



The Passionate Pursuit of Perfection

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INNOVATION

Improves Core Competitiveness
for Customers.



Injection Moulding Machine




















BOLE Machinery Breakthrougher of Plastic Moulding Process

Six main series with more than 300 machine models

Central Clamping Toggle Invention Patent in China

(Patent No.: ZL2011 10250342.5)



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Precess

BOLE Machinery (hereinafter referred to as "BOLE") was founded in 1998. As a subsidiary of CHENGLU group, BOLE is a high-tech enterprises that focus on the research, development and manufacture of precision machinery equipment. It adopts the model of "technology from Germany, made in China", integrates design, manufacture, assembly, testing and sales, and provides complete injection moulding devices special for customers. BOLE injection moulding machines are developed and directed by German experts. The machine range covers nearly 100 specifications and 6 main series, including high-precision Two-Platen DK series, hydraulic servo EK-S series, full-electric FE series, carbon-fiber products intelligent moulding line CIML series, high-speed HK series and multi-materials injection MK series. The clamping force range is from 70 ton to 6800 ton, and the injection weight range is from 65g to 60000g.

As a latecomer in China's injection moulding machine market, BOLE keeps competing continuously with other brands at markets, and wins the trust from customers with high-performance and high-stability product as well as customized service. BOLE injection moulding machines have been sold and exported to more than 70 countries so far. Especially in the last three years, the developed countries in America and Europe have grown into the main markets of BOLE.

BOLE proposes a comprehensive strategic partnership with the well-known household appliances enterprises including GREE, TCL, AUX, etc. Meanwhile, BOLE plays an important role in Auto industry and builds a strategic cooperation with famous auto-part suppliers including Ningbo HuaXiang Group, Germany Adler Pelzer Group, etc. So far BOLE has entered the supporting systems of Auto-part manufacturers and suppliers including Beijing Benz, Shenyang Huachen BMW, China FAW Group, Shanghai Volkswagen, Shanghai General Motors, Geely Automobile, etc.

In the future BOLE will take intelligence, efficiency, precision and energy saving as the direction of innovation and development, and concentrate on improving the core competitiveness of customers. Besides, BOLE will also continue to advance the path integrated by Hi-Tech industry development, professional production and perfect sales, and establish a sustainable modern high-tech brand.

- 1998** Ningbo Shuangma Machinery Industry co. LTD. was established
- 2002** Thousand-ton-level injection moulding machine was developed with proprietary intellectual property rights
- 2003** Listed as the Chinese Injection Molding Machine Characteristic Industrial Base
- 2004** Undertook the national 863 scientific research project, and built provincial engineering (technology) center
- 2005** Energy-saving servo system was developed with proprietary intellectual property rights, and the first set of super energy-saving servo injection moulding machine was produced
- 2006** Awarded Nation High-tech Enterprise by the ministry of science and technology
- 2007** CHENGLU Group wholly owned SHUANGMA Machinery, and invested 300 million RMB to build BOLE industrial zone
- 2008** Invested 130 million RMB, Introduced top talent from abroad, and developed successfully EK series injection moulding machine with central locking mechanism
- 2009** Launched small and medium-sized injection molding machines of EK series successfully; The Malaysian factory was completed and put into operation; Bole developed rapidly on transnational operation
- 2010** The third generation super-energy-saving servo precision injection molding machine EK series was developed and launched totally with cost effectiveness, outer-crank-shaft mechanism and larger parameters; BOLE's scientific research bases were established for servo energy-saving project in Chinese Academy of Sciences (CAS) and Nanjing University of Aeronautics and Astronautics (NUAA)
- 2011** BOLE entered the rapid development stage, and Central Locking Structure of EK series was awarded the national patent. (Patent No.ZL201110250342.5)
- 2012** Large-volume injection moulding machine was developed
- 2014** Became the Top 25 enterprise of comprehensive strength among China's plastic machinery industry; Became the Top 10 among injection moulding machine enterprises in China
- 2015** The team led by a senior German expert, developed world-leading Two-platen machine DK series successfully; Carbon-fiber products intelligent moulding line CIML series was developed and launched; became No.1 on the growth rate of China's plastics industry; established a Strategic cooperation with Gree Electric Appliances Inc
- 2016** Launched servo energy-saving injection moulding machine EKII series
- 2017** Joined China plastics processing industry association (CPPPIA) and became the governing unit; R&D success on the next generation of EK-S series
- 2018** R&D success on well-built MK series
Successful development on MK series with multiple injection unit Gain market recognition after application of Ultra-high Molecular Weight Polyethylene mould technology. In the down market environment of the overall industry, the performance has grown steadily and reached a record high.
- 2019** Successful development on optical IMM and rolling belt IMM , put into market one after another

