



洗衣机钣金生产线

Washing Machine Shell Forming line

青岛海德马克智能装备有限公司
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HDMECH
QINGDAO HDMECH INTELLIGENT EQUIPMENT CO.,LTD

精细化的产品 国际化的海德马克

www.hdmech.com

公司简介 Company Profile

青岛海德马克智能装备有限公司（“海德马克”或“公司”）原青岛华东工程机械有限公司，成立于1994年10月28日，注册资金6166万元，位于青岛市高新技术产业开发区春阳路北侧、思源路西侧，公司厂区占地面积13.9万平方米（208亩），总资产3.57亿，现有员工170余人。

海德马克，是一家从事智能化生产线、机器人、物联网技术研发、设计、制造、销售、服务于一体的国家高新技术企业。主要产品包括：冰箱（冷柜）智能化生产线、洗衣机智能化生产线、油烟机智能化生产线、热水器智能化生产线、工业机器人、智能无人高精密锻造操作装备、径锻机、智能数控碾环机、智能数控热处理装备等。

海德马克，先后服务于海尔、海信、美的、澳柯玛、TCL、GE、格力、倍科、一重、二重、上重、太重、沈重、大连华瑞、无锡叶片、马钢、宝钛以及德国罗特艾德等知名企业。

Qingdao HDMECH Intelligent Equipment Co. Ltd. (“HDMECH”) Qingdao Huadong Engineering Machinery Co. Ltd., founded in October 28, 1994, registered capital of 61.66 million yuan, is located in Qingdao high tech Industrial Development Zone, between the north of Chunyang Road, and the west of Siyuan Road, the company covers an area of 139 thousands square meters (208 acres), with total assets of 357 million and enrolled employees more than 170.

HDMECH, is a national high-tech enterprise engaged in the R&D, designing, manufacturing, sales of home appliance intelligent production line, robot, internet of things technology. The main products include: refrigerator (freezer) intelligent production line, wash machine intelligent production line, kitchen ventilator intelligent machine production line, heater intelligent production line, intelligent unmanned-operation high precision forging equipment, industrial robots, intelligent CNC ring rolling machine, radial forging machine, intelligent CNC heat treatment equipment etc..

HDMECH has been supplied production line for Arcelik, Haier, Hisense, Midea, AUCMA, GREE, TCL, GE, and CFHI, CNEG, TAYOR, TYHI, NHI, DHHI, WTB, MIS, BaoTi and Germany Rothe Erde and other famous enterprises.

国家高新技术企业
山东省企业技术中心
青岛市液力装备工程技术研究中心
多个创新研发项目列入国家、省市重点技术创新项
60t数控重载锻造操作机技术被列入2010年度国家火炬计划
1000kg全液压重载机器人项目列入国家扩大内需重点资金支持项目
智能无人高精密锻造操作装备（800KN）被评为2015年度山东省首台套技术装备
260t锻造操作机项目获得青岛市重点技术攻关项目
数控精密锻造基层技术研发，被列入青岛市关键技术攻关计划
“18MN径向锻造压机、径向锻造操作机”被认定为2014青岛市企业技术创新重点项目
冷柜全自动钣金铆接线开发被列入青岛市企业技术创新重点项目计划
对开门冰箱门壳自动化生产线的开发被列入青岛市企业技术创新重点项目计划
洗衣机全自动内筒成型线的开发被列入青岛市企业技术创新重点项目计划

National high-tech enterprise
Shandong Enterprise Technology Center
Qingdao hydraulic equipment Engineering Technology Research Center
A number of innovative R & D projects included in the national, provincial key technological innovation projects
60t CNC heavy duty forging manipulator technology was included in the 2010 National Torch Program
1000kg all hydraulic heavy duty robot project included in the national expansion of domestic demand key funding projects
Intelligent unmanned operation high precision forging equipment (800KN) was named the 2015 annual Shandong province first sets of technical equipment
The project of 260t forging machine has been awarded the key technical project of Qingdao
CNC precision forging technology research and development, has been included in the key technology projects in Qingdao
"18MN radial forging press, radial forging manipulator" was identified as the 2014 Qingdao enterprise technology innovation key projects
Refrigerator automatic sheet metal rivet line development was included in the key projects of Qingdao city enterprise technology innovation plan
The development of the automatic door shell production line of the French door refrigerator was included in the key project of Qingdao enterprise technology innovation
The development of full automatic washing machine drum forming line of was included in the key project of enterprise technology innovation in Qingdao

技术专利
Technology Patents

装料取料伺服仿真机械手发明专利
生产线传输对中机构及其方法发明专利
金属板料滚边装置及其方法发明专利
机械手及其夹持方法发明专利
钣金件复合加工模具及其方法发明专利
装出料机及其控制方法发明专利
机械手控制系统及控制方法发明专利
自动对中装置、对中方法及带有此装置的仿真手柄发
冰箱隐形门折弯模具及其折弯方法发明专利
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Patent of loading and reclaiming servo simulation manipulator
Patent of production line transmission centering mechanism and method
Patent of sheet metal rolling device and method
Patent of manipulator and its clamping method
Patent of sheet metal part composite machining die method
Patent of charging and discharging machine and its control method
Patent of Robot control system and its control method
Patent of automatic centering device, centering method, and simulation handle with this device
Patent of refrigerator invisible door bending die and its bending method

