂质过量
- inclusions of air below components 器件底部空隙过大
- solder paste chemistry 焊膏化学作用

Example of different type of voids:

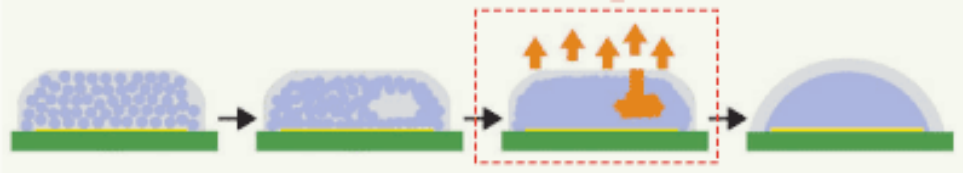


Gas voids in a solder joint

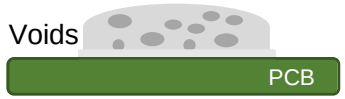


Voids in Dpak component

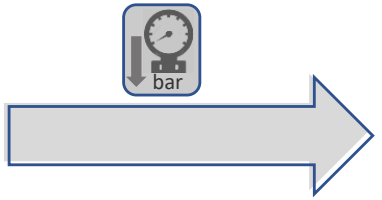
Reflow with vacuum

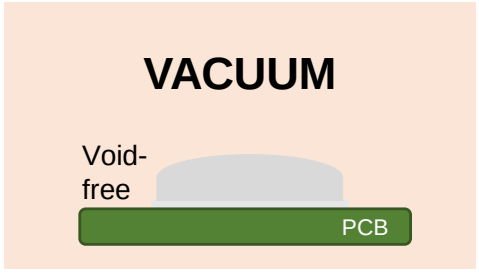


Void-free



A solution:





Vapour Phase Reflow Soldering

IPS thermal profiling 智能温度曲线编程

VAC745 / VAC765

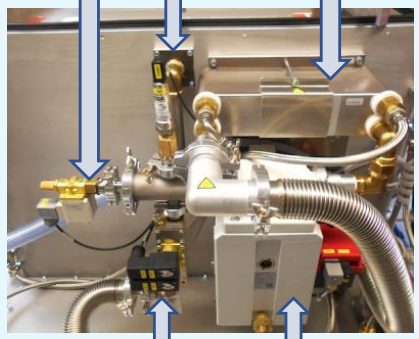
Leading in Vapour Phase Technology

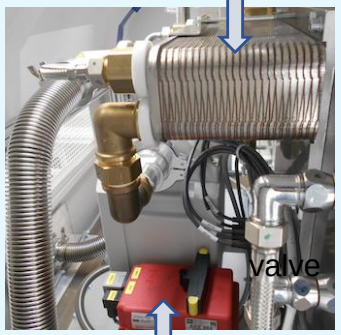
Vacuum process description: 汽相层真空焊接流程

Air venting valve

Pressure sensor

Heat exchanger vacuum system

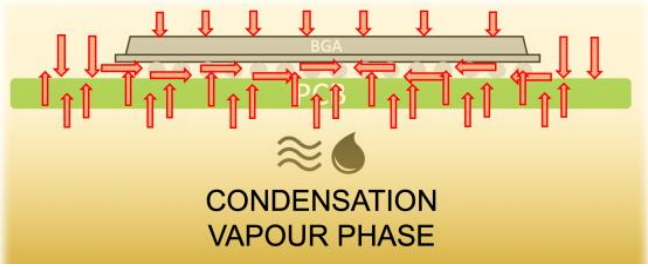




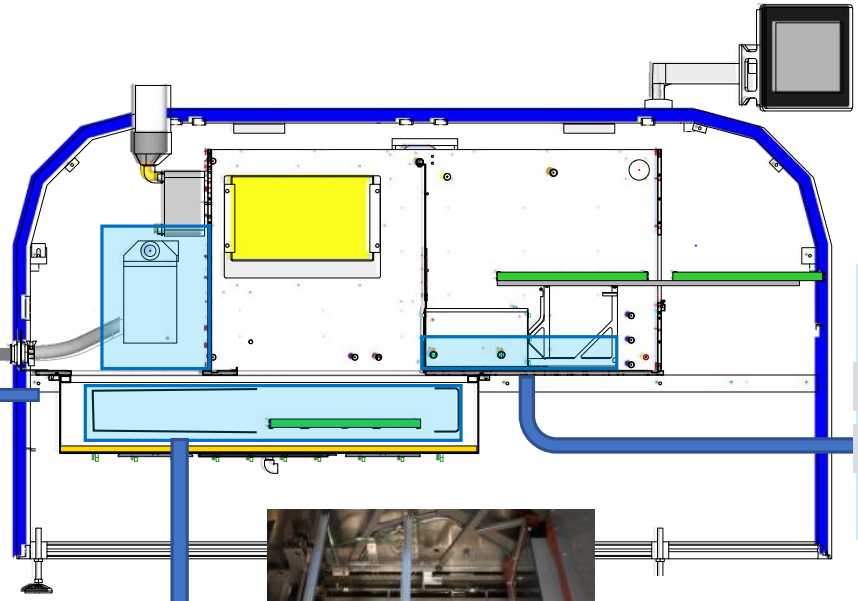
Vacuum speed valves

Medium condenser

Medium drain back



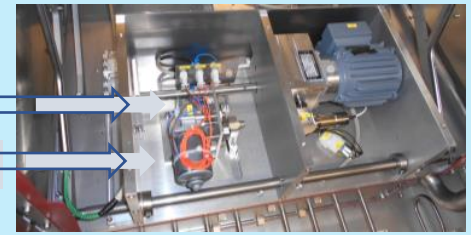
Effective heat up of challenging components, e.g. BGAs



TPS

slide switches

slide motor



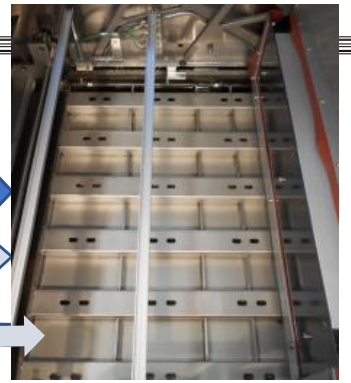
Vacuum pump

Sight glass level of lubricant

Drain out lubricant

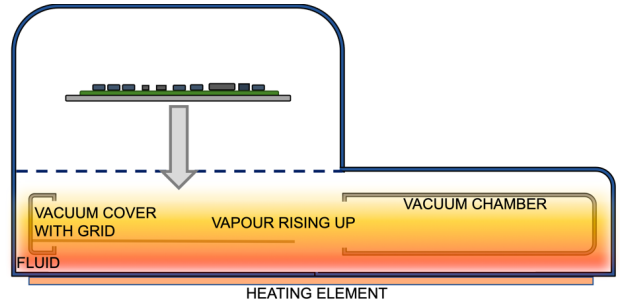
Vacuum cover

Vacuumchamber



INVAPOUR VACUUM

Vacuum chamber located in the process area



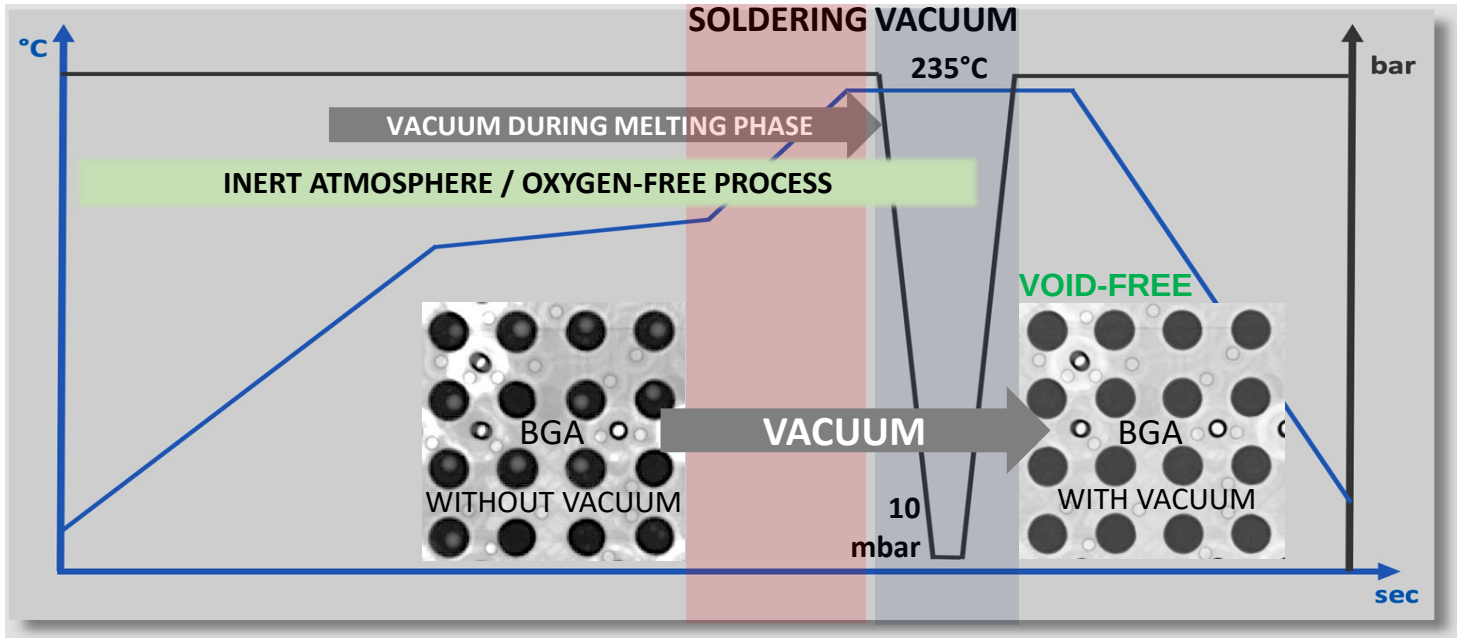
Vapour Phase Reflow Soldering

In Vapour Vacuum Technology 汽相层真空技术 VAC745 / VAC765

Leading in Vapour Phase Technology

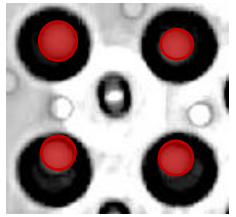
Vacuum process description: 汽相层真空焊接流程

- Evacuation of the product in the vapour phase reflow area
  - ✓ Fully inert (oxygen-free) process 完全无氧环境
  - ✓ Direct Vacuum with monitor 直接真空, 实时真空度监控
  - ✓ No loss of time or temperature 不延时不降温
  - ✓ Provides best void reduction 最佳除气泡效果