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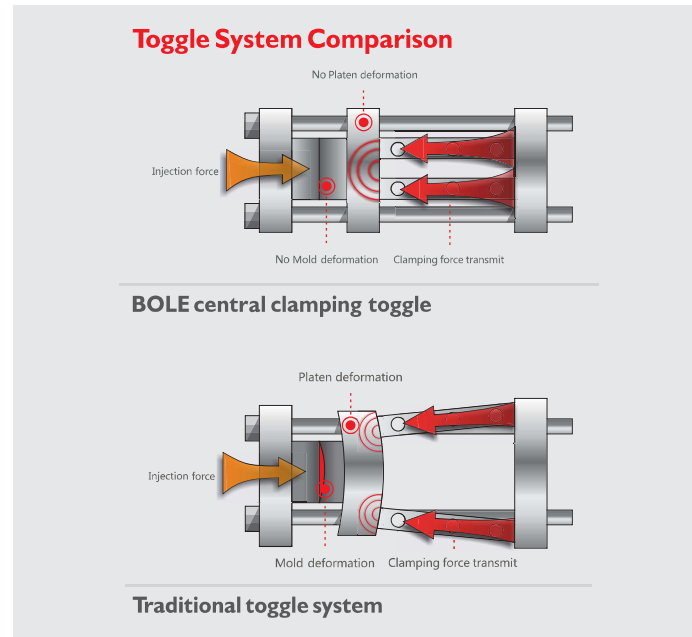
USER SATISFACTION IS THE PURPOSE

The service only starts, the satisfaction has no end,
the user's satisfaction is our eternal pursuit!

Our sales network covers more than 73 countries.
Our Customers(partners):



Central Clamping Toggle Invention Patent in China



01 High utilization of clamping force

After sample survey, clamping force efficiency of BOLE central clamping toggle design can reach 100%, Clamping force efficiency of traditional edge clamping force only can reach 80-85%.

03 High accuracy Less possibility of flash

Repetitive positioning accuracy of mold opening&closing: $\pm 1\text{mm}$
Product weight repetitive accuracy: $\leq 0.5\%$
Less possibility of flash, and save flash trim process

05 Wide mould size application rage

The latest clamping toggle with less platen distortion, can bear averaged force and apply for the smaller molds.

02 Material Saving

BOLE central clamping toggle design can save 2-5% material for 80% of customers mold (comparing to customer's molds damping toggle design).

04 Offer better protection for molds and platens

The latest design of damping toggle, averaged force and less distortion for mould platen. Precise low-pressure function for mould closing, proportional pressure control, iso-stress mould platen design, to extend mould life.

06 Bigger opening stroke

Central damping toggle can provide bigger opening stroke&ejection stroke than other brands' stroke, and can install larger molds easier (Especially for deep cavity working condition.)



**Central Clamping Toggle
Invention Patent in China**
(Patent No.: ZL2011 10250342.5)

EKS Hydraulic Servo Energy Saving Injection Moulding Machine

More than 60 technical upgrading in terms of mechanical, electrical, hydraulic, software and assembling process.



Stable

Structural rigidity increased by 30% with more than 60 technical innovations, excellent performance reaches to European standards.

Accurate

Mold open&close positioning accuracy : $\pm 0.5\text{mm}$
Injection positioning accuracy: $\pm 0.2\text{mm}$
Injection weight accuracy : 3%

Economy

After sample survey, we conclude BOLE central damping toggle design can save 2-5% material for 80% of customers' mould, comparing to traditional edge clamping toggle design.