荣获100多项国家发明专利及实用新型专利 Won more than 100 national invention patents and utility model



合作与交流
Cooperation and Exchange



公司一直与上海交通大学、燕山大学、中国海洋大学、济南铸锻所、中国重型机械研究院、马钢设计院等高校及科研院所保持着长期战略合作关系，通过与高校和科研院所的交流与合作提高技术创新能力。

HDMECH has maintained long term strategic relationship with Shanghai Jiao Tong University, Yanshan University, Ocean University of China, Ji'nan JFMMRI, Chinese Heavy Machinery Research Institute, Maanshan Institute and other universities and research institutes, and to improve the technological innovation capability through the exchange and cooperation with universities and research institutes

设备参数表

Technical specifications

Perfect Product / International Hdmech
精细化的产品 / 国际化的海德马克



系列 Series	产品类型 Product type	成品图 Product drawing	产品成形尺寸 Product drawing	设备节拍 Cycle time	加工品种转换时间 Processing variety changing time		适用材质 Applicable material	产品合格率 Qualification rate	工艺流程Technological process	设备构成 Equipment composition
洗衣机系列 WM series	波轮洗衣机外箱线 Top loading WM outer shell forming line		高度: 600-900 长度: 500-800 宽度: 500-800 Height:600-900 Length :500-800 Width :500-800	折弯铆接自动线: 16S/件, 设备节拍 Bending & clinching automatic line cycle time: 16S/PCS,	10分钟 10 minutes	人工转换箱体销块钉定位的位置 Manual change pin position	冷轧钢板、覆膜预涂板 Cold rolled steel、Pre-painted steel	≥99.8%	自动上料机→冲切→压型→折弯1→折U→后联板铆接→角板铆接1→角板铆接2→自动下料 Automatic feeding→Punching→Pressing→Bending1→Folding u→Rear plate clinching→Corner plate clinching 1→Corner plate clinching 2→Unloading automaticly	1. 自动上料工位 2. 冲切工位 3. 压型工位 4. 折弯工位 5. 后联板铆接工位 6. 角板铆接工位 7. 自动下料工位 1. Automatic feeding 2. Punching 3. Pressing 4. Bending 5. Rear plate Clinching 6. Corner plate clinching 7. Automatic unloading
	波轮洗衣机内筒成型线 Top loading WM drum automatic forming line		直径400mm-680mm; 高度300mm-600mm Diameter 400mm-680mm; Height 300mm-600mm	16/件(pcs)	不更换模具: 1分钟 No need change molds:1 minutes	可兼容三种直径的产品在线生产, 无需更换模具。 Can be compatible with three kinds of diameter of the product online production, no need to replace the mold	不锈钢板 Stainless steel sheet	≥99.8%	自动上料→自动折边→抱圆扣缝→滚筋1→滚筋2→下料 Automatic feeding→Automatic bending→Rolling&Seam locking→Groove forming 1→Groove forming 2→Unloading	1、自动上料工位2、定位折边工位3、抱圆扣缝工位4、滚筋1工位5、滚筋2工位 1. Automatic feeding 2. Positioning&Bending 3. Rolling & Seaming locking 4. Grooving 1 5. Grooving 2
	滚筒洗衣机外箱线 Front loading WM outer shell forming line		高度: 600-900 长度: 500-800 宽度: 400-800 Height:600-900 Length:500-800 Width:400-800	折弯铆接自动线: 16S/件, 设备节拍 Bending & clinching automatic line cycle time: 16S/PCS,	10分钟 10 minutes	人工转换箱体块销钉定位的位置 Manual change pin position	冷轧钢板、覆膜预涂板 Cold rolled steel、Pre-painted steel	≥99.8%	折弯→联板铆接→上加强板铆接1→上加强板铆接2→下加强板铆接1→下加强板铆接2→下料 Bending→Plate clinching→Upper reinforcement clinching→lower reinforcement clinching	1、自动折弯工位。2联板铆接工位。3上加强板铆接1工位、4上加强板铆接2工位、5下加强板铆接1工位、6下加强板铆接2工位、7自动下料工位。 1. Automatic bending 2. Plate clinching 3. Upper reinforcement clinching 1 4. Upper reinforcement clinching 2 5. Lower reinforcement clinching 1 6. Lower reinforcement clinching 2 7. Automatic unloading
	滚筒洗衣机内筒成型线 Front loading WM drum forming line		直径400mm-680mm; 高度260mm-600mm Diameter 400mm-680mm Height 260mm-600mm	≤20s/件(pcs)	快速换模 Quick die change	15min/2人 15min/2 person	不锈钢板 Stainless steel sheet	≥99.8%	卷圆→扣缝压筋→翻边→端盖旋铆→冲孔→倒角→自动打螺丝→检测→下料 Rolling →Seam locking & Grooving→Punching holes→Chamfering→Automatic screwing→Testing→Unloading	1. 自动上料卷圆机: 1台。 2. 折边扣缝机压筋机: 1台。 3. 翻边机: 1台。 4. 上端盖机: 1台。 5. 冲孔机: 1台。 6. 倒角自动打螺钉机: 1台。 7. 内筒检测工装: 1台。 1. Roll machine 1 set. 2. Bending & Seaming locking 1 set. 3. Flanging 1 set. 4. Assembling up cover 1 set 5. Puncing holes 1 set 6. Chamfering & Screwing 7、Testing 1 set