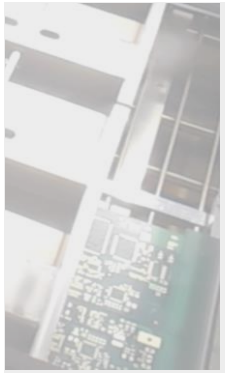


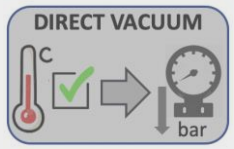
NO VACUUM:

VOIDS !

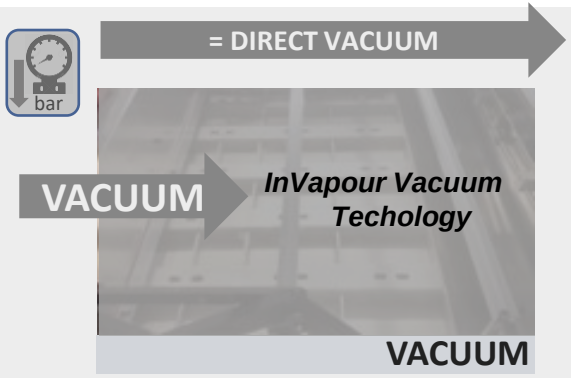


WITH VACUUM:

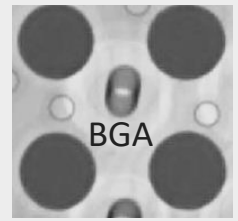




IN VAPOUR VACUUM TECHNOLOGY



VOID-FREE

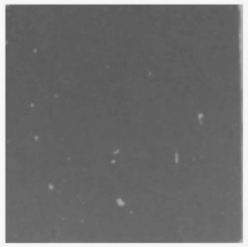
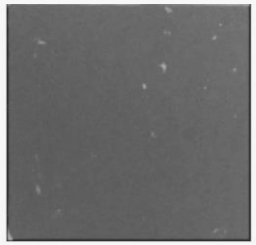


IBL vacuum technology results: 抽真空去气泡效果对比

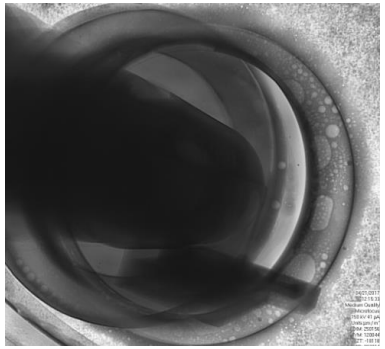
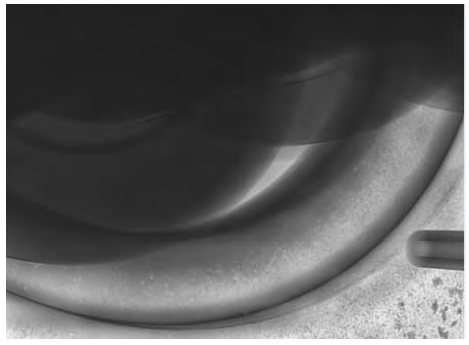
- X-ray images show a comparison between soldering with common reflow without vacuum to IBLs vapour phase reflow with vacuum 不带真空/带真空X-ray影像对比

Si-Chip soldered with SAC305 on Ni-DCB

IBL VAPOUR PHASE WITH VACUUM
25mbar

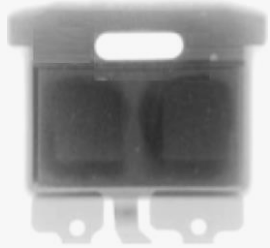
< 1% VOIDS

Dpak transistor

REFLOW WITHOUT VACUUM

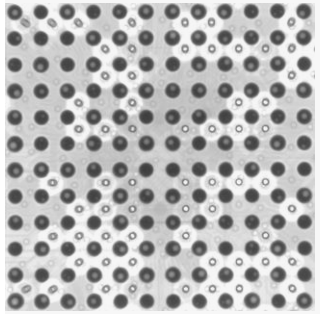
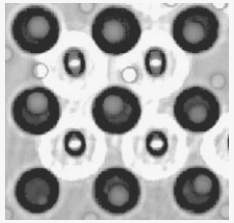
IBL VAPOUR PHASE WITH VACUUM
20mbar



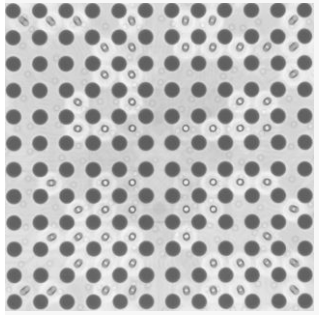
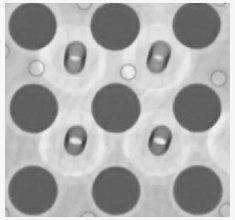
VOID-FREE

BGA

REFLOW WITHOUT VACUUM

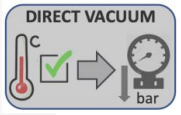
IBL VAPOUR PHASE WITH VACUUM
20mbar

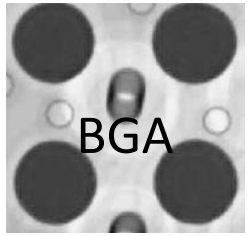
VOID-FREE

Parameter description: 灵活可调真空参数设置

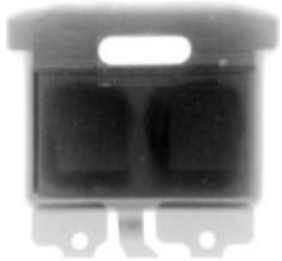
- Flexible vacuum parameter system, for each sequence following program values are available:
  - ✓ Adjustable evacuation speed 可调抽真空速率设置
  - ✓ Variable pressure setting 可调最低真空度设置
  - ✓ Adjustable dwell time 可调真空延时时间设置
- Double-Vac function, machine performing two evacuation cycles 二次抽真空功能
- Adjustable ventilation speed (after vacuum) 可调真空释放速率设置

