



MK6 vs XX-II/IIS (Internal Confidential)















Measured Performance

Specifications vs
Actual Measured

INTERNAL ONLY

Summary Scoring

Model	General	Electricals	Hydraulics	Mechanics	Total Score
JM168-MK6					16
XX1600II					12
XX1600IIS					12

Highest Actual Measured Speed for All Specifications at 99% Settings

		Units	XX1600II	XX1600IIS	JM168-MK6
Max. Clamp Closing Speed		mm/s	696	638	817 (+28%)
Max. Clamp Opening Speed		mm/s	1,197	1,010	1,313 (+30%)
Max. Injection Speed		mm/s	104	100	108 (+8%)
Max. Plasticizing Speed		rpm	206	217	224 (+9%)
Ejector	Max. Eject Speed	mm/s	375	295	527 (+79%)
	Max. Return Speed	mm/s	355	341	496 (+45%)
Carri- age	Max. Fwd Speed	mm/s	50		102 (2x)
	Max. Bwd Speed	mm/s	62		77 (+24%)
Max. Mould Adj. Speed		mm/s	2.0	2.3	2.5 (+25%)

Comparison in Actual Production

	XX1600II	JM168-MK6
Part	Thin-Walled Enclosure Part	
Resin	ABS	
Screw Diameter	D45	D46
Shot Weight	28.1g	28.1g
Cycle Time	29.1 sec.	21.2 sec. (-27%)
Productivity	120 / hour	169 / hour (+41%)
Electricity Consumption	796 kW/kg	634 kW/kg (-19%)

What Makes The Difference

Precision Hydraulics®
for the MK6



Precision Hydraulics®

- Next-Gen computer control algorithms and hydraulics circuit design
- Developed by senior Japanese engineers with decades of technical expertise, using advanced hydraulics simulation software
- Enhancement of 3rd Gen Servo-Pump technology: from 3G to 4G
- Eliminates unnecessary pressure drops for ultimate precision

Precision at HIGH SPEED

(JM168-MK6 has *sustainable* dry cycle of only 1.9s)

Rock-Solid Stability

(little vibrations and shocks even running at max. speed)

High Repeatability

(tolerances < 0.05%)