波轮洗衣机外箱线

Top loading WM cabinet shell forming line

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精细化的产品 / 国际化的海德马克

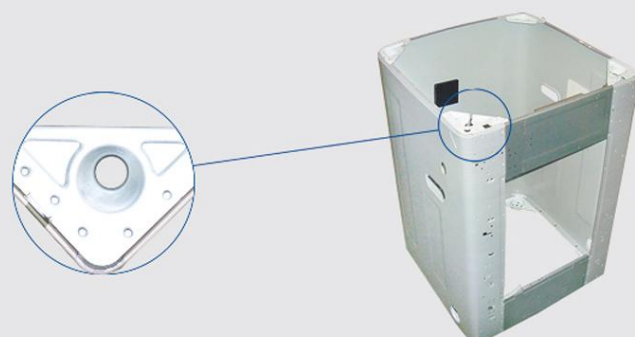
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该设备用于自动生产洗衣机的外壳，
料片经模具冲切、压型、折弯、铆接或焊接连板和角座等工序加工后出料。
可根据客户需求和洗衣机外壳形式给出具体的设计方案。

This line is used to process cabinet shell.

The sheet metal goes through processes of punching, pressing, bending, clinching or welding.

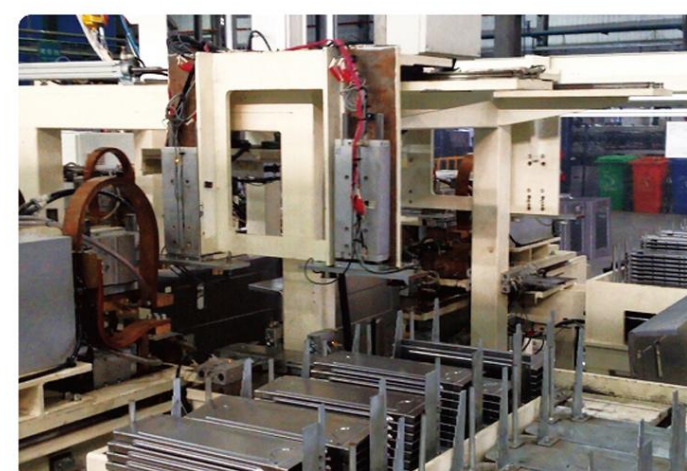
A specified designing scheme can be give according to WM cabinet shell shape and customer's requirement.



整体介绍

我公司具有多年的洗衣机外壳设备设计制造经验，始终保持着和国内外著名洗衣机厂家的密切合作，以优异的设备支持其不断地更新换代。通过借鉴欧洲和日本的技术并不断研发，一直引领国内洗衣机外壳自动成型行业的发展和方向。

We have many years design and manufacturing experience of washing machine cabinet shell, and always maintained a close cooperation with well-known domestic and foreign WM manufacturers, with excellent equipment to support its constantly upgrading. Through the combination of European and Japanese technology and continuous research and development, HDMECH always leads the domestic washing machine shell automatic forming line industry development and direction.



波轮洗衣机内筒线

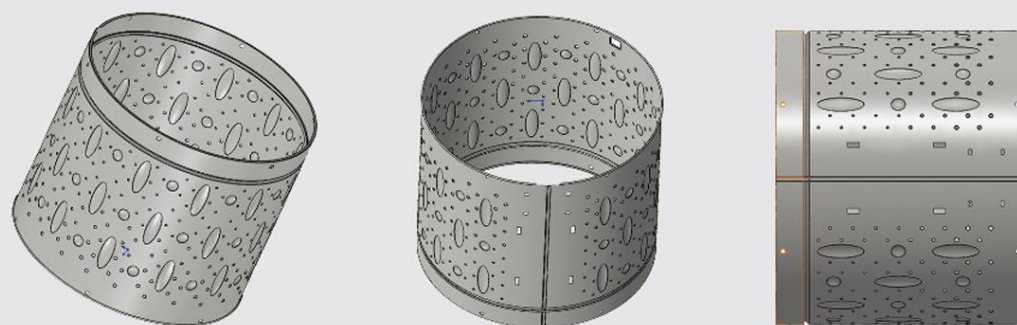
Top loading WM drum forming line

Perfect Product / International Hdmech
精细化的产品 / 国际化的海德马克

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本生产线为嘉龙公司第一条波轮洗衣机内筒成型线，并且具备国内领先的技术优势，以最先进的控制方式，通过对底层伺服电机、plc，中层CC-linek，高层H或地平网络的有效应用。实现设备的自动化生产。实现了国内传统洗衣机内筒专机生产模式向高端自动无人化生产模式的转变。

This production line is the first top-load washing machine drum semi-automatic line with in domestic advanced technology and most advanced control way, realized transformation of the traditional domestic washing machine drum machine production manner to high-end automatic unmanned production manner.