Intelligent

Intelligent networking management system

March into industry 4.0, opening a new era of intelligent factories

High performance PLC of MMI, which getting information of the robot, mold temperature controller, cooling water, machine accessories etc, realize data interaction, wireless networking management system. Besides, PC or cell phone terminal can always tell machine information, process parameters, operation status, failure situation and product analysis at a glance. Order dispatched by computer, which aims to working efficiency maximization, better product planning and operation control, production efficiency improvement. Meanwhile, we provide MES data exchange terminal, making it possible to automate the whole line of the factory.

EKII Series Hydraulic Servo Energy Saving Injection Moulding Machine



Big

Dimension-one level bigger than competitors

Precise

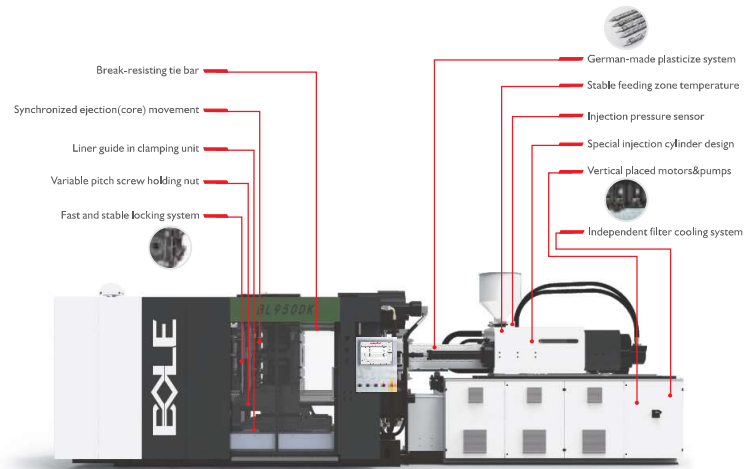
Finished products with high precision

Save

Save 2-5% material for customers

DK Series Two-platen Injection Moulding Machine

GERMAN TECHNOLOGY MADE IN CHINA



DK Series two-platen injection moulding machine, designed by BOLE German chief engineer, will bring big change to two-platen machine market of China.

Operated by independent team, ensure machine with German level quality and European grade machine performance.
More than 100 tests and 20 patents, all-round improvement in speed, precision, stability.
Benchmarking European IMM brand, DK already become the best choice for auto industry.



OTTO KARL
Chief engineer
German top expert



FE Series Electrical Injection Moulding Machine

Precise High-speed Common Reliable

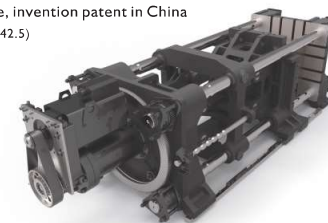


Advantage Of Full Electrical Injection Moulding Machine Compared to the traditional hydraulic injection moulding machine

- Energy Saving**
Efficient energy conversion, Reduce power consumption. No need water for hydraulic oil cooling.
- Clean**
No pressure hydraulic oil, keep a clean production environment
- Efficient**
Synchronous machine movement is possible to achieve a short cycle time
- High Speed**
High-speed & smart movement control for mold and injection, fulfill different application
- Precise**
Up to 0.01mm high position control accuracy, ensure product quality
- Quiet**
Low noise level, create comfortable environment

E-version of Central Clamping Toggle System

Central clamping toggle, invention patent in China
(Patent NO:ZL2011 10250342.5)



- Saving**
Save material
Save electricity
Save nr. Of machine
Save maintenance
- Precise**
Precise position
Precise speed
Reliable mold protection
Precise parallelism
- Large**
Large space between tie-bars
Large open stroke
- Clean**
The product area is free of oil

Patented Encapsulated Ball Screw Structure



Breakthrough

- Encapsulated ballscrew, reduce the requirement of workshop environment
- The heat created by friction is taken by oil bath, Ballscrew is well kept cool.
- Lubrication is kept on the friction surface by oil bath