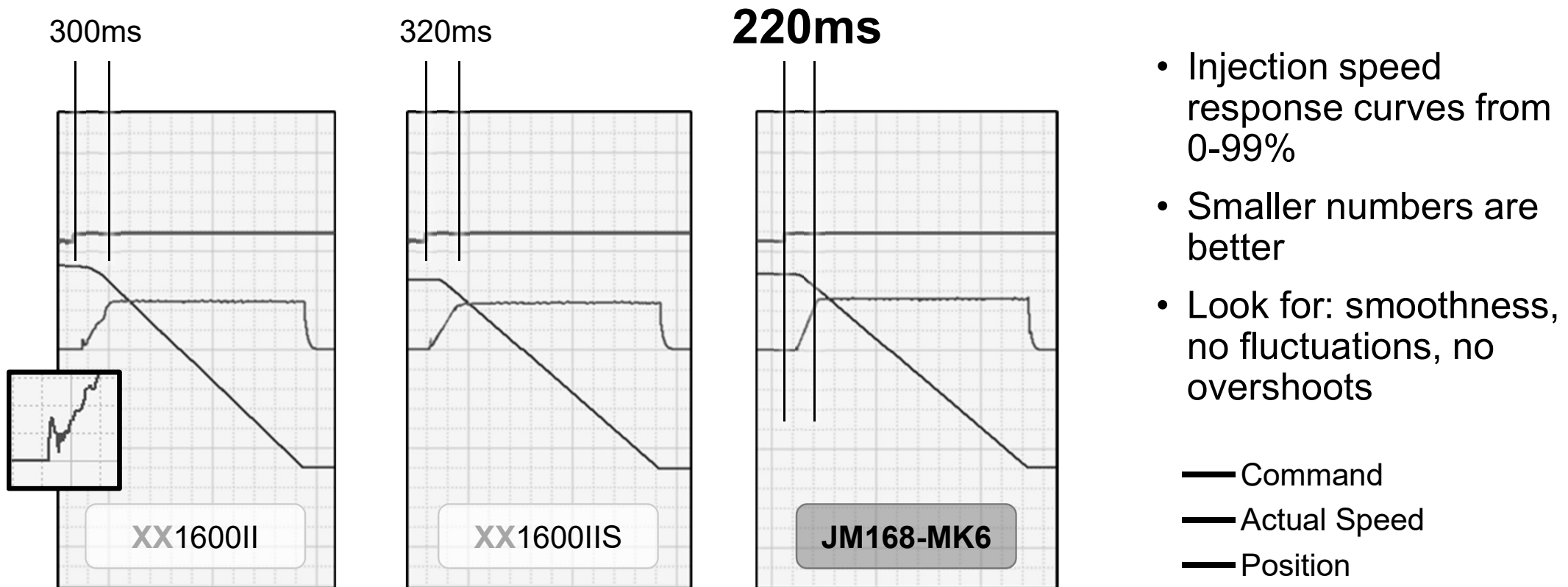


Injection Performance

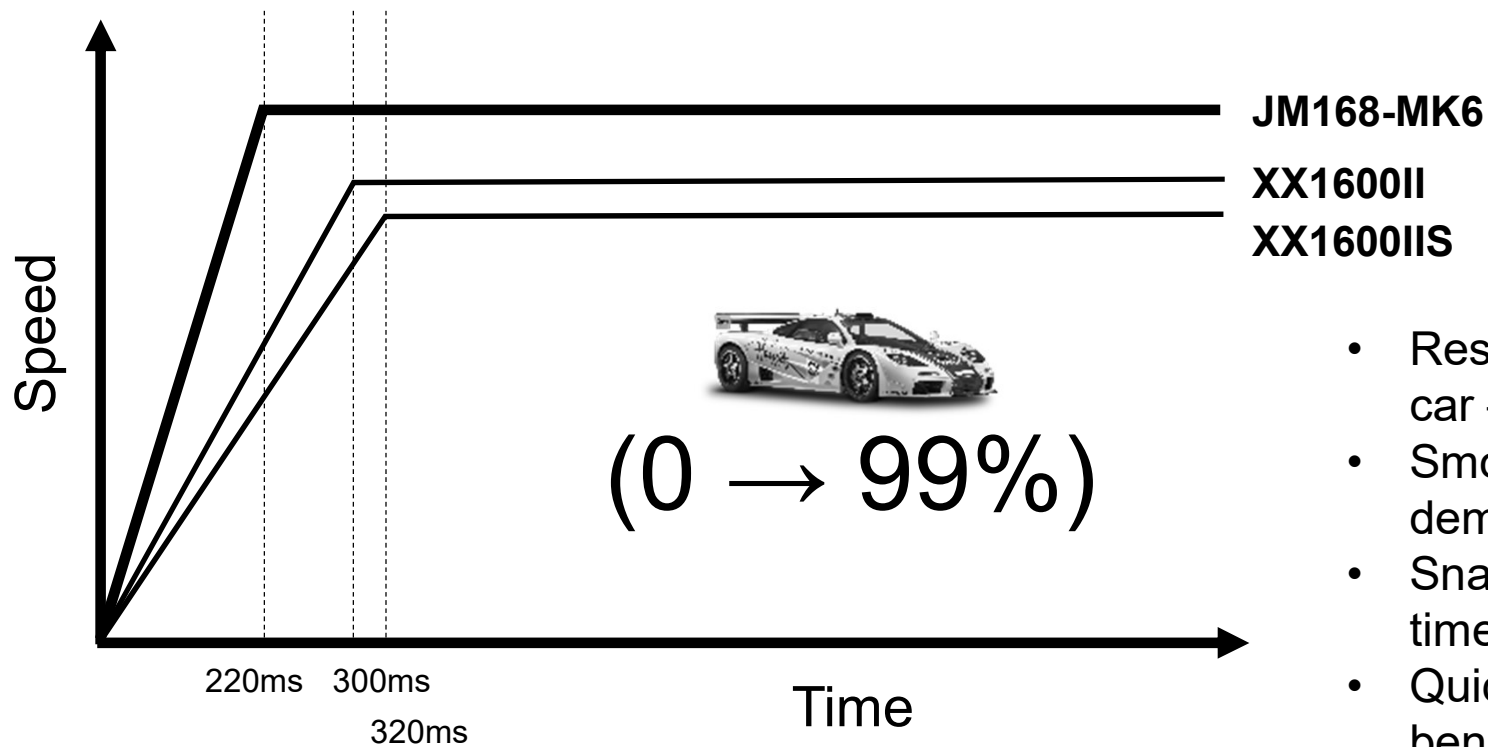
Comparisons of Injection Specs &
Actual Measurements