本生产线通过开卷机自动打开卷料，由校平机对不锈钢带进行平整校平，再由伺服送带机送入自动冲孔机和自动成型切边机进行冲孔与成型，并由联动输送机手对工件进行平稳输送，冲压后的板料由机械手存入对应的缓存小车上，当生产制定型号的内桶时，机械手将相应的内筒片移入生产输送线上，进入自动折边抱圆扣骨机，机械手自动将半成品桶移入滚筋机内自动滚筋，完成后由机械手将工件移出自动线。实现了板料从开卷校平到滚筋工序的无人化自动连续生产。人工预装桶底，使用筒体收口卷边机将内桶旋铆到塑料底座上，最后通过物料线将完成的内筒输送到总装线上，完成生产。

The production line through auto- open coil stack , with flat leveling of stainless steel belt. The servo motor feeding device feed stainless belt to automatic punching machine and forming machine . The stainless belts are smoothly transported by interlock manipulator .The punched stainless material is put on caching trolley. When produced inner drum . The manipulator transported inner tube piece to production transportation line , enter into automatic rounding & folding & buckle seam machine . Then manipulator automatically put the inner tube to rolling rib machine to achieve automatic rib, then tube is transported by manipulator 'realizing unmanned automatic from uncoil to rolling rib continuous production. Workers pre-assembled bottom of inner tube, rivet the inner tube to plastic bottom by closing crimping machine, and finally through the line will be completed within the cylinder is transported to the final assembly line, complete production.



滚筒洗衣机内筒线

Front loading WM drum forming line

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该设备用于生产客户指定形状和尺寸的洗衣机内桶
钢板经模具冲切、卷圆、折边扣缝或焊接、翻边、安装端盖等工序的加工后出料，以便进行洗衣机组装。
洗衣机内桶形状与尺寸等可根据客户图纸给出具体设计方案。

The equipment is used to produce washing machine drum based on the customer specified shape and size.

The finished sheet can be used for next WM assembling after die punching, rolling round, folding seam or welding, flanging and some processes. Washing machine drum shape and size can be given according to customer drawings specific design.



滚筒洗衣机内筒线

Front loading WM drum forming line

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开卷校平

送料装置采用集料架、矫正、送料三机一体全自动伺服送料装置，整体设备节省空间、耐用、操作简单；校平机采用金属滚杠无动力校平。滚杠表面镀铬，校平时内筒半成品无压痕。



冲压设备

冲压设备结构依据产品结构。压力机冲裁力设计要比所需冲裁力至少大30%余量，C型压机采用钢结构焊接，并经退火及时效处理，具有足够的强度和刚度。冲压机后设置板料翻转机，翻转机采用两条平行辊杠线的机械式翻转机结构，辊杠线采用塑胶辊杠，采用皮带传动，无噪音。



扣铆压筋机

采用悬臂式压力机结构，油压压力，压力设计25吨，上压头通过油缸施压，铜导向轴承导向。压头模具设计为复合模具，可完成折边、扣合、压筋三个功能。液压站和设备设计成一个整体，安装、调试方便，占地面积小。



卷圆翻边机

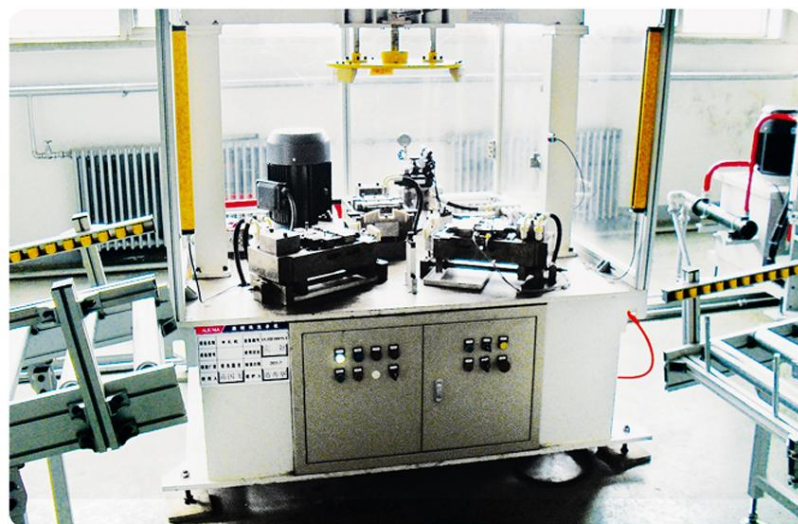
主体基本按照标准三辊卷圆机的结构设计，在上下料部分设置自动化设备满足自动化生产。
卷辊采用硫化卷辊，防止挤伤料片上的排水孔。