CIML Series Carbon-fiber Products Intelligent Moulding Line

LFT-D-IM Technology Advantages

Specialized in light weight production for Auto industry

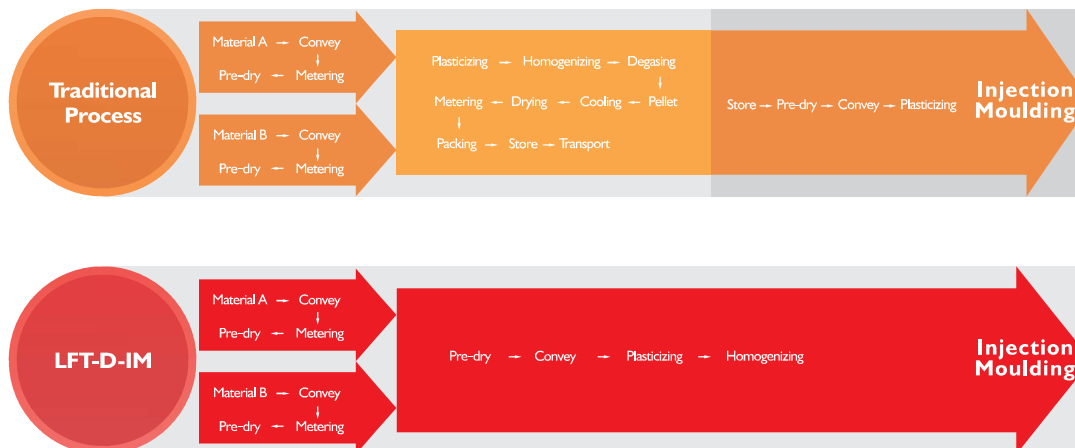
Focus to be:

One stop Solution provider of fiber reinforced composites molding process.

As the edged tool tailored by "lightweight of automobile", CIML carbon fiber product intelligent moulding line combines equipment, technology and material and units the "prilling" and "injection moulding" into one, provided fiber reinforced composite moulding technology to help all the customers enhance the core competitiveness.



- Less Energy
- Less Material
- Less Cost
- Higher Efficiency
- Advanced Performance



10 Save 10 Procedures
Reduce energy consumption, improve efficiency
One step with multiple programs
One step with multiple materials

3 3 Time Longer
Reduce one heating process, avoid damage on Polymer chain increase fiber length(VS LFT-G)
Fiber Length
LFT-D-IM 5-8mm
Traditional Process 1-3mm

1/3 Cost Saving 1/3
Reduce the amount of material
Reduce the cost of material
User-defined material formulation process
Independent intellectual property

MK Series Multiple Injection Moulding Machine

With excellent performance and quality, BOLE MK series multiple IMM will better meet the demand of automobile, household appliances, daily necessities, food packing and toy industries for their appearance and personalized design and will help customers improve their core competitiveness.



Precise

Mould open & close positioning accuracy: $\pm 0.5\text{mm}$
Injection weight accuracy: 3‰

Flexible

The injection moulding progress is set according to the characteristics of product to ensure product quality

Energy saving

Hydraulic servo system has advantages of saving energy, protecting environment and high control accuracy

Economy

After sample survey, BOLE central clamping toggle design can save 2-5% material for 80% of customers mould (comparing to customer's moulds clamping toggle design).

Rotary Platen

With wide plate design, the mould volume is big and has a wide range of applications. Meanwhile, it also has variety of functions and can meet customers' specific needs.

Standard with servo turntable system

Turntable is fast, stable and precise in movement;
Easy to operate. Stable in oil pressure and oil temperature.

Tie-bar detach

Without lubrication on the connection between tie bars and platens, so clamping unit keeps clear.
No copper bush to be wear out for machines from 170-450Tn

Linear guide

MK series from 170-450Tn, all adopt linear guide. High-precision and high-rigidity linear guide, matches with slide foot to assure excellent parallelism and positioning accuracy. Linear guide with low friction and little energy consumption, makes mould opening and closing faster and more stable. Meanwhile, avoid the problem of lubricating oil splashing, making the whole machine run more stable and faster.

Two sets of independent injection cylinders at Injection Unit

Two sets of independent injection cylinders at Injection Unit, which can be matched according to customers' requirements.

Single injection cylinder structure

Based on this special structure, the injection piston won't rotate together with screw to avoid the risk of oil leakage.

