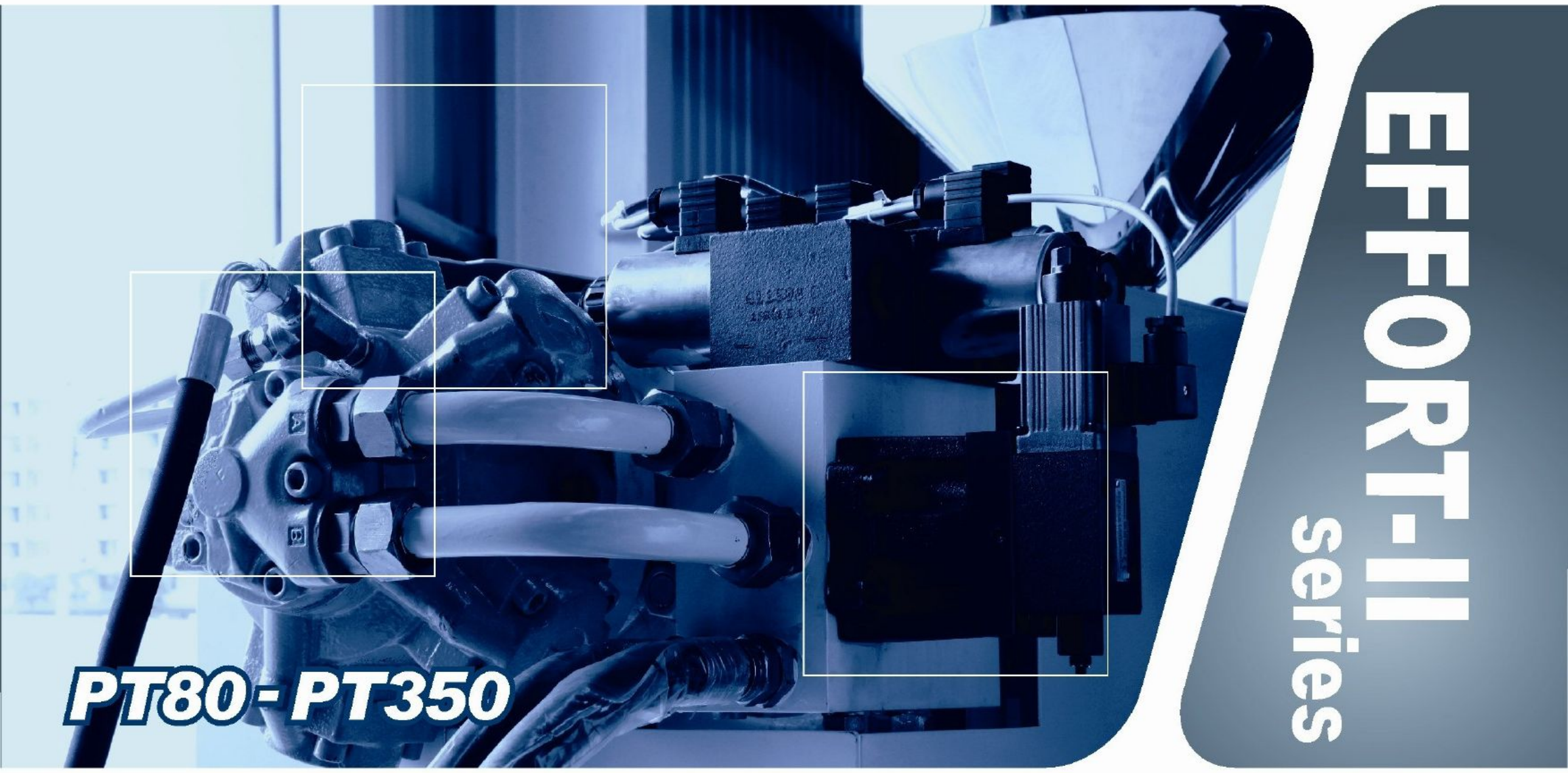
中国名牌　香港名牌　广东名牌　上海名牌　中国机械500强

节能型注塑机 1

中国塑料机械工业协会

直壓式 伺服節能注塑機



LK DIRECT HYDRAULIC ENERGY SAVING AND HIGH PRECISION SERVO INJECTION MOLDING MACHINE

力勁集團
L.K. GROUP

EFFORT-II 直壓式 Series

DIRECT HYDRAULIC 伺服節能注塑機

Plastic Injection Molding Machine

力劲集团1979年创立于香港,是一家专业从事设计,制造和销售冷、热室压铸机及镁合金压铸机、精密注塑机和电脑数控加工中心的技术和资本密集型企业集团，目前是全球最大的压铸机制造商、中国主要的注塑机制造商之一和中国最具解决方案的电脑数控加工中心制造商。集团于2006年在香港联交所主板成功上市。力劲“LK”牌产品是享誉海内外的知名品牌。