上下端盖铆接专机

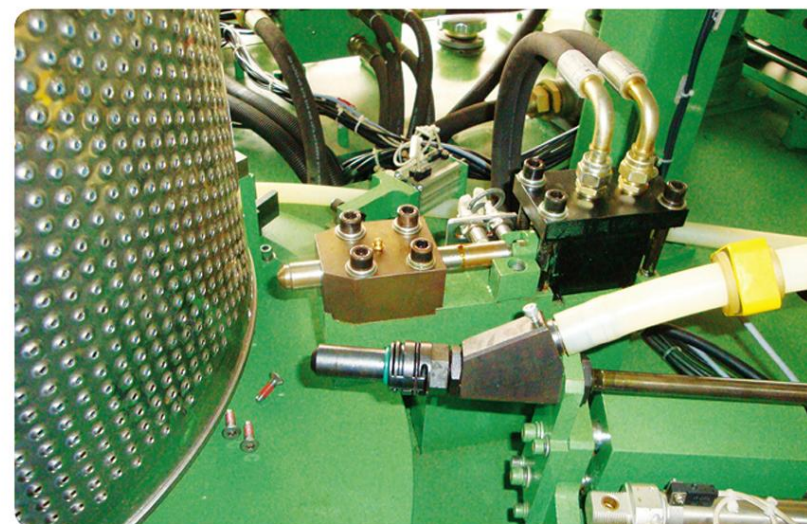
主要由机架、旋转模具单元、扣合模具及进刀系统、液压系统、电控系统组成。

机架整体采用三梁四柱式压力机结构，立柱采用标准活塞杆制作，中间梁的滑动采用铜质导套导向。工件的旋转由上下的定位模具带动，定位模具根据产品的尺寸进行设计制作。



冲孔机、上三脚架专机

设备构成为两工位操作（一人操作）；
冲孔装置根据工件设置为三套独立式装置，呈圆形布置，打孔机构采用液压冲孔式。



打螺丝机

沉孔装置和上螺钉装置采用同一工位操作。液压沉孔系统对内筒进行自动沉孔，三套自动螺钉拧紧装置自动将螺钉送入并进行拧紧。螺钉装料装置一次性承接螺钉数量250件，采用震动方式自动将螺钉送入气动螺丝刀。



检测装置

本装置通过电传感器自动检测桶口的端跳和径跳等数据，并和电脑内标准数据相比较，以检测内桶精度是否满足要求。

滚筒洗衣机内筒线

Front loading WM drum forming line

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Decoiling

Materials-conveying device consists of materials holder, corrector, conveying device combined as a whole servo conveying device. It has the characteristic of space-saving, durable and easy operation. Chrome plated Metal rollers are used in corrector which has neither power source nor scratch print.



Punching

The punching equipment function is in accordance with the production. The punching power is designed, more than 30% requisite power. The C press is adapt with steel structure weld after annealing and aging treatment, provides enough intensity and stiffness. Turnover work station equipped after punching work station. The turnover work is adapt with 2 parallel roller line with mechanical turn over workstation, roller material is rubber, transported by belt noiseless.



Bending and Seam-lock Machine

Cantilever type oil cylinder structure is used with designed oil pressure: 250KN. The mold is designed as composite molds, it can complete bending, seam-lock, ribbing actions. The hydraulic station and other parts are designed as a whole unit, space-saving, easy installation and easy debugging.



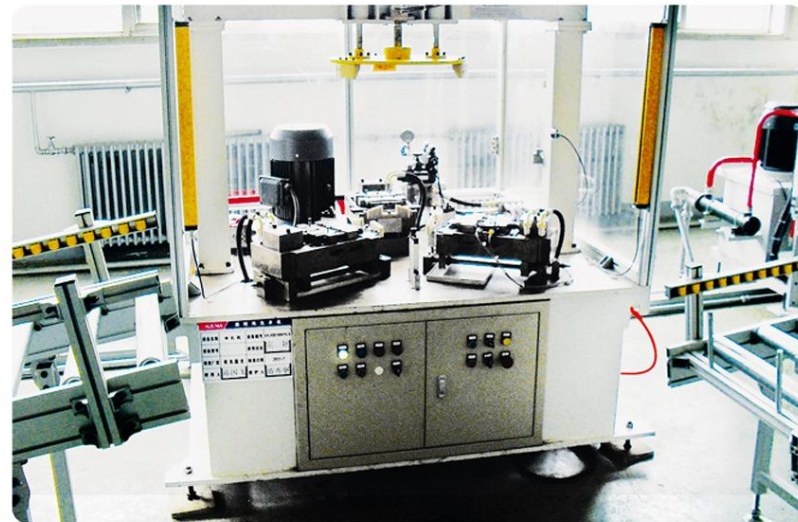
Rolling machine

Sulfide rollers are used to make sure the surface in good condition, acute triangle structure and high speed motor are used to make sure the roundness, unloading rate.