INTERNAL ONLY

Injection Speed Response (0 → 99%)



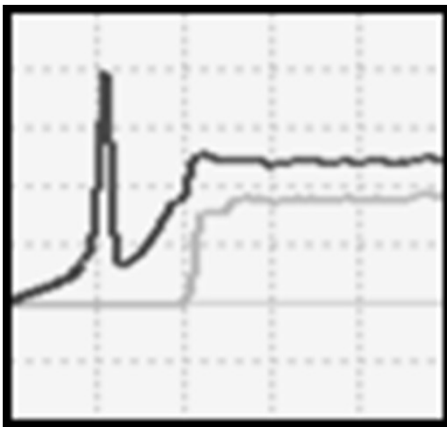
The Importance of Speedy Response



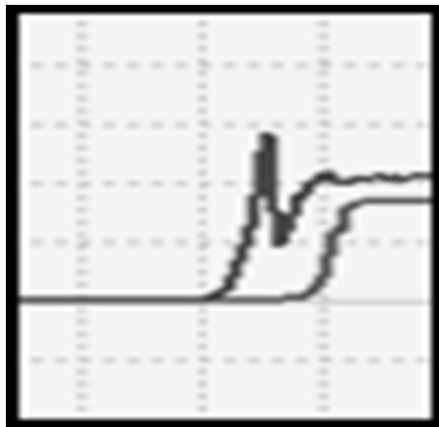
Notes

- Response is similar to a sports car – 0-100kph acceleration time
- Smooth rides at high speed demands quick responses
- Snappy responses reduce cycle times, increase productivity
- Quick responses are particularly beneficial to difficult or thin-walled moulding processes