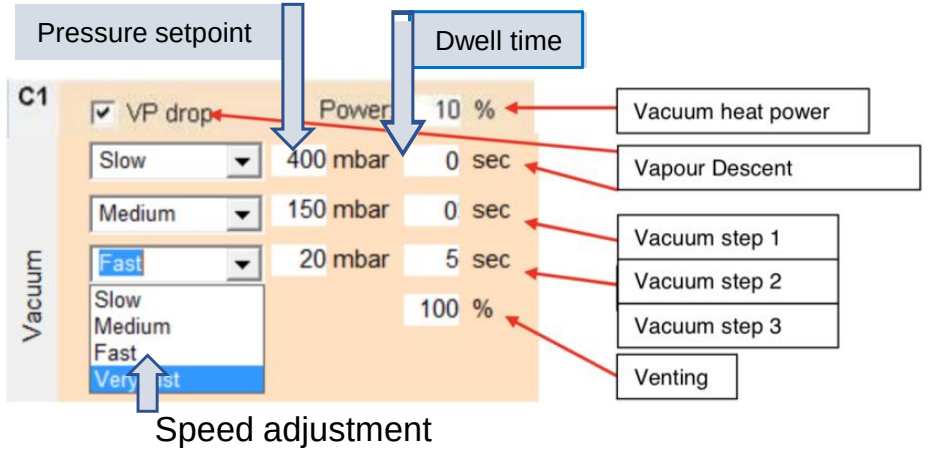


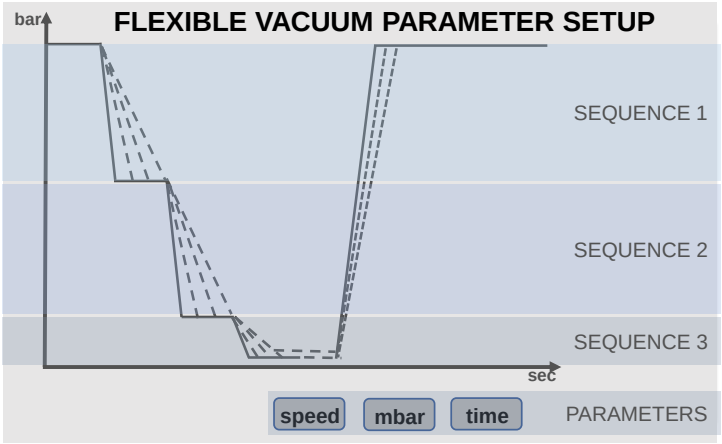
VOID-FREE

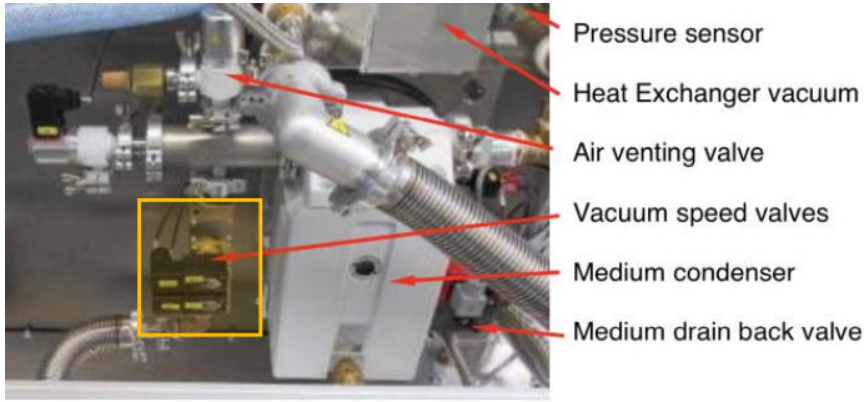


VOID-FREE









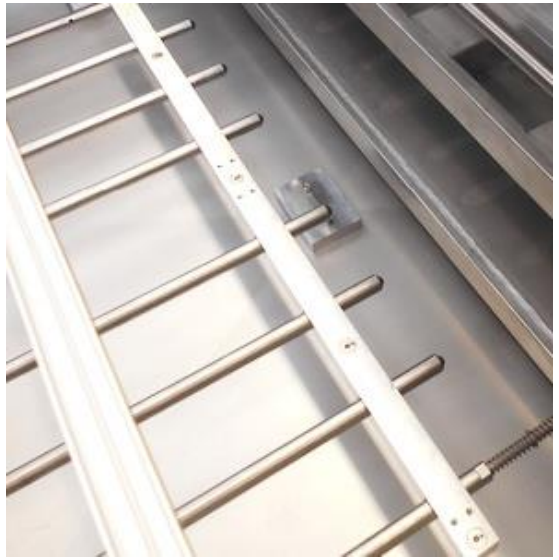
Vapour Phase Reflow Soldering

In Vapour Vacuum Technology汽相层真空技术 VAC745 / VAC765

Leading in Vapour Phase Technology

In Vapour Vacuum hardware: 汽相层真空硬件结构

- Durable design, vacuum chamber and cover out of high quality stainless steel优质不锈钢高可靠耐用设计
  - ✓ Long-lasting materials
  - ✓ Reduced maintenance efforts
  - ✓ Designed for 24/7-production
- Fluid recovery system integrated, re-condensing unit for effective fluid recovery 汽相液冷凝回收系统，有效回收抽真空过程中抽出的汽相液
  - ✓ Low fluid consumption 低汽相液消耗
  - ✓ Minimizing the running costs 低运行成本



Stainless steel vacuum chamber 真空腔体

RESEARCH & DEVELOPMENT — HIGH-END TECHNOLOGY & DESIGN

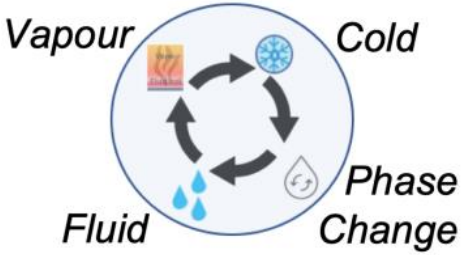
LOCAL SUPPLY — HIGH QUALITY MATERIALS LOCAL SUPPLY

High quality materials

LOWER COSTS COST SAVING — LOWER RUNNING COSTS

Re-condensing System 冷凝回收系统

Fluid Recovery



Vapour Phase Reflow Soldering

In Vapour Vacuum Technology汽相层真空技术 VAC745 / VAC765

Leading in Vapour Phase Technology

In Vapour Vacuum Technology - Process attributes 真空焊温度曲线控制

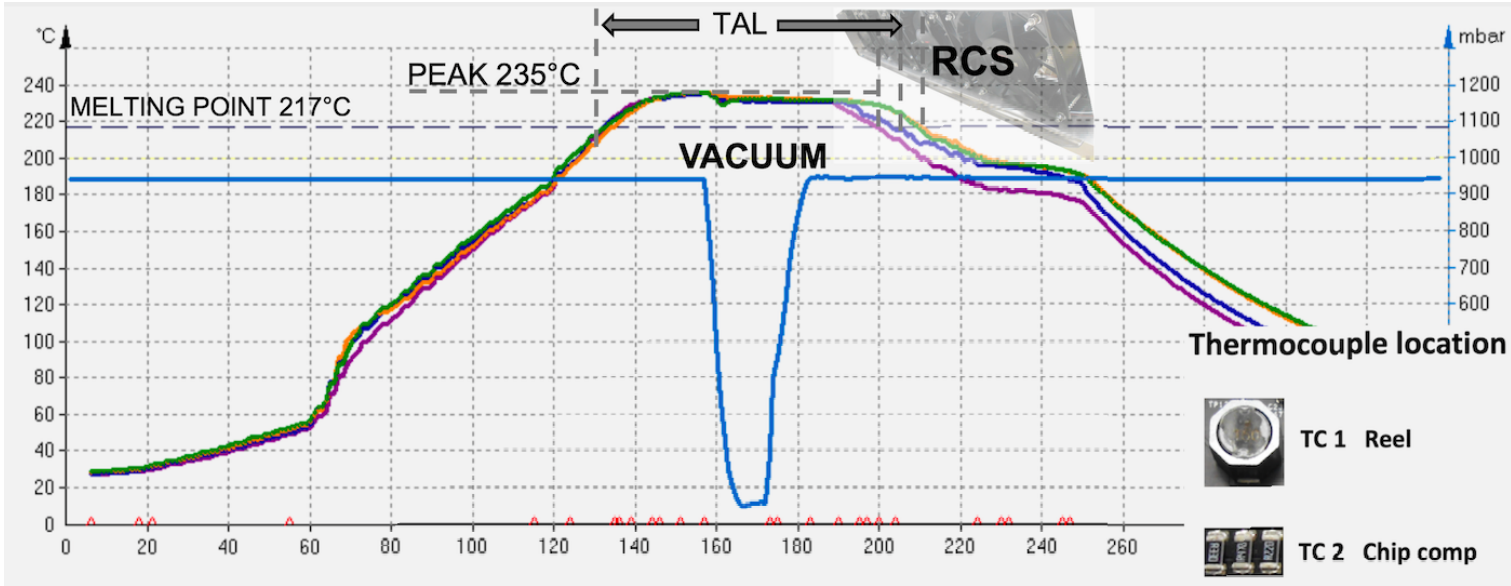
- Full thermal profile control inclusive optional RCS (Rapid Cooling System)
  全过程温度曲线显示
  - ✓ Low soldering temperature
    相对普通回流焊超低温安全焊接
  - ✓ Short time above liquidus (TAL)
    较短的液相时间TAL

PATENTED

Component	Peak temperature	TAL (T > 217°C)
TC 1 - Reel	235.6°C	67 sec
TC 2 - Chip comp	235.4°C	71 sec
TC 3 - Dpak	235.9°C	76 sec
TC 4 - IC	235.9°C	77 sec

- ✓ Rapid Cooling System to provide increased cooling power until solder paste is solid (reduce the TAL)
  SRC快速降温系统有效缩短TAL时间

APPLICATION EXAMPLE – THERMAL PROFILE
GALDEN HS235 – PEAK 235°C – VACUUM 50MBAR – RCS COOLING



P	Pressure	46 mbar					
		Peak	dT/dt:	T >= 200 °C	T 150-200 °C	T 200-232 °C	T >= 217 °C
1	TC1 Reel	235.6 °C		83 sec			67 sec
2	TC2 Chip comp	235.4 °C		94 sec			71 sec
3	TC3 Dpak	235.9 °C		99 sec			76 sec
4	TC4 IC	235.9 °C		99 sec			77 sec