Founded in 1979 in Hong Kong, L.K. Group has demonstrated its core strength in design, manufacture and sales of hot and cold chamber die casting machine, magnesium die casting machine, precision injection molding machine and CNC machining center. L.K. is now the world's largest die casting machine manufacturer and one of the major injection molding machine makers in China. Its CNC machining center also provides the most comprehensive solution to user. In 2006, L.K. has become the listed Company of the Stock Exchange of Hong Kong Limited. With the continual effort throughout decades, L.K. has established a good international reputation.

力勁是中國注塑機主要制造商之一，運用當前工業的最新技術，并結合多家國内外一流塑膠生產廠家實際生產經驗，研發出EFFORT－II系列注塑機。此系列具有先進的射膠、鎖模、控制性能。

As one of the leading injection molding machine manufacturer in China, L.K. has integrated the experience of Chinese and Overseas injection molding plants and developed the EFFORT-II series injection molding machine. The machine consists of advanced injection, clamaping and control function.

射膠特性 Injection

- 單缸注射裝置
- 注射中心精度高，熔膠過程精確
- 射臺滑移采用綫性導軌
- 高品質的液壓密封技術大大提高可靠性
- 將螺杆、加熱筒優化，提高了可塑化能力
- Single cylinder injection device
- Precise and easy nozzle centering, precise plasticizing process control
- Injection carriage support with linear guide rails
- Durability enhanced by high quality sealing components and techniques
- Enhanced plasticizing by optimized screw and barrel

EFFORT-II series 主要特性

控制特性 Control

- 8寸大屏彩色顯示控制器
- 注塑過程監控
- 采用伺服控制系統
- 强大的數據存儲監控功能

- 8” Large size color LCD
- Injection process control
- Servo control system
- Large capacity of data storage and monitoring function

鎖模特性 Clamping

- 穩定的“直壓式”快速鎖模機構
- 低壓模具保護裝置
- 中板滑動采用綫性導軌
- 容模量及開模行程很大

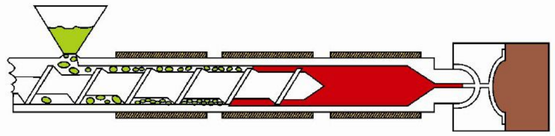
- Fast mold closing mechanism
- Low pressure mold protection device
- Moving platen guided with linear rail
- Large daylight and mold opening stroke

穩定的高性能射膠系統

Stable and high performance injection system

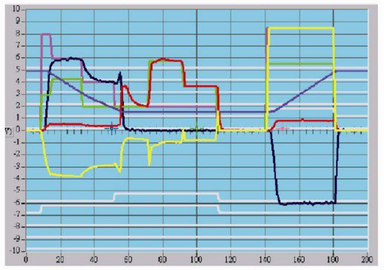
主要特點 Features

- 油缸活塞杆與螺杆軸心在一條直綫上，活塞杆直接推動螺杆，注射中心精度高
- 熔膠安裝高精度電子尺，射膠定位精度高
- 熔膠系統采用直綫導軌副支撐和導向,機臺運行更平穩可靠，摩擦系數小
- 優于雙缸注射的不同步
- 數控背壓控制各段熔膠
- 熔膠過程精確
- 設定最佳加熱筒温度控制區、温度檢測點，實現理想的温度分布
- 加載熔膠計數功能，計量更精確、成型工藝參數調整更方便、直觀
- 熔膠筒保温罩，避免操作人員燙傷，避免熱量損失可節能降耗
- 自動清料功能
- 螺杆倒索防流涎裝置