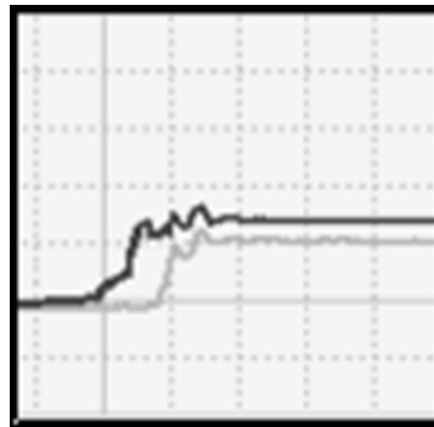
Injection Pressure Control



XX1600II



XX1600IIS

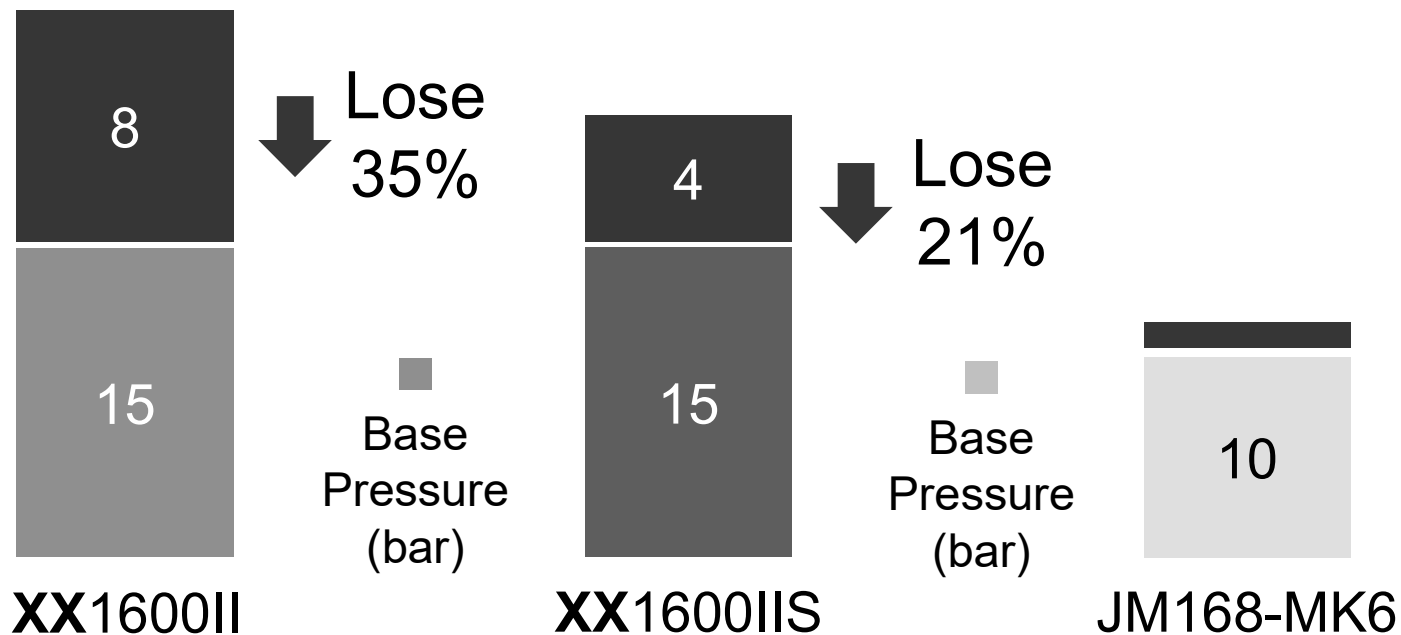


JM168-MK6

- Look for: smoothness, no fluctuations, no overshoots
- Injection pressure control is vital to ultimate part quality