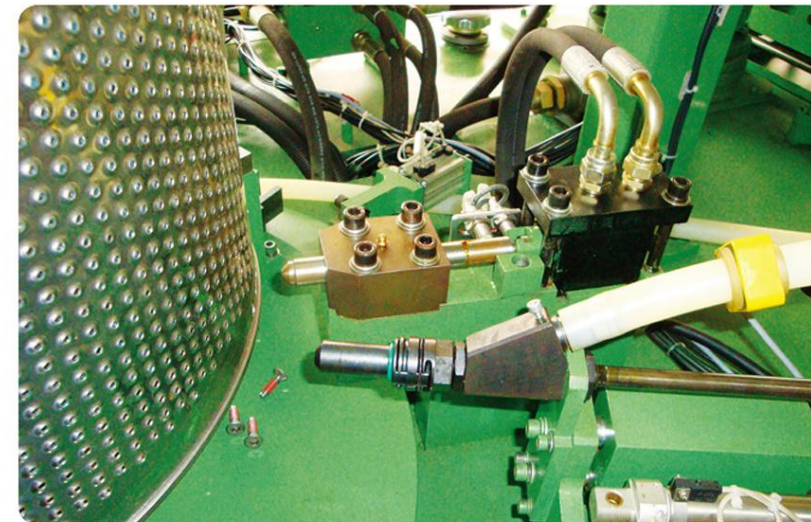
Upper and lower cover clinching Machine

This machine consists of base frame, rotating mold unit, seam- lock mold, cutting feed system, hydraulic and electrical system. Three beams and four columns as a whole unit are used as framework. The column is made of standard piston cutter bar; sliding device of middle beam is made of copper guide sleeve. Upper and lower location molds designed and manufactured according to size of products drives rotation of workpiece.



Piercing, Triangle Riveting Machine

Two sets of piercing device are used in this machine, one Punching device using hydraulic power.



Screwing Machine

Countersink and screwing device are designed as a whole. Hydraulic countersink system sinks holes automatically; three sets of screwing device feed screws and tighten them automatically. 250 ps screws are fed into screwing machine in one-time through vibration mode.



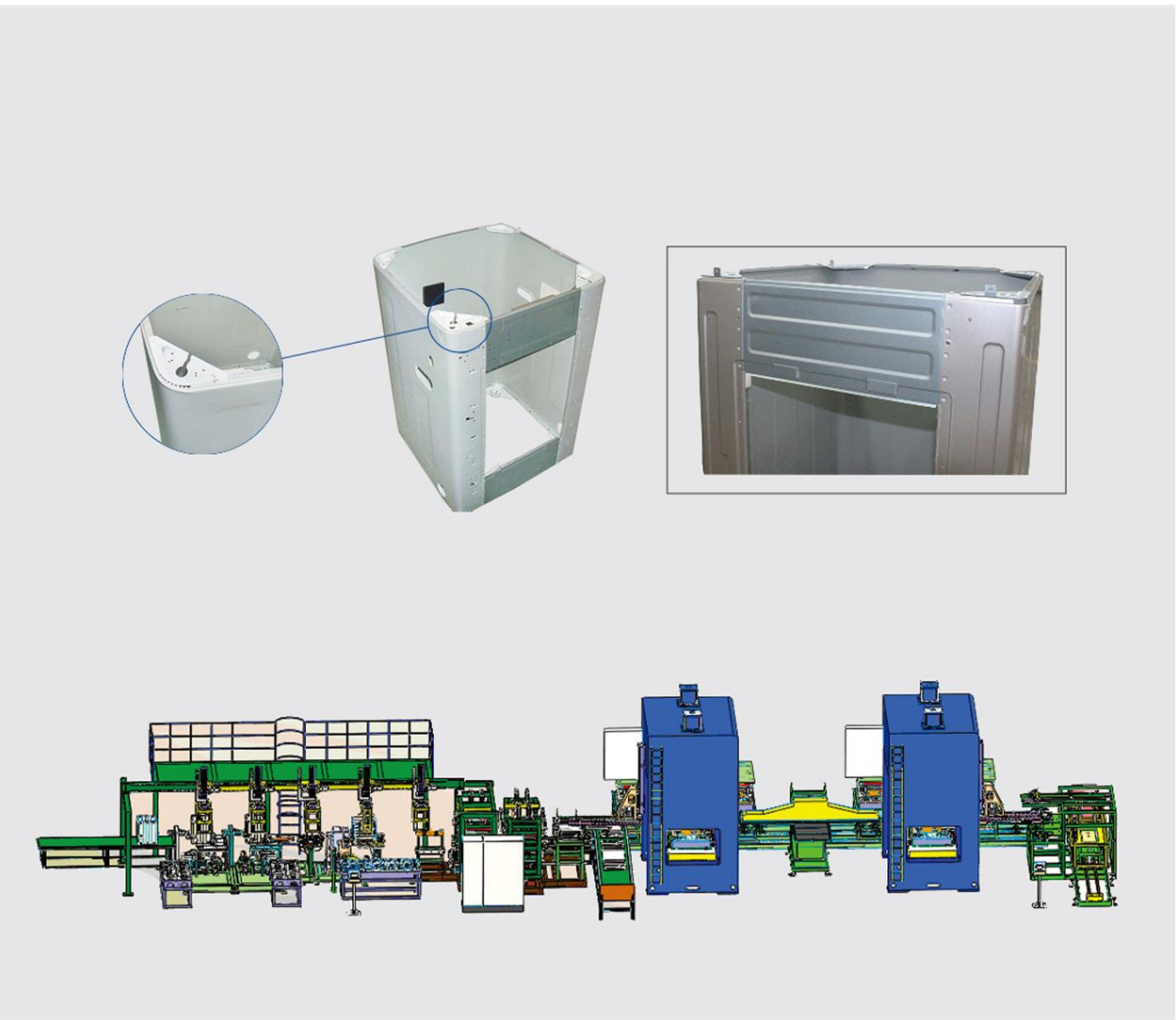
Detector

This device is used to detect the date of ends jump and radial jump through electrical sensor then compared with standard date stored in PLC to satisfy the accuracy requirement.