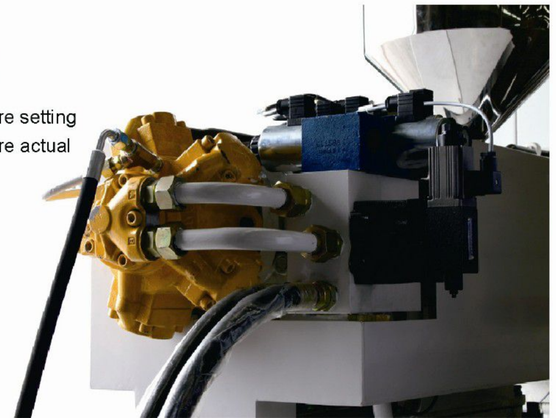
- Injection cylinder collinear with the injection screw and driven the screw directly, provide high precision control for injection;
- Plasticizing equipped with high precision linear transducer, accurate injection position control;
- Injection carriage equipped with linear guide, more stable for production and decrease the friction between parts;
- Better than double injection cylinder about the sync. of cylinders;
- Multi-stages for plasticizing with digital back pressure control;
- Precision plasticizing procedure;
- Temperature detection achieve the best temperature control for the barrel, to ideal the temperature layout.
- Tachometer for plasticizing, measurement more accurate and more convenient for parameter setting;
- Insulated barrel cover which can prevent operator from injury and reduce energy loss;
- Auto purge function;
- Screw decompression to prevent drooling.

射膠曲綫圖 Injection curve diagram



- 此爲實測射膠閉環控制過程速度,壓力曲綫,并可在電腦畫面上實時顯示(選配).
  It is injection closed-loop control velocity and pressure output curve, as an option of Forza it can display and save on the computer at the same time.

- **射膠速度設定值**
- **射膠速度實際值**
- Injection velocity setting
- Injection velocity actual
- **射膠壓力設定值**
- **射膠壓力實際值**
- Injection pressure setting
- Injection pressure actual
- **射膠壓力傳感器實際值**
- **壓力閥的輸出.**
- Injection pressure sensor actual
- Servo valve output data

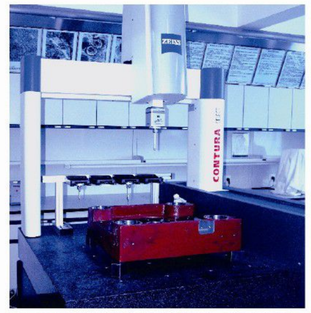


強勁耐用的鎖模單元

Powerful and durable clamping system

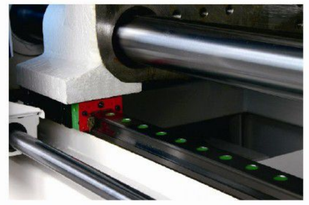
主要特點 Features

- 采用純直壓式機構，長期維持平行度
- 永遠一致的鎖模力傳遞，重復精度高，減少産品偏差
- 無須調模，更長開模行程
- 鎖模采用再生油路控制，速度快
- 鎖模和頂針安裝高精度電子尺，鎖模和頂針位置精度高
- 可以參數設定“低（適當）鎖模力”，可延長模具的使用壽命
- “微速開模方式”，大幅度提高了産品脱離模具時的低速穩定性（對彈簧模具的效果也很大）
- 中板用直綫導軌副支撐,摩擦系數小,導向定位精准
- 中板與哥林柱不接觸,提高哥林柱的使用壽命,同時減少潤滑脂的使用



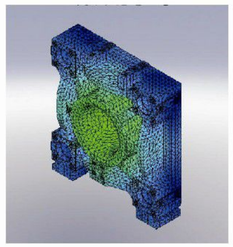
應用三坐標測量儀檢測零件空間尺寸，保證加工精度
By means of super-large size CMM, the machining dimensions can be guaranteed.

- Adopt pure direct hydraulic structure to keep the parallelism in long peroid
- Constant clamping force to reduce the different between products
- Not necessary for mold adjustment and extend the daylight also
- High speed clamping by the differential hydraulic circuits
- High precision linear transducer for the position control of clamping and ejector
- Extend the mold life by setting the suitable low clamping force
- Opening with "Micro speed", more stable for the products eject from the mold cavity
- Linear guide support the moving platen, decrease the friction and guide the direction accurately.
- Bushless design between moving platen and tie-bars, extend the working peroid for the tie-bars. Reduce the lubricant also

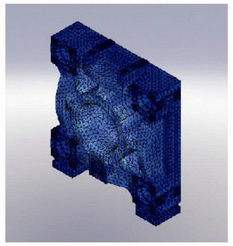


采用直綫導軌副支撑，摩擦系數小，導向定位精准
Linear guide support the moving platen, decrease the friction and guide the direction accurately.