- Special materials (e.g. engineering resins) are particularly sensitive to pressure fluctuations
- Stable injection pressure has a definitive impact on yield rates
- MK6 has superior pressure control

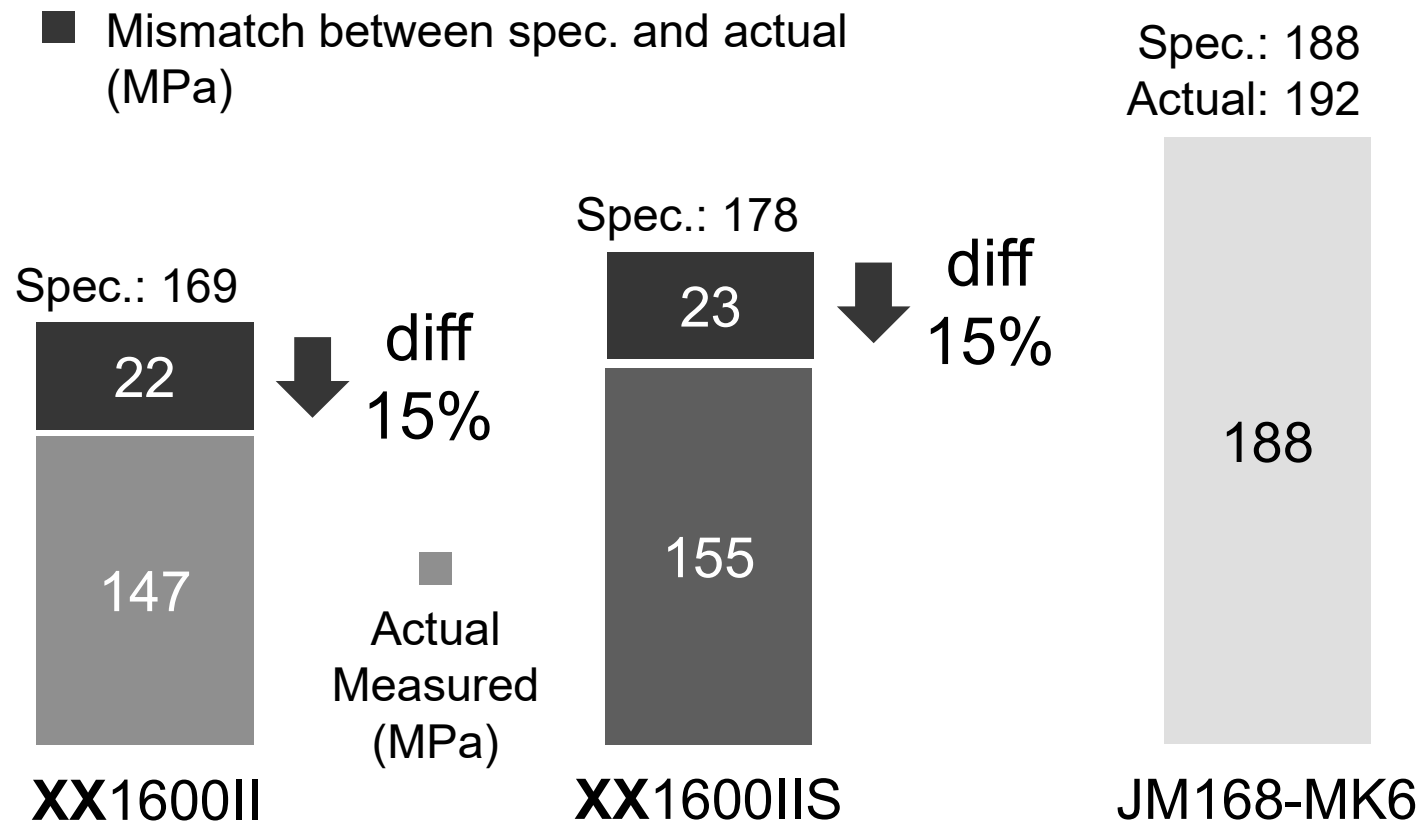
Injection Base Pressure and Pressure Drop