Vapour Phase Reflow Soldering

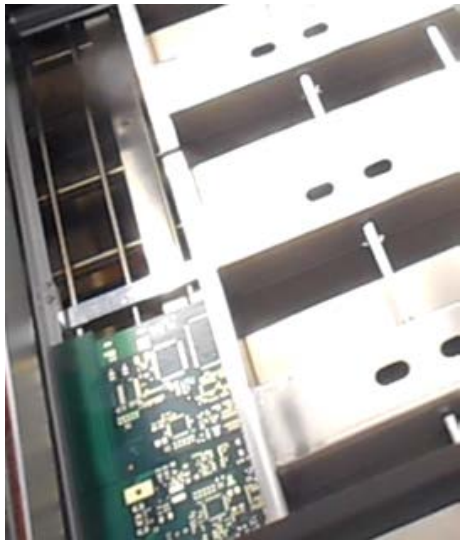
IPS thermal profiling 智能温度曲线编程控制

VAC745 / VAC765

Leading in Vapour Phase Technology

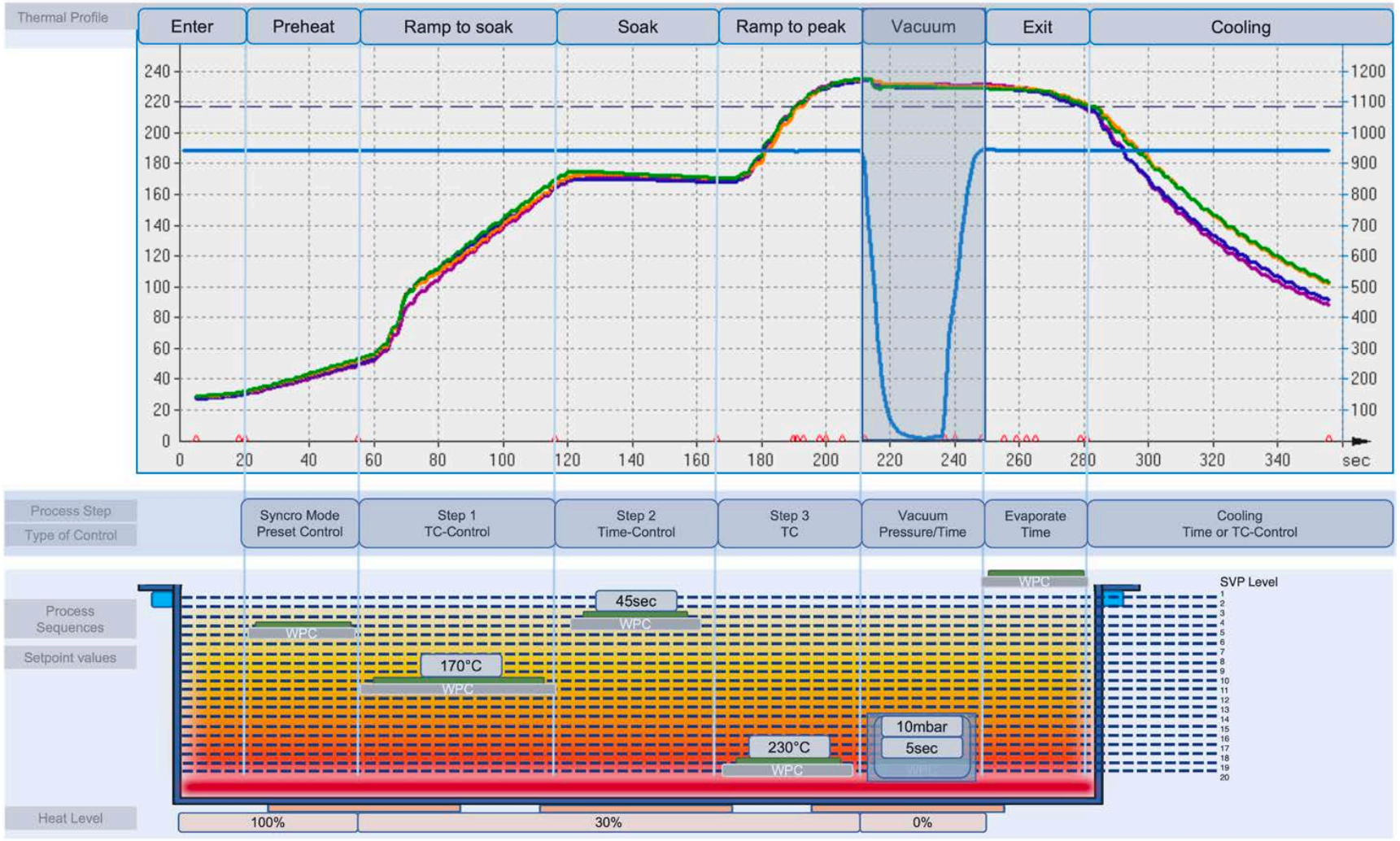
In Vapour Vacuum Technology - Process attributes 真空焊温度曲线控制

Soak type profile
with Vacuum
温度曲线与托盘位置对应



Vacuum chamber

Profiler unit on Carrier



Vapour Phase Reflow Soldering

Vacuum process extension真空焊接扩展功能 VAC745 / VAC765

Leading in Vapour Phase Technology

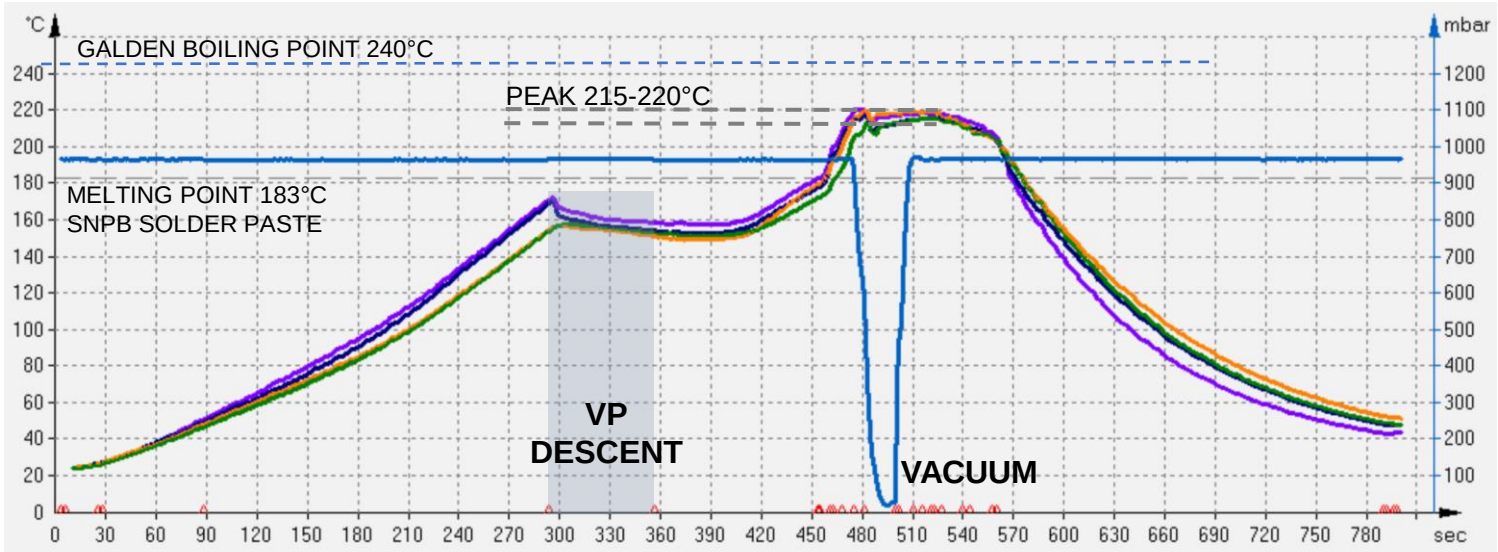
In Vapour Vacuum Technology - Process extension 二次保温技术，实现锡珠飞溅，提升焊料润湿性，实现多温度焊接

- Extended thermal profile control with optional VP-Descent-Function
  - ✓ Enables lowering of the peak temperature, e.g. for soldering two solder alloys in one machine
    用高温汽相液进行低峰值温度焊接，满足多种温度焊料灵活应用。
  - ✓ VP-Descent can be used during the soldering process to increase the thermal profile control or during the vacuum process
    汽相层强制下降功能用于抽真空焊接程序的峰值温度控制（选项）

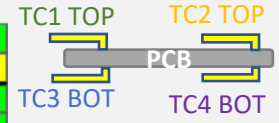
Water tank and pump

Cooling Coil

APPLICATION EXAMPLE – THERMAL PROFILE WITH VP DESCENT
GALDEN HS240 – PEAK 215-220°C – VACUUM 20MBAR



P	Pressure	17 mbar					
		Peak	dT/dt:	T 100-150 °C	T 150-200 °C	T 200-236 °C	T >= 183 °C
A		196.4 °C					
1	-1- TC4 Bot	220.5 °C					113 sec
2	-2- TC3 Bot	217.4 °C					113 sec
3	-3- TC2 Top	219.7 °C					117 sec
4	-4- TC1 Top	215.3 °C					111 sec