新型的整體模板 New design platens



位移分析
Displacement Analysis



應力分析
Stress Analysis

高剛性

- 應用超大型有限元軟件優化設計
- 新型的整體模板，高剛性，提升鑄件質量

高強度

- 優化設計的新型整體模板，高强度，延長機器使用壽命

High rigidity

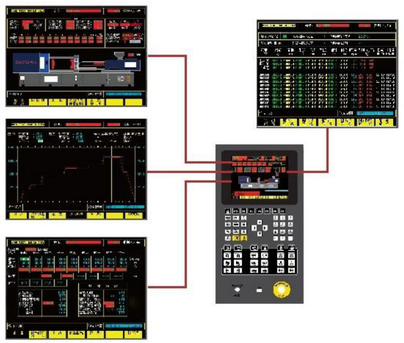
- By means of super FEA software to optimize the design.
- New whole piece platen design, result in high rigidity and raise the platen structure quality.

High strength

- Optimum design of the new type whole piece platens has high strength, increase the working life of the machines.

功能完善的注塑控制系統

Injection control system with powerful function



力勁專用注塑機控製系統［標準配置］

主要特點 Features

- 先進的AF－1000電腦系統：采用最新人機界面監控，增强的模具資料記憶系統；并備有S.P.C.生產數據統計頁面和備選閉環控制系統等，使簡易操作與高性能并存一體
- 控制器可集成熱流道控制功能
- 集成網絡管理功能
- PID温度控制，控制精度高，温度波動小
- 控制組件經細心選配，可靠耐用。
- 配備生產管理及監測的軟件，可配合現今的生產品管及生產效益／成本控制的要求，完全符合大型企業生產管理的模式
- 以人爲本，配備完善及多重的安全保護互鎖功能，確保操作人員的安全

- Advanced AF-1000 system: Equips with the latest HMI which has mold data memory system and can show SPC production parameters. Closed loop control can be chosen which integrates easy operation and high accuracy of operation.
- Integrated hot runner system.
- Centralize production management network system.
- Equips with PID automatic temperature control.
- Reliable control and electrical components are chosen.
- Production management and monitoring system are installed in order to fulfill nowadays requirement of quality and manufacturing
- The control system is designed ergonomically with good man machine interface. Multi-level safety interlock is impleme nted to ensure operator safety.

輔助的軟件系統［選配］ Add-on softwave system [Option]

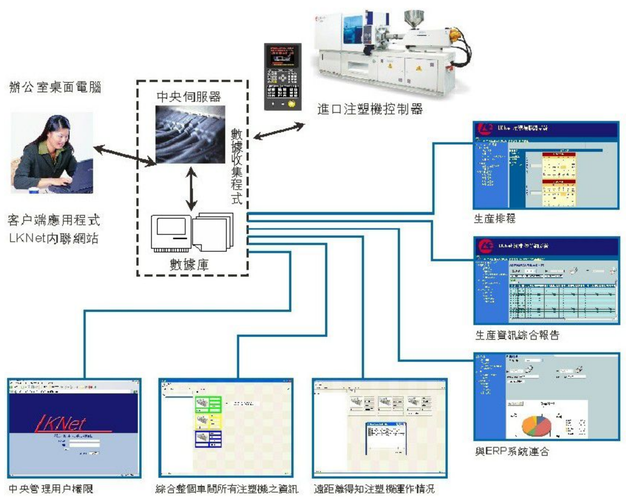
LK-NET management system
LK-NET 生產管理系統

LK-NET是力勁集團開發的一套注塑車間生產管理系統，通過對每臺單獨的注塑機聯網，實施電腦監控及管理，實現車間現場管理的集成化、智能化，可極大的提高生產效率、降低人力成本。

- 連綫生產數據監控
- 連綫注塑過程參數查詢
- 連綫產品統計
- 連綫模具管理

LK-NET is developed by LK for central management of all machines in the production floor. By means of the networking technology, the system can centralize all data collection and thus reduce expensive labour.

- Network for monitoring production process data
- Network for monitoring injection process
- Network for collecting production status and data
- Network for management of die parameters



力勁EFFORT-II系列伺服直壓機是融合電氣式和油壓式的優點，設計出復合式環保節能及低噪音注塑機。

L.K. " EFFORT II series-Direct hydraulic structure equipped with servo power pack" .The injection molding machine which is a complex design of energy-saving and low noise, intergrated the charateristics of electric and hydraulic type machine.

