

# 环形炉热处理生产线

Ring Hearth Furnace Plants

适用于大批量金属零部件热处理

For Heat Treatment of Large Capacities



Reliability at Work

爱协林热处理系统（北京）有限公司  
AICHELIN Heat Treatment Systems (Beijing) Co., LTD.

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### 生产线概述 INTRODUCTION

爱协林开发的先进炉型，结合转底炉和推盘炉的优点，具有单独的加热、渗碳和扩散区，可以在几乎独立的炉室中获得不同的碳势和温度分布曲线。

The ring hearth furnace is a newly improved design which combines the advantages of a rotary hearth furnace and a pusher furnace. The design allows a separation of heating, carburizing and diffusion zone. Therefore, different carbon levels and temperature profiles can be processed nearly independently in the different chambers.

### 爱协林环形渗碳、压淬/直淬自动生产线

#### AICHELIN Ring Hearth Carburizing, Press Quenching/Quenching Automatic Plant

爱协林环形渗碳、压淬/直淬自动生产线是汽车后桥主从动螺旋伞齿轮不同层深气体渗碳、压淬/直淬，同炉混装作业的全自动柔性生产线。其主要组成为：上卸料辊道、推盘式预氧化炉、推盘式加热炉、环形渗碳炉、推盘式降温炉、压淬保温炉、淬火油槽、机器人、三工位后清洗机、推盘式回火炉及风冷台和生产线的控制系统等。

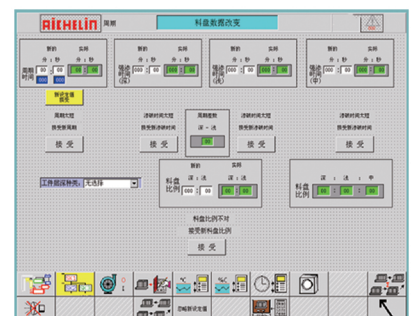
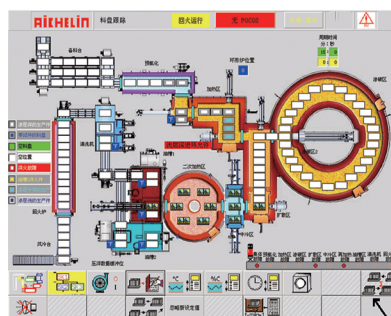
Fully automatic flexible product line applied for gas carburizing, press quenching/quenching of driving & driven spiral bevel gear of automobile rear axle. Capable to achieve different case-hardening depth for mixture production in one furnace. It mainly consists of loading & unloading roller table; pusher type pre-heating furnace, pusher type heating furnace, ring type carburizing furnace, pusher type cooling furnace, press quenching heat/reservation furnace, quenching oil tank, robots, 3-position post washer, pusher type tempering furnace, air buffer and control system for the production line, etc.



### 料盘跟踪 TRAY-TRACING SYSTEM

每一料盘自上料起至卸料均可实现全程跟踪。通过点击各料盘位置获取该盘料的详细信息，包括进入各区时间、料盘种类、温度等。

Tracing trays during the whole process from loading to unloading, providing detail information of trays such as staying time in each zone, tray categories, temp., etc.



## 生产线特点 ADVANTAGES

- 工件和料盘随炉底一起转动，相互间无运动，减小料盘受力，延长其使用寿命，节省料盘和驱动电机的费用  
Reduced stress and longer lifetime of the trays due to the rotation with the loads in the furnace, savings of basic trays and motor drives of the furnace.
- 料盘之间留有空间，加热更快，工件间气体流动性更好  
Quicker heating up and an improved gas transport possibility between the different loads because the loads are not pushed together, leaving some space in between.
- 用于淬火敏感零件渗碳和随后的压淬，也可用于齿轮和齿轮轴的渗碳和油淬或气淬  
Apply for carburizing of quenching sensitive parts and press quenching afterwards; it also applies for carburizing, oil quenching and air quenching for gears and gear shafts.
- 因大幅缩短工艺周期，在节约成本、减少能源消耗、减少空间占用、节省料盘等方面都有突出表现  
Cost savings due to significant shortening of the process cycle, less energy consumption, less space requirement, and savings of charging trays.
- 不同层深工件可同时进行作业,缩短工艺辅助时间，灵活方便  
Workpieces with different layer depths can be operated at the same time to shorten the process assistance time, which makes it flexible and convenient.
- 自动化程度高：可实现手动、全自动操作模式，并可配对立体仓库，实现无人化作业  
High automation: manual and fully automatic operation modes can be realized, and with stereoscopic warehouse can realize un-manned operation.
- 严格执行高标准安全设计，安全设施完善，确保运行中操作人员、设备和产品的安全  
Strictly implement high standard design. Reliable safety device secures operator, equipment , and products.