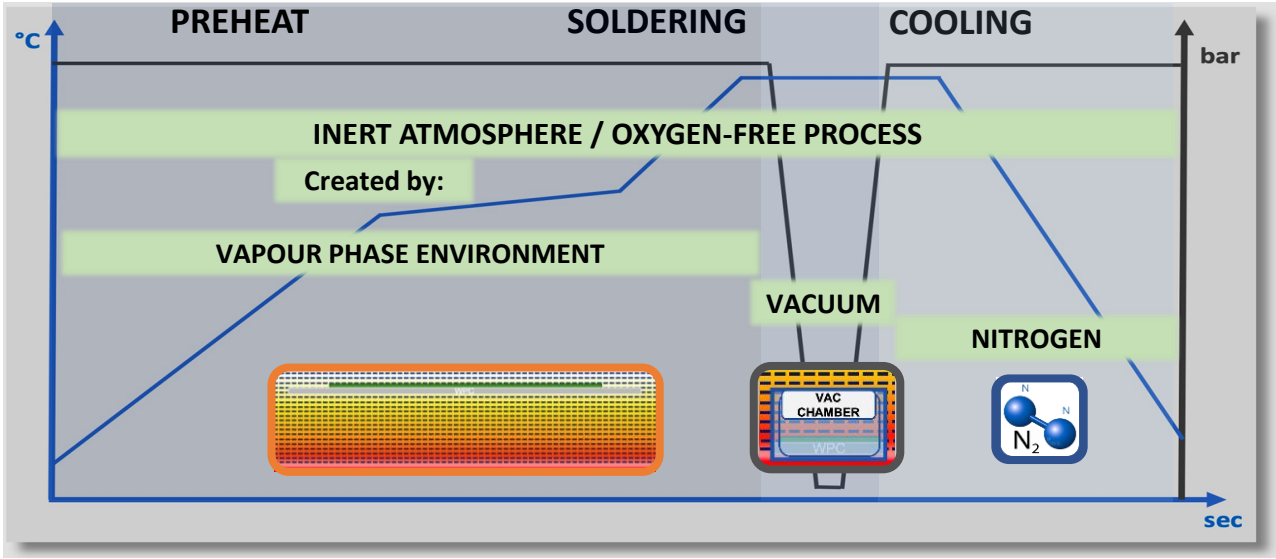
Vapour Phase Reflow Soldering

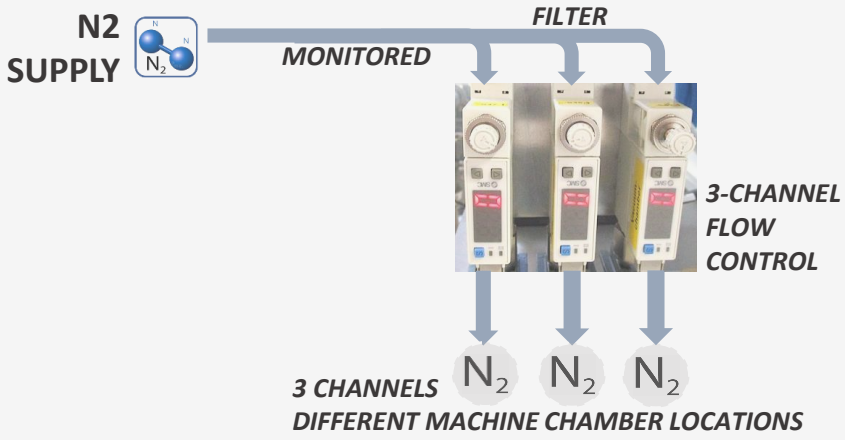
Vacuum process extension真空焊接扩展功能 VAC745 / VAC765

Leading in Vapour Phase Technology

Optional nitrogen flooding during cooling phase: 冷却区自动氮气接口控制

- To provide oxygen-free atmosphere during cooling process 冷却区氮气保护
- 3-Channel system to allow process optimization 三通道氮气接口可调控制
- Recommended to minimize the oxidation of e.g. copper surfaces at the soldering application满足半导体、大功率模块等裸铜材料焊接应用



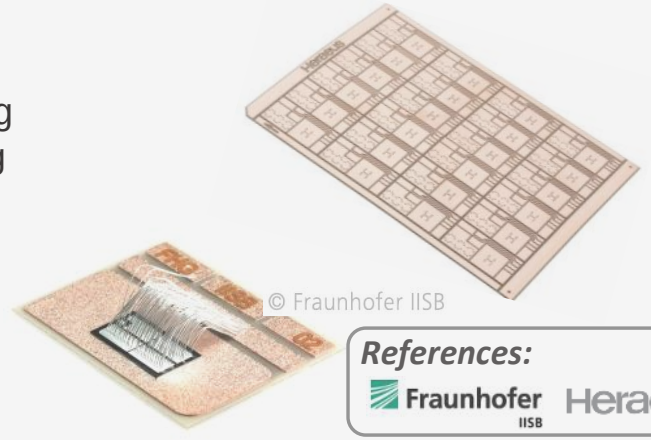


Field of applications应用领域

DBC, IGBT and Power Module soldering Applications with following wire bonding process

Soldering of single and double sided semiconductor devices

Only applications with standard tin based lead free alloys (soft soldering)



References:
Fraunhofer IISB Heraeus

Vapour Phase Reflow Soldering

Innovative Technologies & Design Excellence 特殊升级定制机型

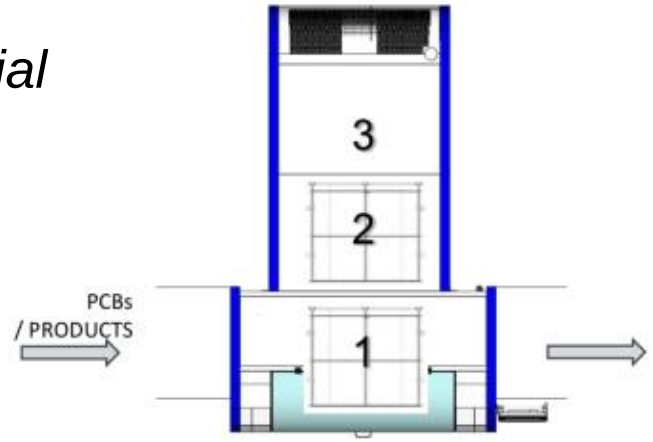
Leading in Vapour Phase Technology

Special requirements

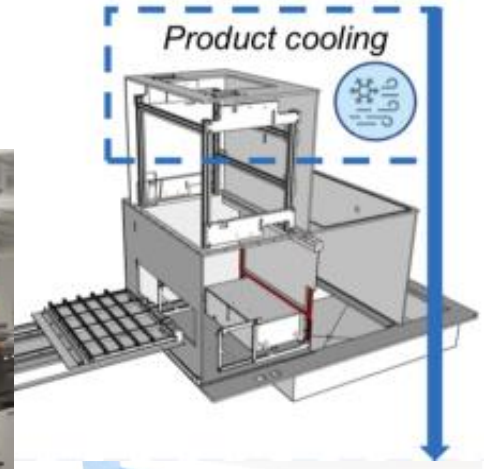
Solution

The VAC-Series offers product extension possibilities for special requirements

提高特殊功能扩展，满足用户特殊需求



VAC745HDxi



VAC 765 HHD

Technical data / Requirement Product requirement		Extension options Technical solution
High product weight (>7kg)	→	HD-Option for product weight up to 14kg
Product height above 70mm	→	Special machine models (VAC7x5H), for product height up to 120mm
Repair / Rework	→	RESY-System as option, to remove/unsolder e.g. BGAs
Glue hardening / special preheat	→	Infrared-Option, can be used to preheat or postheat the product and to realize the thermal profile for SMT-glue hardening processes

Vapour Phase Reflow Soldering

Innovative Technologies & Design Excellence 特殊升级定制机型

Leading in Vapour Phase Technology

Field of applications Line integration 全自动在线式生产

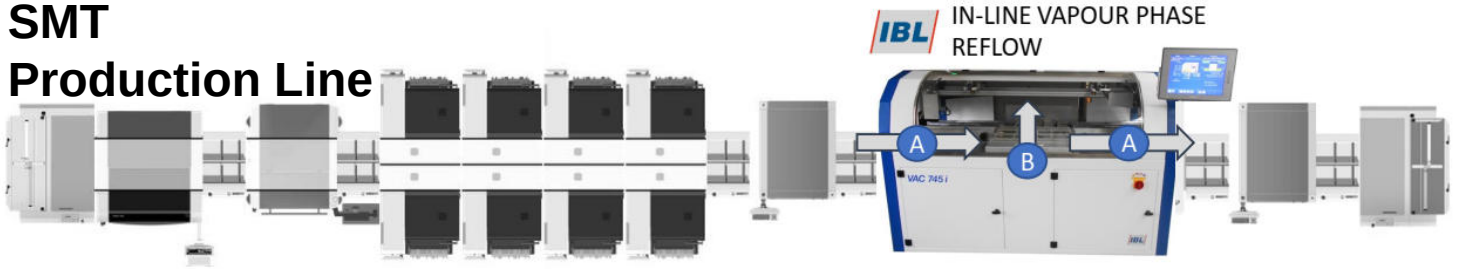
ECO FRIENDLY

LOWER COSTS COST SAVING

GENTLE PRODUCT HANDLING

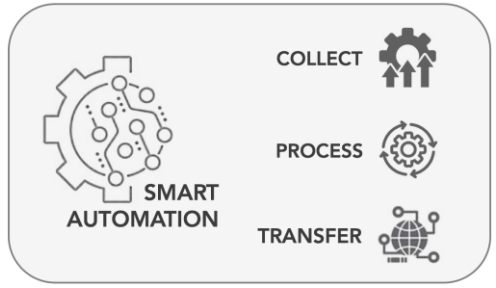
IBLs inline machines can easily be integrated to common SMT production lines, allowing a fully automated process.

SMT Production Line



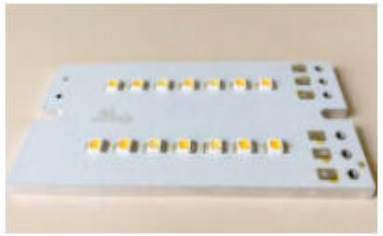
Line automation and traceability - Industry 4.0

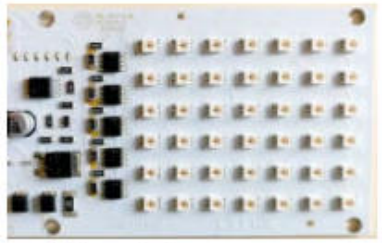
IBL developed solutions for connecting the IBL-machine to already excisting line automation systems. As well several modules and functions for the IBL-machines are available, to achieve the product and process traceability.