節能 Energy-saving

采用伺服系統的直壓機，液壓系統按照實際需要的流量和壓力來供油，克服了普通定量泵系統高壓溢流生的高能耗，在預塑、合模、射膠等高流量工作階段電機按照設定的轉速工作，在保壓、冷却等低流量工作階段降低了電機轉速，油泵電機實際能耗降低了50%－80%。

The direct hydraulic injection molding machine adopt servo power pack, provide the power with the actual requirement in the hydraulic system, solven the production with high power consumption that compared with fixed pump. Motor follows the setting rotary speed in Plasticizing, Clamping and Injection which is in high flow rate, and decrease the rotary speed in Packing and Cooling which is in low flow rate, produces energy savings from 20% to 50% or more!

精密—壓力穩定 Stable and precision pressure

伺服系統調節能力强，壓力以死循環控制模式，使系統壓力非常穩定，提高了塑料產品的成型質量；射臺運動位置重復精度高，生產出的產品一致性好；伺服系統還可以按照計算機設定的任意壓力、流量曲綫運行，爲生產各種塑料產品的成型工藝創造了條件。

Adjustable servo power pack, close loop control for hydraulic pressure to provide a very stable system pressure and increase the molding quality for the products; Repeatable injection control to achieve consistent production. Production with adjustable curve control for pressure and flow rate, to provide the conditions for the molding technology.

生產效率高—響應速度快 Fast response speed and high efficiency production

伺服系統反應速度快，壓力上升和流量上升的時間快至30ms，提高了液壓系統的反應速度，減少了動作轉換時間，加快了整機的運行動作；注塑機液壓系統自動運行時，關門打開，系統壓力會瞬間下降，伺服可以在30ms以内迅速補充油量，恢復壓力至設定值。

Fast response speed for servo power pack, the rise time for Pressure and Flow fast to 30ms. Increase the reaction speed for the hydraulic system, decrease the converting time between each action, accelerate the machine production; Hydraulic system can be compensate the decompression in 30ms when valves opened in production to recovery and reach the setting pressure.

5 優于國家標准的節能效果
Better than the national standard of energy saving

國家塑料機械產品質量監督檢驗中心權威檢測
National Quality Superbision and Testing Centerof Plastic Machinery for the authority of detection

達到一級節能標准
Achiieve the top levelof energy-saving standards

- 經國家塑料機械產品質量監督檢驗中心權威檢測
- 力勁 EFFOTR-II 伺服節能系列注塑機能耗檢測試驗結果達到國家一級標准
- 以優于標准的成績名列前茅

中国节能型注塑机能耗标识
CHINA ENERGY LABEL
Low energy consumption

节能型注塑机

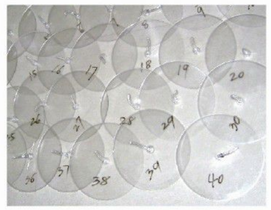
- According to the National Quality Superbisionand Testing Center of Plastic Machineryfor the authority of detection.
- LK EFFORT-II series serbo injection moldingmachine achieve the top level of energy-saving standards.
- Better than the standard of performance and top.

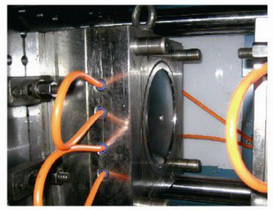
力勁EFFOTR-II參與能耗測試的機型及能耗等級
L.K. EFFORT-II participate in the test moldes and energy consumption levels

数据项目	PT80	PT130	PT160	PT200	PT250	PT300	PT350
測試數量 Production	50pcs	50pcs	50pcs	50pcs	50pcs	50pcs	50pcs
每千克能耗 Energy consumption/kg	小于0.4	小于0.4	小于0.4	小于0.4	小于0.4	小于0.4	小于0.4
能耗等級 Energy saving level	1級	1級	1級	1級	1級	1級	1級
等級劃分：注塑機能耗等級分爲1、2、3、4、5、6個等級　Energy consumption divided into 6 level(For injection molding machine)							
等級標准：1級≤0.4　2級≤0.55　1、2級表示等級最高即能耗最小（最節能）　Standard:1st level≤0.4，2nd level≤0.55							
測試條件：統一測試計量器具，統一測試要求，統一測試方法，統一測試模具　Unified tools,requirement,testing menthod and mold							

● 以上數據摘錄于國家塑料機械產品質量監督檢驗中心對力勁EFFOTR-II伺服節能注塑機的能耗檢測試驗報告。
Testing results from National Quality Supervision and Testing Center of Plastic Machinery.

部分測試、計量器具及工具 Measuring and Testing Instruments Tools





6 節能案例
EXAMPLE

1 力勁EFFORT－II PT160直壓式伺服注塑機與某品牌160T定量泵的節能測試對比
Comparison between EFFORT-II PT160 and another brand of 160tons FDP machine.