German designed plasticizing system

German designed plasticizing system, based on common materials, e.g. ABS, PS, PP, the plasticizing efficiency is at least 20% better than that of domestic level.

Stable feeding zone temperature

Temperature at feed opening is under control of closed loop at temperature unit. It improves the efficiency and accuracy of Injection Unit.

High rigidity frame

All modes of MK adopt high-rigidity machine frame, linear guide and modular design to achieve better performance.

Ultra-high Molecular Weight Polyethylene Moulding Machine

GERMAN TECHNOLOGY MADE IN CHINA

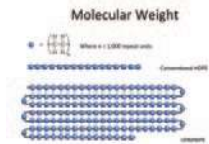


Advantages of UHMW-PE injection moulding machine

- One-step moulding technology, no need secondary processing and welding, high efficiency and less manpower.
- Injection moulding technology can guarantee the high repeatability of products.
- Moulding in one, high intensity product, no leakage risk.
- Less materials waste, low production cost.

(UHMW-PE : Ultra-high Molecular Weight Polyethylene)

UHMW-PE is a linear material that have more than 1,500,000 polyethylene chains without branch in one molecule. A common UHMW-PE chains are about 1,000,000-6,000,000. The highest one can reach 10,000,000. It's an engineering thermoplastic with excellent comprehensive performance. UHMWPE is a subset of the thermoplastic polyethylene. It has extremely long chains resulting in a very tough material

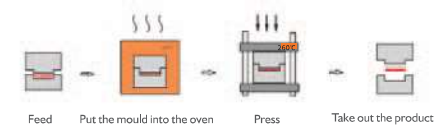


Four major difficulties encountered in the forming of UHMW-PE by the usual thermoplastic processing method :

- The melt viscosity is high, the melt viscosity is as high as 108 Pa.s, and the melt flow rate is almost zero.
- The friction coefficient is small, so it is easy to slip in the feeding section during the feeding process and cannot advance forward.
- The critical shear rate is low, and at very low shear rates (10-2/s), melt fractures may occur, which decrease with increasing molecular weight.
- The moulding temperature range is narrow and easy to oxidize and degrade.

Moulding

In the processing method of UHMW-PE, the molding-sintering method is the largest and most primitive method so far. After pressurizing the mold, the mould and the raw materials are put together in a heating furnace for heating and plasticization, and then remove the cooling and finally remove the product.



In this moulding process, the key is to control the pressure, sintering temperature and time. The pressure is small, the product texture is not dense, and the physical and mechanical properties are poor; otherwise, it will cause additional power consumption. The sintering temperature and time are selected according to different products, and it is preferred that the product be transparent. If the time is short and the temperature is low, the product will not be plasticized and will have a white core; otherwise, it will undergo discoloration and degradation.



Introduction of bole's moulding

Advantages :
Moulding mechanization, automation, and higher efficiency lower energy consumption, better working environment and reduced manpower.
Consumption and raw materials are more economical.

Our process flow



Large Volume Injection Moulding Machine



- ✧ Central clamping toggle, invention patent in China
- ✧ Fully optimized hydraulic system, improve efficiency.
- ✧ Hydraulic parts from famous international manufacturers, ensure machine with reliable performance.
- ✧ Optimized electrical cabinet design, conform to GB, CE, UL, KCS or other safety standard.
- ✧ Electrical parts from famous international manufacturers, ensure machine with reliable performance.
- ✧ KEBA controller is standard.
- ✧ Plasticizing system originated from German design, and the efficiency improve 20% above the performance of other Chinese manufacturers. (Common plastic materials ABS, PS, PP, etc.)
- ✧ Meet Custom-made requirement for complex technical process and special plasticizing solutions.
- ✧ EKII series of large volume injection improve the design for PP/HDPE/PE materials, and solve the key issues of the application such as colour exchange of large volume injection, carbon deposition of injection piston and barrel exhaust.

Special Machine Series —Naloy Tap Injection Moulding Machine

BOLE-CABLE TIE Customized injection moulding machine can help our customer solve these problems very efficiently.