Vapour Phase Reflow Soldering
Field of applications 应用领域

Leading in Vapour Phase Technology



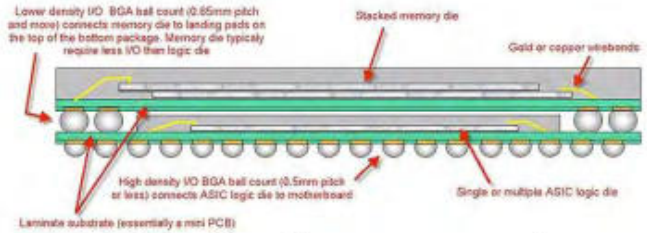


• Aluminium core PCBs are efficiently heated up, low soldering temperature leads to no discolouring of the surface 超底温焊接

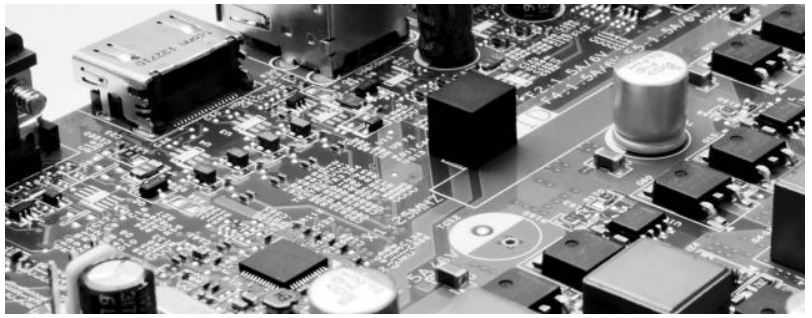
• No arrears at lenses of LEDs

• No DeltaT in the peak temperature, homogeneous and efficient heat transfer 无温差

• Perfect for BGAs, LGAs, CGAs, Package on Package (PoP), Flip Chip Packages,....



• Challenging components or applications can be soldered with the vapour phase reflow 大热容量器件 (e.g. Heat sinks, reels, ceramics, metal cores or backplanes)



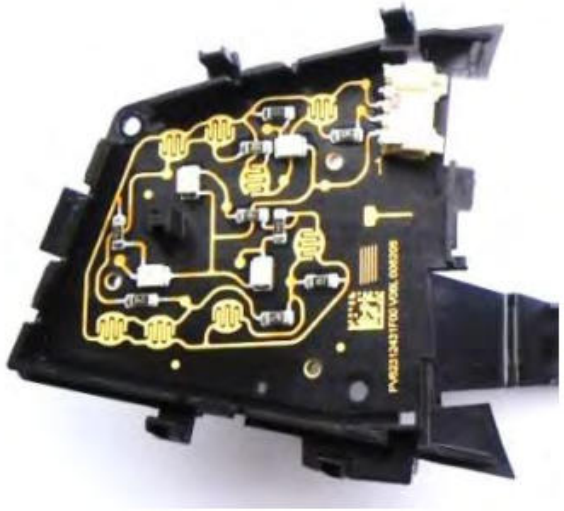
Vapour Phase Reflow Soldering

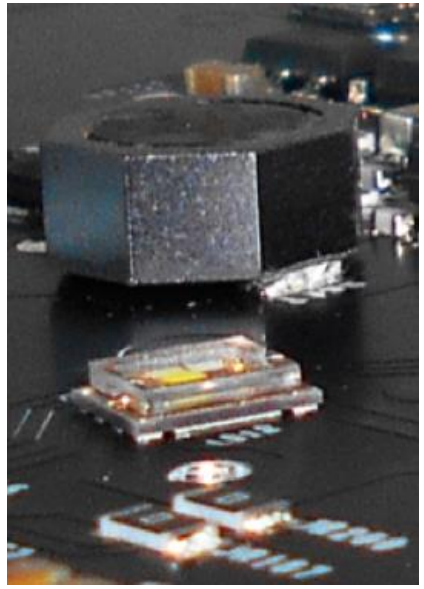
Field of applications 应用领域

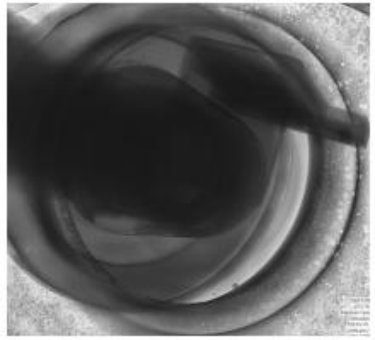
Leading in Vapour Phase Technology

- Soldering of plastic applications
- PA6GF20 plastic
- SAC305 alloy
- No deformation of the plastic

超低温塑料工件焊接应用

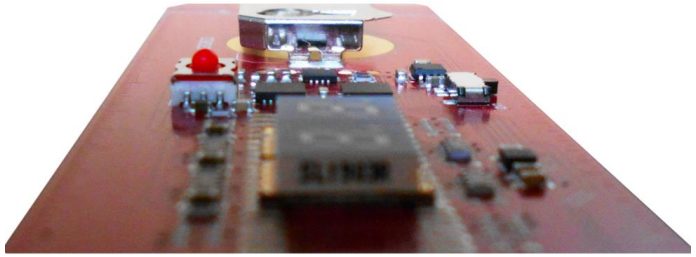






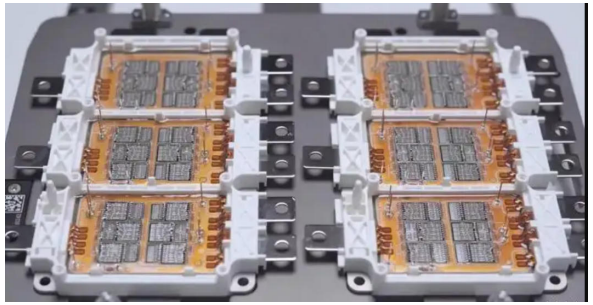
- 3DMID applications
- Vapour phase process is used due to equal peak temperature

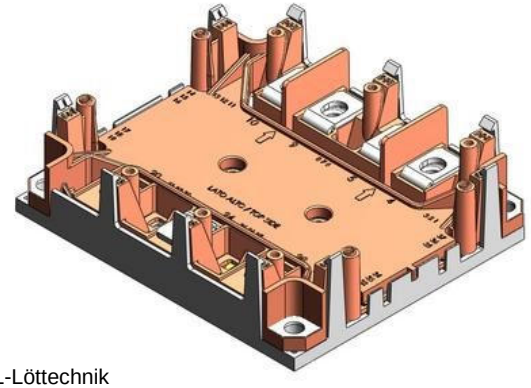
无温差安全焊接



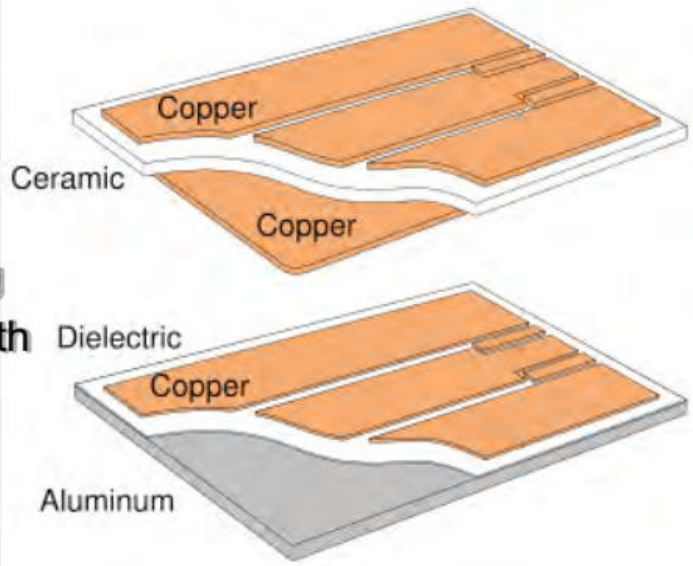
Vapour Phase Reflow Soldering
Field of applications 应用领域

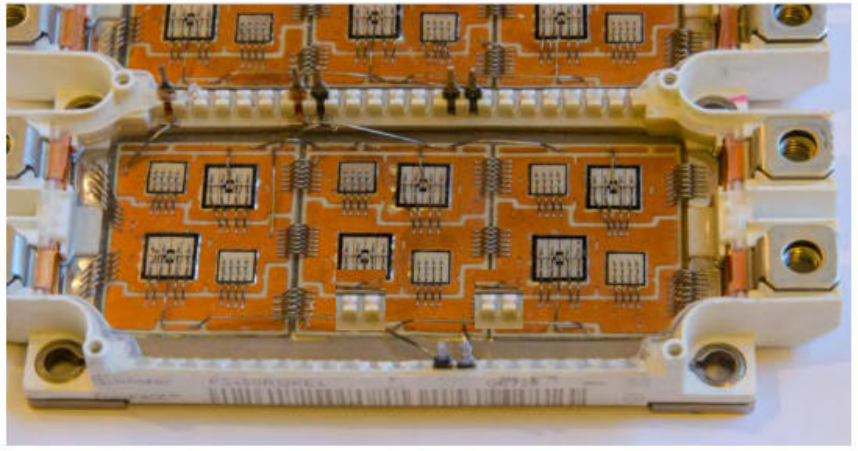
Leading in Vapour Phase Technology





- DBCs, IGBTs, power electronics, semiconductors can be soldered in the vapour phase machine due to efficient and homogenous heat transfer
- Power modules with baseplate is the standard design
- DBC (Direct Bond Copper) is the most common packaging
- DBCs are soldered in the vapour phase reflow machine with a peak temperature of **235-240°C (for SAC305 alloy)**
- Common failures like thermal stress or expansion are avoided due to low CTE (coefficient of thermal expansion)