省電 41%
SAVED 41%

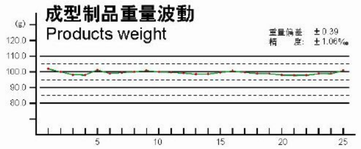
測試產品圖片 Product image

測試結果對比 Comparison

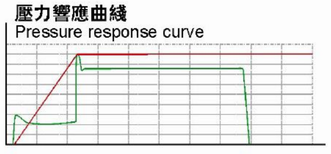
機臺系列/型號 Machine Model		單位 Unit	某品牌160T定量泵注塑機 Another brand of 160 tons(FDP)	力勁EFFORT－II PT160直壓式伺服注塑機 EFFORT-II PT160(Servo)
產品重量	Prouduct weight	g	100g	100g
模腔數目	No. of cavity		1×2Cav.	1×2Cav.
產品膠料	Material		PE+EVA	ABS
產量／小時	Production / hr		59啤	59啤
耗電量／小時	Power per hr	kWh	6.41度／小時	3.75度／小時
日平均用電(24小時)	Power per day	kWh	154度／日	90度／日
節電效率	Energy saved	%	0	41%
年節電量(365天)	Energy saved / year	kWh	0	23360度

● 備注：節能效果可能因機制不同產品而有所變化。Remarks:Energy saveing may vary due to product

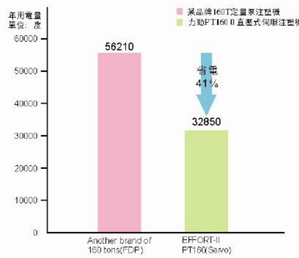
成型制品重量波動
Products weight



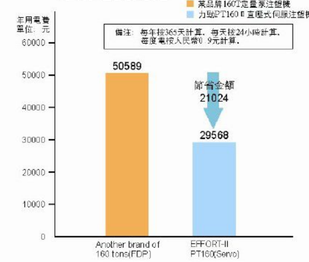
壓力響應曲綫
Pressure response curve



年用電量對比
power comparison



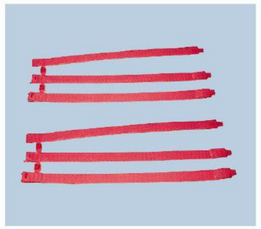
年用電費對比



2 力勁EFFORT－II PT250直壓式伺服注塑機與某品牌250T變量泵的節能測試對比
Comparison between EFFORT-II PT250 and another brand of 250tons FDP machine.

省電 54%
SAVED 54%

測試產品圖片 Product image

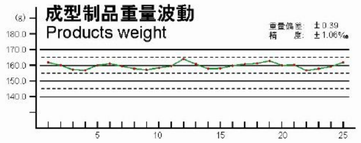


測試結果對比 Comparison

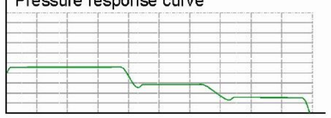
機臺系列/型號 Machine Model		單位 Unit	某品牌250T變量泵注塑機 Another brand of 250 tons(FDP)	力勁EFFORT－II PT250直壓式伺服注塑機 EFFORT-II PT250(Servo)
產品重量	Prouduct weight	g	160g	160g
模腔數目	No. of cavity		1×2Cav.	1×2Cav.
產品膠料	Material		ABS	ABS
產量／小時	Production / hr		76啤	78啤
耗電量／小時	Power per hr	kWh	19.9度／小時	9.16度／小時
日平均用電(24小時)	Power per day	kWh	479度／日	220度／日
節電效率	Energy saved	%	0	54%
年節電量(365天)	Energy saved / year	kWh	0	94535度

● 備注：節能效果可能因機制不同產品而有所變化。Remarks:Energy saveing may vary due to product

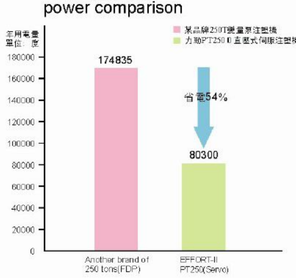
成型制品重量波動
Products weight



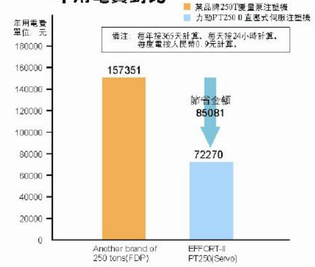
壓力響應曲綫
Pressure response curve



年用電量對比
power comparison



年用電費對比



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