## 柔性生产 FLEXIBLE PRODUCTION

不同层深的工件处理无需更换工艺，可按计算比例实现两种或三种层深工件同时生产，并根据各自渗碳时长分批出炉，互不干涉。

Capable of achieving 2~3 different case hardening depths without shifting processes. Parts unloading according to each carburizing time with no interruption among each other.



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## 机器人自动上卸料、压淬保温室、立体料库

LOADING AND UNLOADING BY ROBOTS/ PRESS QUENCHING AND INSULATING CHAMBER/ STEREOSCOPIC WAREHOUSE

本生产线由机器人与转移机械手配合，可实现主动齿轮与被动伞齿轮的自动装卸料、工件二维码扫描追踪、热后打印，实现工件的全过程参数记录跟踪，完全达到信息化管理目标。

压淬保温室采用独特的设计：炉门不动，层垛工件逐层上升，由取料机械手逐层取出工件和隔盘，再由机器人将热的工件放到压床上淬火；隔盘、料盘放到返回线上冷却后再由码垛机械手放到立体料库备用。压淬后的工件由机器人取出放到返回线上的料盘上码垛传输到下工序。

底料盘和中间隔盘进行定期翻面，减少工装变形，延长使用寿命。

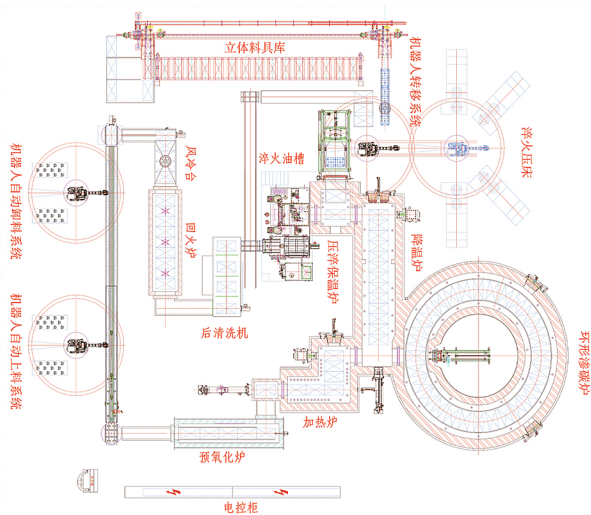
By equipped with a robot and a transfer manipulator, this production line can realize the automatic loading and unloading of the driving gear and the passive bevel gear, the QR code scanning and tracking of the workpiece, and laser recoding of workpiece after heat treatment, which can record and track of the whole process parameters of the workpiece, and fully achieve the goal of information management.

The press quenching and insulating chamber adopts a unique design: the furnace door does not move, the stacked workpieces rise layer by layer, the workpiece and the isolate trays are taken out layer by layer by the reclaiming manipulator, and then the robot puts the hot workpiece on the press for quenching; The intermediate isolate trays and bottom trays are placed on the return line to cool, and then transferred to the stereoscopic warehouse by the palletizing manipulator for reuse. The workpiece after press quenching is taken out by the robot and placed on the tray on the return line for stacking and transmission to the next process.

The bottom trays and the intermediate trays are flipped regularly to reduce the deformation of the tooling and prolong the service life.



▲ 立体料库



环形炉热处理生产线布置图示例  
Layout of Ring Hearth Furnace Plant

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