- DBC with bottom press-fit pins and phase change materials

Vapour Phase Reflow Soldering

VAC745 / VAC765

Leading in Vapour Phase Technology

Summary 总结

VAC – Premium Vacuum Soldering Machines

1 **Design and construction**
Attributes and benefits

设计与组成
特性和优点

- Solid design with integrated fluid recovery 集成液体回收设计
- Long-lasting materials and construction 耐用材料与结构
- Vibration-/Maintenance-free transportsystem 无振动免维护传输系统
- Fluid filter system and easy access to process chamber
气相液过滤系统、易于清理焊接腔

Benefits 优点

- Operator comfort and low fluid consumption 操作舒适、气相液消耗低
- Low maintenance efforts and long life-time 长寿命、维护工作量低
- High product reliability and low maintenance efforts 高可靠性
- Simplifying the maintenance works 维护工作简单

Summary 总结

VAC – Premium Vacuum Soldering Machines

2

Patented vacuum process
Attributes and benefits

专利的汽相层真空技术
特性和优点

- High-end technology, vacuum in process area 高端技术、在焊接区抽真空
- Direct Vacuum, vacuum directly after the soldering 在回流后直接抽真空
- Flexibel vacuum parameter setup 真空参数设置灵活
- Pressure monitoring during vacuum process 抽真空过程中，压力监控

Benefits 优点

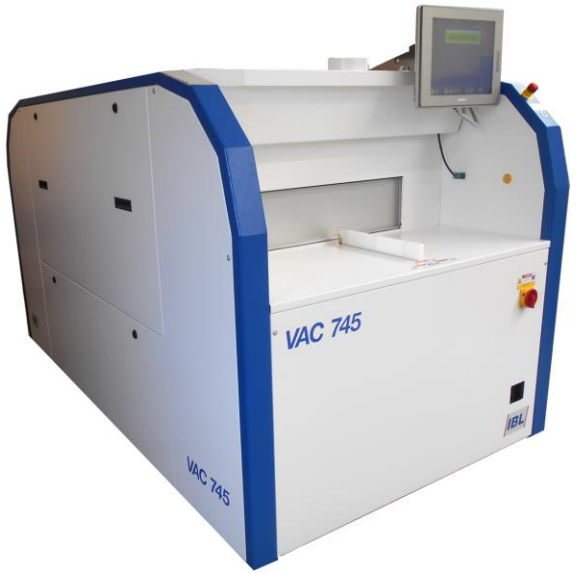
- High product quality and reliability 高质量和可靠性
- Low “Time above liquidus“ and fully inert process 低TAL时间，完全惰性环境
- High process and optimization flexibility 工艺优化、灵活
- Important part for process and production monitoring 重要工艺、产生监控

Summary 总结

VAC – Premium Vacuum Soldering Machines

3 **Machine control and monitoring**
Attributes and benefits
设备系统控制和监测
特性和优点

- 15“ HMI Multitouch **15**寸多点触摸屏
- Combinated Soft-PLC / PC - Controller 集成**PLC**软件和**PC**控制
- User Manager 用户管理
- Maintenance Manager 维护管理



Benefits 优点

- Clear and convenient operation and process monitoring 清晰方便操作、过程监控
- Permanent data collection and network capability 永久数据采集、可用网络
- Traceable login system incl. password protection 登录系统密码保护
- Preventive Maintenance incl. documentation 预防性维护包含文档

Summary 总结

VAC – Premium Vacuum Soldering Machines

4 **Process control and monitoring**
Attributes and benefits
焊接工艺控制和监测
特性和优点

- IPS SVP Gradient control **IPS SVP**温度斜率控制
- IPS TC Process control **IPS TC**温度控制
- Automatic TC Process monitoring 自动**TC**过程控制
- TRS Temperature Recording and Analysis Software **TRS**温度记录和分析系统

Benefits 优点

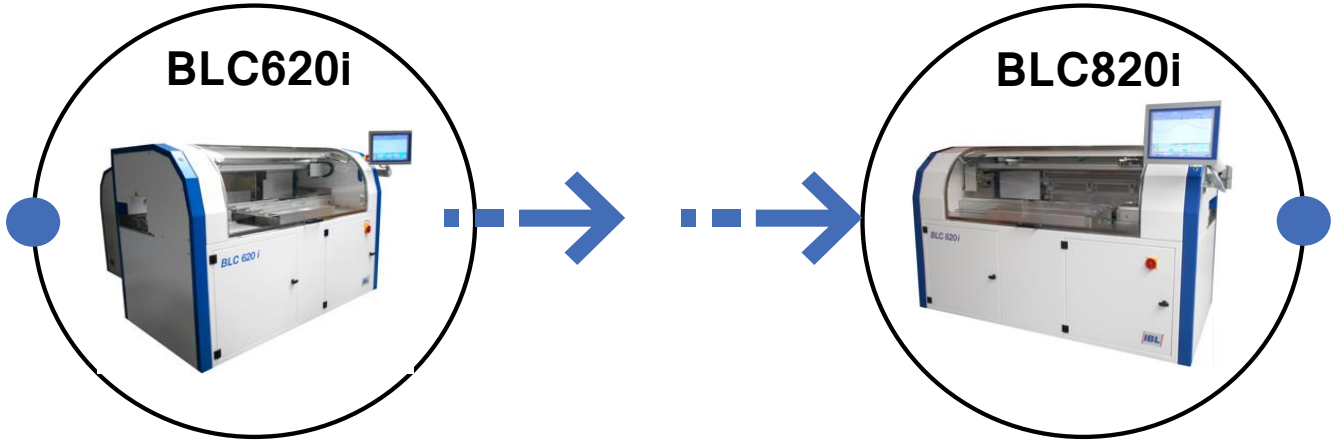
- Precise and repeatable modification of gradients 斜率修改精确可重复
- Targeted and simple process and profile generation 温度曲线生产简单
- Professionel process and product traceability 专业的过程和生产可跟踪
- Process data collection and analysis, report function 过程数据采集、分析、报告功能

Products Premium Line 产品线机型选择(单机式)

PREMIUM BATCH

Model	BLC420	BLC620	BLC820
Type	Batchsystem	Batchsystem	Batchsystem
Work size	450x540mm	650x540mm	850x540mm
Ø Power rate	2,5kWh	3kWh	3,5kWh

Products Premium Line 产品线机型选择（在线式）



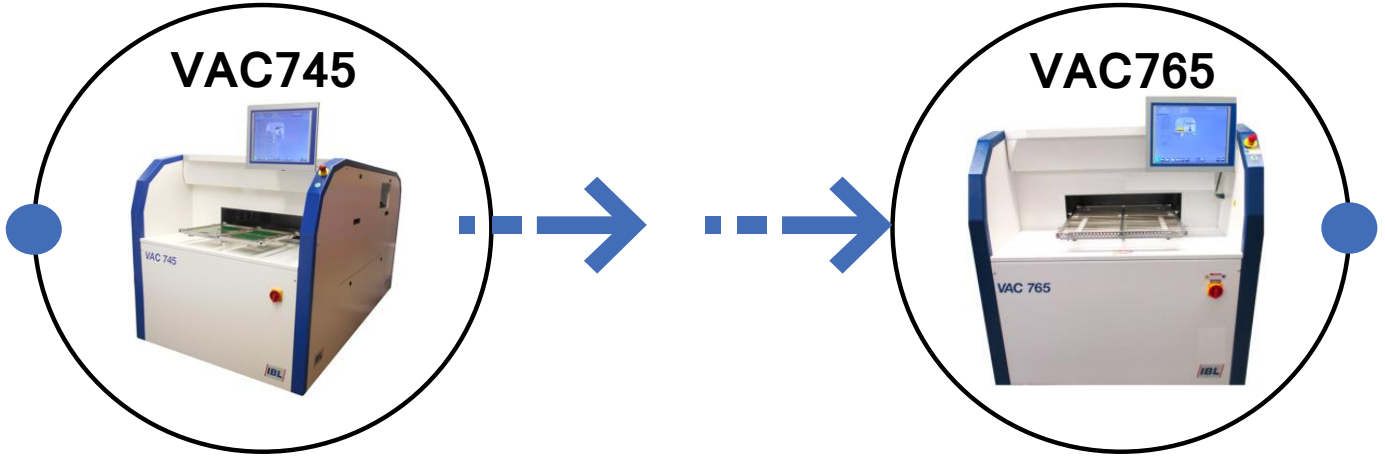
PREMIUM
INLINE

Model	BLC620i	BLC820i
Type	Inlinesystem, 1-carrier	Inlinesystem, 1-carrier
Work size	650x540mm	850x540mm
Max infeed size	630x400mm (optional 500mm)	630x400mm (optional 830x500mm)
Ø Power rate	3kWh	3,5kWh

Products Premium Line 产品线机型选择(单机式真空汽相)

PREMIUM

BATCH



Model	VAC745	VAC765
Type	Batchsystem	Batchsystem
Work size	635x444mm	635x644mm
Ø Power rate	5,5kWh	6kWh

Products Premium Line 产品线机型选择(在线式真空汽相)