洗衣机外箱冲压折弯铆接自动线

Stamping & bending & rivet automatic line for WM cabinet

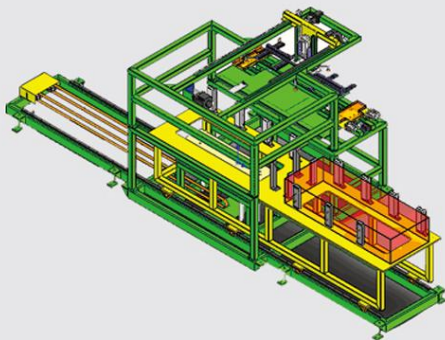
Perfect Product / International Hdmech
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设备参数:
外形尺寸: 35m×7.6m
节拍: 15s/件
用人数量: 2人 (角板、联板上料1人、下箱1人)
换模时间: 5min (一键自动换模)
合格率: 99.8%
故障率: 0

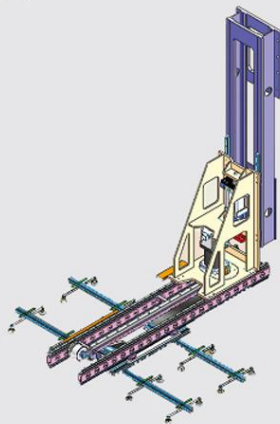
上料

上料工位由料垛小车、移栽吸盘机械手、定位台和架体等部分组成。
料垛小车共设置两台并排在垂直于线体方向上进出上料系统框架, 由电机带动在由两根工作面位于地平面以下的导轨上行走, 可以做到不停产换料。
共16套吸盘, 每2组吸盘配一个真空发射器。吸盘位置布局合理, 满足甲方多种平台箱体的生产。每个吸盘上均设置有过滤装置, 防止因气源不洁净造成吸盘损坏。



1#机械手

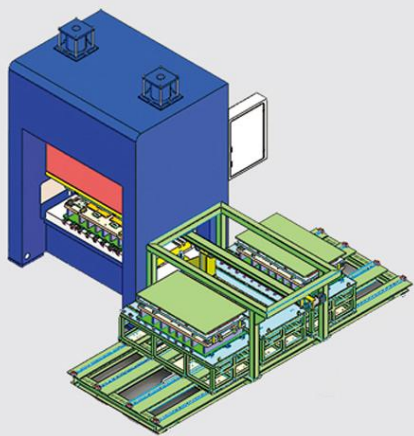
1#机械手的主要作用是将板料从定位平台输送至冲切工位;
机械手的升降和移栽均采用伺服电机驱动。
吸盘组件由吸盘、真空发生装置、吸盘固定架等组成, 共16套吸盘, 每2组吸盘配一个真空发射器。吸盘位置布局合理, 满足甲方多种平台箱体 对生产。据板料尺寸长短自动选择开、关吸盘真空状态。
吸料检测: 每套机械手均设置电子吸料检测装置, 以保证机械手正确抓取板料。