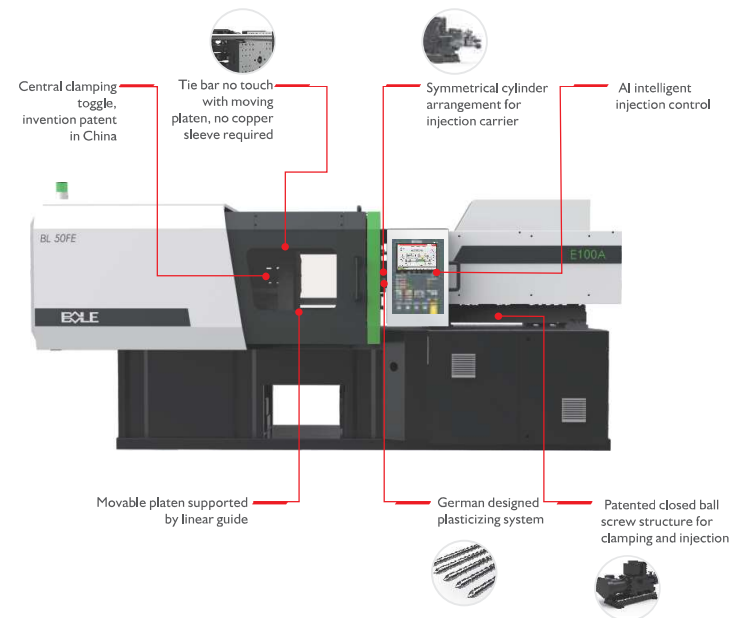


- Based on the technical features of the cable tie special IMM, BOLE R&D team made a lot of technological breakthrough especially on tie bar protection aspect. With BOLE new technology, machine tie bar life time can be extended efficiently.
- BOLE central clamping toggle, 100% clamping force use, and offer good protection to moulds and machine platens
- Professional plasticizing system for Cable Tie with German design, works with lower heating temperature which make can prevent the PA material from degradation.

Special Machine Series —Optics Injection Moulding Machine

Bole ultra-precision full-electric optics injection moulding machine can effectively solve the following problems for you

- ❗ The deformation of the mould platen is caused by the conduction of the mold temperature, which makes the amount of the optical axis offset and the surface precision of the two curved surfaces of the lens too large
- ⦿ Products have white spots and black spots
- ⚠ Tilting the fixed template and opening the mold to tilt the template
Moving template straight forward accuracy is not smooth
Frame deformation, moving template sinking
Move template horizontal and vertical offset
- ❌ Injectable products have poor stability and low pass rate



Special Machine Series —CIM MIM Injection Moulding

MIM CIM Injection Moulding Technology Introduction

Ceramic Injection Moulding (CIM) is similar to Metal Powder Injection Moulding (MIM), which is the main branch of powder injection molding (PIM) technology. It is based on polymer injection molding technology developed. It is the fastest growing and most widely used manufacturing technology in the world due to its ability to produce complex shaped products with high dimensional accuracy, low machining volume, smooth surface, low cost and suitable for mass production.



Special Machine Series —Special Machine for 5G Mobile Phone Shell



Future 5G mobile phone shell development direction

As 5G mobile phones come to the forefront, their requirements for signal interference become higher. Traditional metal frames have a greater impact on signal transmission. Therefore, 5G mobile phone cases will be replaced by new materials such as plastic or ceramics in the future. Currently, 5G mobile phone cases are adopted. The modified PC is injection-molded to overcome the rainbow pattern, using an injection molding process, and ceramic powder injection molding.



Injection moulding advantage

- Less rainbow stripes after hardening
- Solve the cracks and local chromatic aberration caused by injection hardening
- Solve the local thin-wall filling
- Solve the unevenness of product
- Solve the deformation caused by heating in back-end production
- Solve the dimensional stability of injection molding



Machine model: BL 150FE

Raw material: PC SC-1220
Cavity: one
Product: Mobile shell
Thickness: 0.75mm
Cycle time: 12.0s

Special Machine Series —Special Machine for Mobile Phone Accessories



Mobile Phone Accessories Industry Status

According to statistics, the national quarterly sales of smart phones is about 100 million units in recent years, smartphones have become a necessity for people. The so-called "water rise" "The ship is high", the hot market of the smartphone bring the smartphone accessories market hot rise.