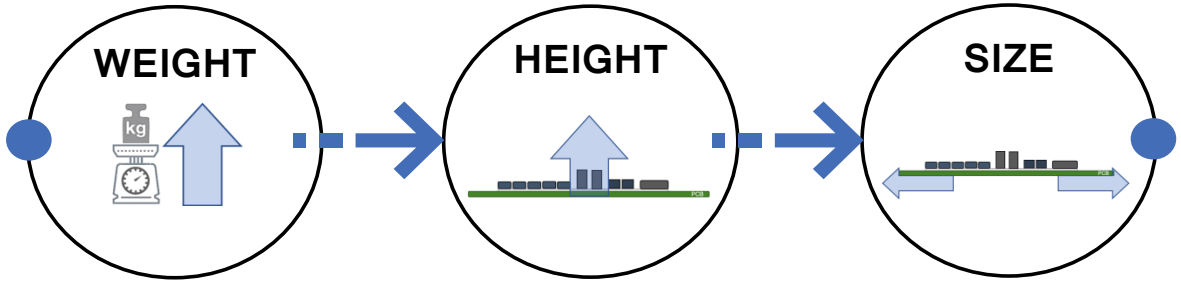
PREMIUM
VACUUM
INLINE

Model	VAC745i	VAC765i	VAC745HDxi
Type	Inlinesystem, 1-carrier	Inlinesystem, 1-carrier	Inlinesystem, 2-carrier
Work size	635x444mm	635x644mm	635x444mm
Max infeed size	630x400mm	630x400mm (optional 500mm)	630x400mm
Ø Power rate	5,5kWh	6kWh	6kWh

Products Premium Line 选型相关要数

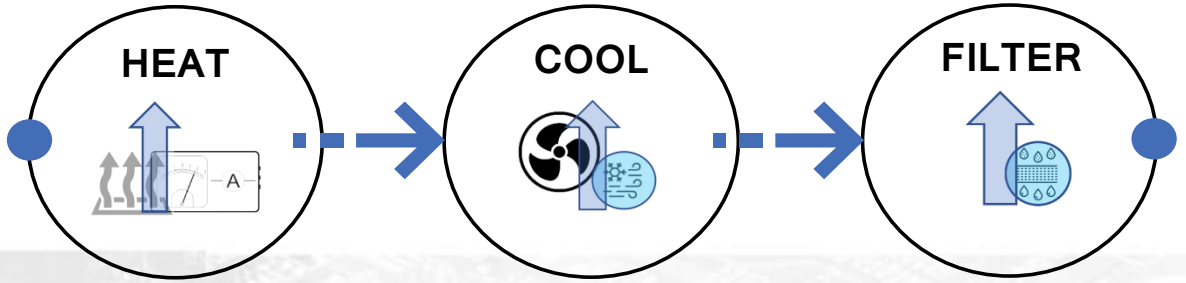
Customized Solutions

We are happy to work on a possible solution in case of customized requirements



PRODUCT REQUIREMENTS 产品要求

Solutions for increased:	Product weight 重量	Product height 产品高度	Product dimensions 产品尺寸



EQUIPMENT REQUIREMENTS 设备要求

Solutions to increase:	Heat capacity 加热效率	Cooling capacity冷却效率	Filter capacity过滤效率

Vapour Phase Reflow Soldering

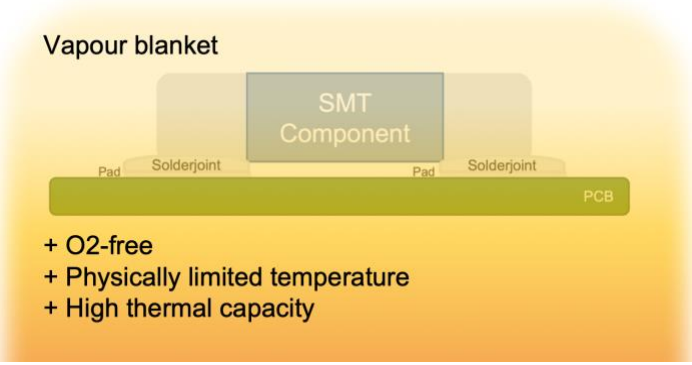
VAC745 / VAC765

Leading in Vapour Phase Technology

Products Premium Line 汽相液选型相关要数

Which soldering temperature range does VP soldering cover ?

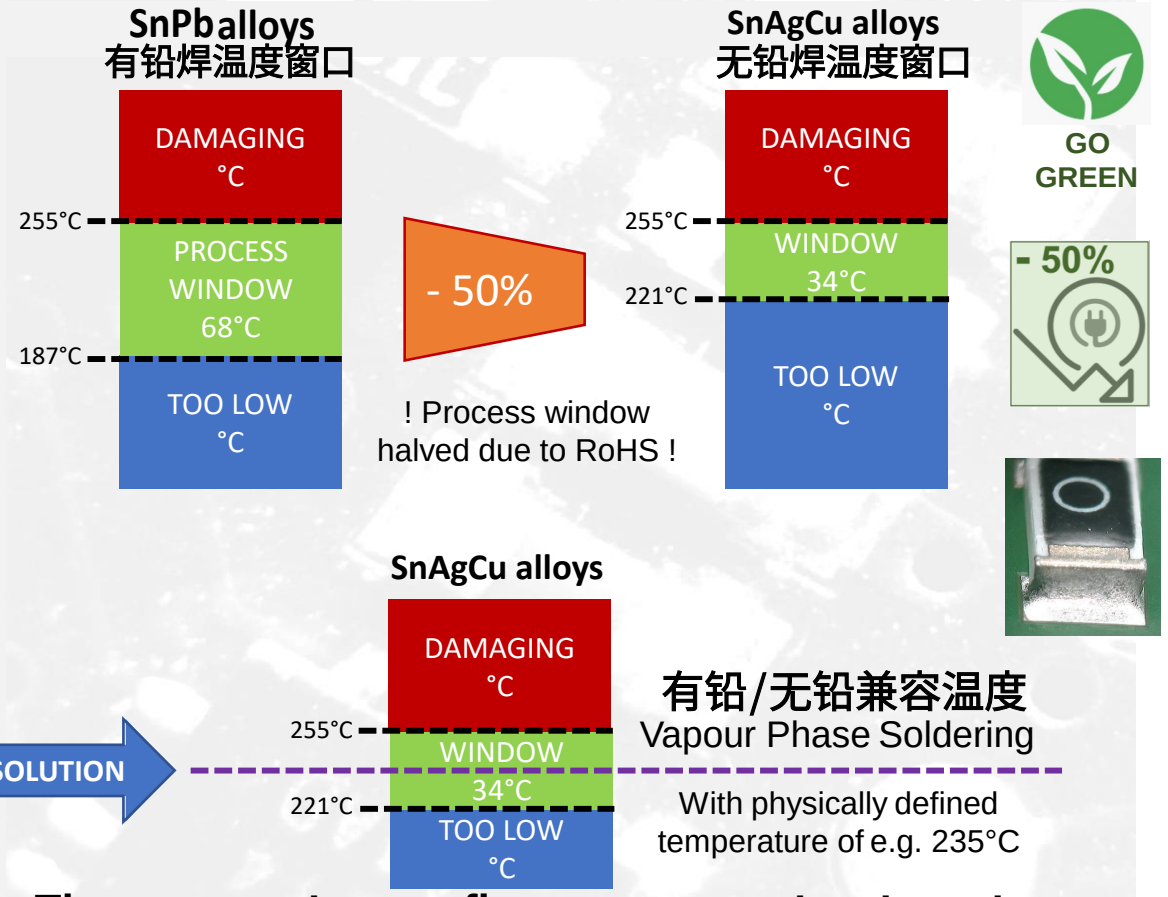
- Maximum temperature 260°C
- Common temperature range 230-240°C
- Also available: 165°C or 215°C



IBL PFPE 汽相液体技术参数

项目 / 型号	单位	LS200	LS215	HS 235	HS 240
沸 点	℃	200	215	235	240
密度，25℃	g/cm^3	1.79	1.80	1.82	1.82
动力学粘度，25℃	cst	2.50	3.80	4.40	5.30
蒸汽压，25℃	Torr	<1	$<10^{-1}$	$<10^{-2}$	$<10^{-2}$
蒸发热@沸点	Cal/g	15	15	15	15
表面张力，25℃	Dynes/cm	19	20	20	20
平均分子量	A.m.u.	870	950	1020	1085

SMT Surface Mount Technology



The vapour phase reflow process solve these issues

IBL 有铅/无铅兼容汽相焊接解决方案

Vapour Phase Reflow Soldering

VAC745 / VAC765

Leading in Vapour Phase Technology

Innovative Technologies & Design Excellence

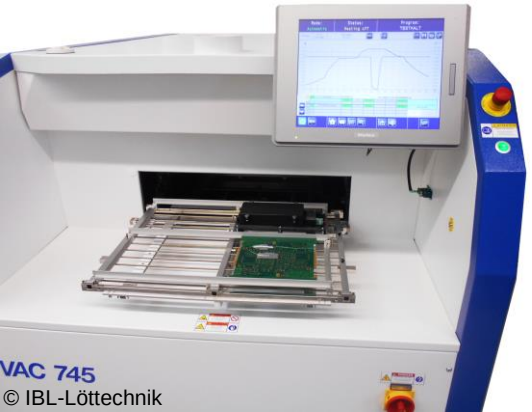
Vacuum Vapour Phase Soldering

★ User experience 用户体验反馈

Newtec
BELGIUM

ST Engineering

“We selected IBL for various reasons. But the most important ones were the stability of the soldering results, the robustness and build of the machine, and the state of the art patented systems that give a real added value to our production quality.”



ThalesAlenia Space
a Thales / Leonardo company
FRANCE

“Since 2013, we invested in different vapour phase machines from IBL. From the first tests we were convinced by the soldering results with a significant reduction in the percentage of defects on our SMD line, the quality of the machine, the support and the technical knowledge of the stuff from IBL and their local sales partner.“

Nicolas MALGOUYRES, SMT Process Specialist
Thales Alenia Space Toulouse

Vapour Phase Reflow Soldering

VAC745 / VAC765

Leading in Vapour Phase Technology

Innovative Technologies & Design Excellence

Vacuum Vapour Phase Soldering

Thank you

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