冲切及压型

冲切工位主要由400吨冲床 (国内外知名品牌)、冲切模具和自动换模系统组成。

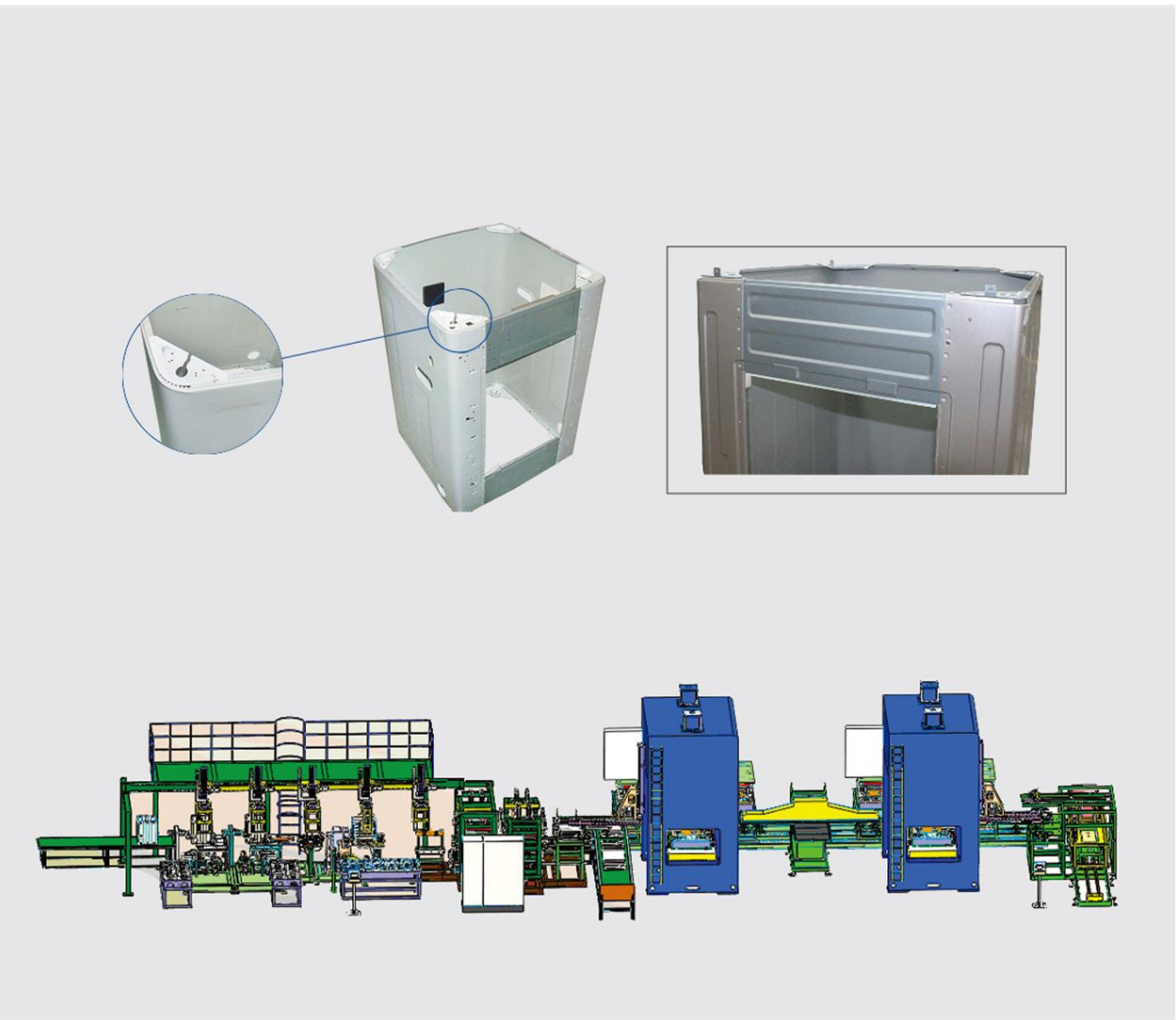
型号、项目	单位	技术参数
		400T (定制)
公称力	kN	4000
公称力行程	mm	10
滑块行程	mm	350
行程次数	次/分	18-25 (变频调速)
最大装模高度	mm	750
装模高度调节量	mm	250
工作台板尺寸	mm	1400×2800×200
滑块底面尺寸	mm	1400×2800
窗口尺寸	mm	1420×700
立柱间距离	mm	2900
主电动机功率	kW	45
空气压力	MPa	0.55



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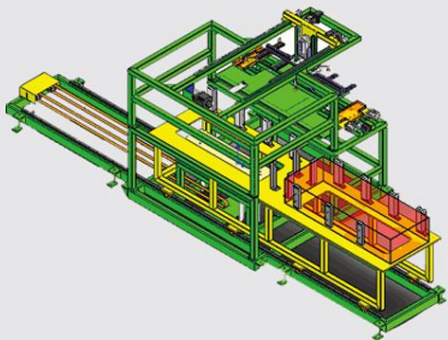
Technical parameter:
External dimension : 35m X 7.6m
Cycle: 15s/piece
Operator Qty:2 guys(lifting ear, connecting plate 1 guy, unloading 1 guy)
Changing model time :5min (one key automatic changing model)
Yield: 99.8%

Loading work station

The feeding station is made up by material stacking trolley, transplanter, a positioning table and frame component etc.

Tow set of material stacking trolley side by side set up in the vertical direction of automatic line, driven by a motor located in tow walking guides below ground level on the working surface, achieving no-stop produce with changing material.

A total of 16 sets of sucker, each of the 2 groups of sucking disc with a vacuum transmitter. Suction location layout is reasonable, to meet a variety of platform party cabinet production. Each sucker is arranged on the filter device, to prevent the damage caused by the suction unclean air.

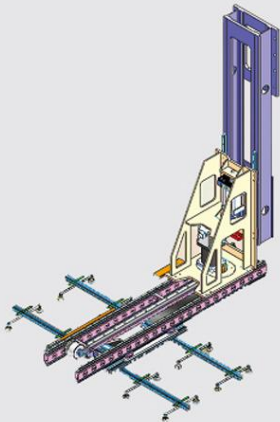


1# manipulator

1# manipulator main function : the sheet from the positioning platform is transported to the punching station; mechanical hand lifting and transportation are driven by servo motor.

Suckers component is composed of a suction cup, a vacuum generating device, the vacuum suction disc fixing rack, Etc., A total 16 sets of sucker, each of the 2 groups of sucking disc with a vacuum transmitter. Suction location layout is reasonable, to meet a variety of production platform party box. According to the size of the sheet material length 'automatic selection of open, closed vacuum suction cup.

Suction detection: Each mechanical hand set electronic suction detection apparatus, in order to ensure correct grasping manipulator sheet.



Punching and pressing work station

Punching unit consists of 400 tons punch (domestic or foreign well-known brands), punching mold and automatic die changing system:

Type, item	Unit	technical parameters
		400T (custom)
Capacity	kN	4000
Capacity stroke	mm	10
slider stroke	mm	350
Stroke times	time/minute	18-25*frequency speed governing*
Max. fixing die height	mm	750
Die set height adjustment	mm	250
Work table size	mm	1400*2800*200
Bottom slider size	mm	1400*2800
the window size	mm	1420*700
The distance between columns	mm	2800
Main motor power	kW	45
Air pressure	MPa	0.55