For the characteristics of this product, such as thin wall, light weight and difficult to form, with the advantage of the patented clamping structure, and the characteristics of the industry, Bole machinery designs the special machine for mobile phone accessories, focusing on the application of phone accessories (frame, case, button), electronic connectors, electricity sub-consumer products etc mainly made by PC and elastomers.

Advantages of injection moulding machine for mobile phone accessories

- Central clamping toggle, invention patent in China
- Special screw for phone accessories, prevent black-spot, while-spot or yellowing
- Stable feeding zone temperature enhance working stability
- Prevent black-spot plating treatment for feeding zone
- High-performance soft tube, without any welding, prevent oil leakage.
- Intelligent software design/ EST Controller as standard
- Mold open & close positioning accuracy $\pm 0.5\text{mm}$
- Product weight repeating accuracy $\leq 0.3\%$



Machine model: BL 130EKII/C290

Raw material: TRU 1090
Cavity: 2
Product: 5.5 soft phone shell
Thickness: 0.7mm
Cycle time: 14.0s

Special Machine Series —HK Series High Speed Machine

Advantages of high speed machine

- Based on standard structure, HK damping structure will be improved by 100% on mould platen rigidity, tie bar rigidity and frame rigidity.
- HK injection unit is with special single injection cylinder design and injection rod is not rotating with screw, which will be no oil leakage risk.
- HK injection speed is from 350mm/s to 600mm/s, which can meet the package and zip tie molding requirement.
- HK whole series machine is equipped with BECHHOFF controller, which is imported from German.
- The response time is 12.5ms.
- Equipped with SM third generation low inertia servo system, minimum response time can be 35ms and save energy 50%.
- Equipped with multi-grade eject function, pulse eject function available.



Special Machine Series—SCFoam

Supercritical Microcellular Foaming Injection Process Introduction

Microcellular supercritical Foaming Technology is a new technology, it break through the limitations of traditional injection molding. This new technology is the mixture of supercritical co2 or N2 injection to the special plasticizing device, make the gas and molten material fully mixing/diffusion, injection the mixed material into the mold, make huge pressure drop, so that its internal precipitation form a large amount of bubbles nuclear; During the cooling process, the inside bubble nuclear growing till finalize design, eventually get the supercritical microcellular plastic products.



DK Series Two Platen Injection Moulding Machine



EKS Hydraulic Servo Energy Saving Injection Moulding Machine



Special Machine Series —PET Special Injection Moulding Machine

Advantages of PET injection moulding machine

- Large R/D high efficiency plasticizing screw designed by Germany
- The plasticizing efficiency is 20% higher than domestic level.
- Compared with traditional toggle machine,BOLE patented central clamping structure can save 2-5% material for more than 80% molds.
- Larger plasticizing motor,faster plasticizing speed.
- Bigger ejecting force
- Multiple core pulling modes
- Low inertia and high efficiency servo saving system



Special Machine Series —Make-up Injection Moulding Machine

EKS series has variable advantages. According to the characteristics of the cosmetic packaging, BOLE machine can solve the problems of black and white spot of transparent PC/PMMA,MS,PS products ; white spot and black spot of PETG tube and nozzle products.



Special Machine Series —PVC Special Injection Moulding Machine

Advantages of PVC injection moulding machine

- Designed by Germany PVC special screw, the plasticizing efficiency is 20% higher than domestic level.
- Barrel cooling by air (fan or compressed air)
- Compared with traditional toggle machine,BOLE patented central clamping structure can save 2-5% material for more than 80% molds.
- Larger plasticizing motor,faster plasticizing speed.
- Wider safe door for PVC products
- Multiple core pulling modes
- Low inertia and high efficiency servo saving system



Special Machine Series —BMC Special Injection Moulding Machine

- BMC special plasticizing pressure and loading system,more adaptation.
- Designed by Germany BMC special bi-metal screw and barrel, the plasticizing efficiency is 20% higher than domestic level.
- Water cooling device for barrel has the anti-condensation.
- Insulation platen and 12 groups mould temperature controller
- Larger plasticizing motor, faster plasticizing speed.
- Compared with traditional toggle machine, BOLE patented central clamping structure can save 2-5% material for more than 80% molds.