■ Pressure Drop (bar)



- Smaller numbers are better
- Base pressure and pressure drops are non-work wasted energy dispersed as heat, requiring even more energy to cool
- High base pressure or pressure drops leads to significantly lower power efficiency and energy saving
- MK6's *Precision Hydraulics*® all but eliminates pressure drops and has very low base pressure

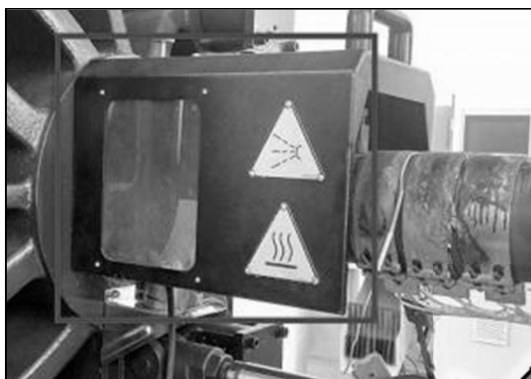
Injection Pressure: Spec. vs Actual Measured



- Injection pressure: bigger numbers are better
- Higher injection pressure means better and more consistent part quality
- Should not exist material differences between actual measured pressure vs specification

Nozzle Protection Guard

Window



XX1600II

Easy to operate



no window



XX1600IIS

not convenient

Window



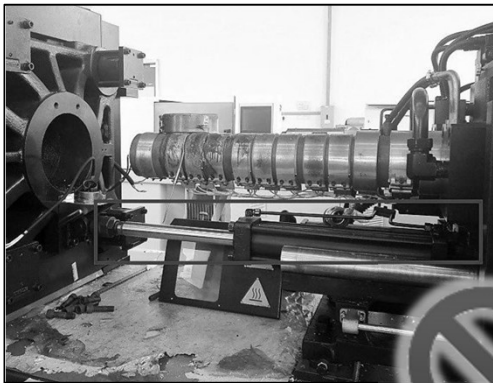
JM168-MK6

Easy to operate



Injection Carriage Cylinders

Single Cylinder



XX1600II

Forces unbalanced
Hinders high-speed
injection

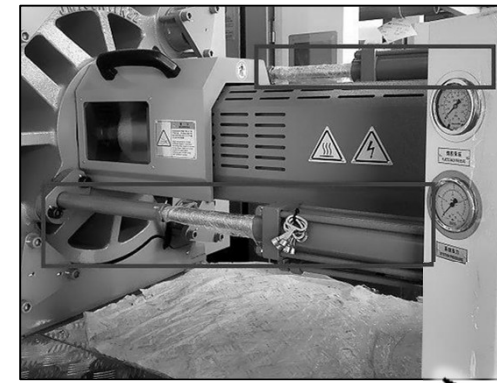
Single Cylinder



XX1600IIS

Forces unbalanced
Hinders high-speed
injection

Dual Balanced



JM168-MK6

Completely balanced
for high speed

Injection Base

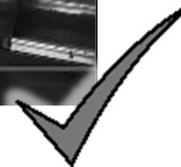
traditional guide rods



XX1600II

not designed for
high-speed injection

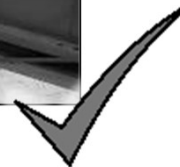
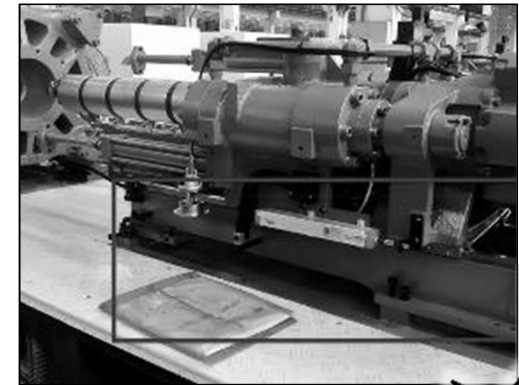
Linear Rails



XX1600IIS

Smoothness for
high-speed injection

Linear Rails



JM168-MK6

Smoothness for
high-speed injection



Holding Performance

Comparisons of Holding Specs &
Actual Measurements



INTERNAL ONLY

Holding Pressure Response (0 → 99%)

290ms



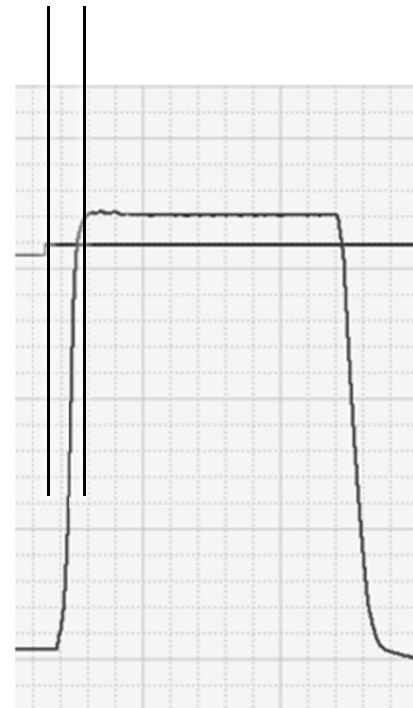
XX1600II

590ms



XX1600IIS

270ms

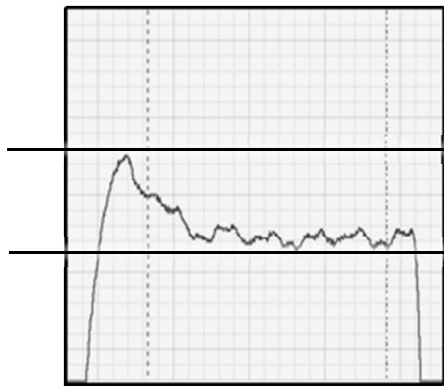


JM168-MK6

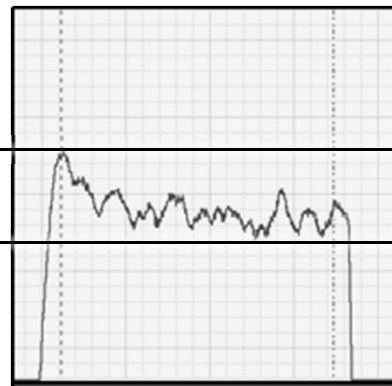
- Holding pressure response curves from 0-99%
- Smaller numbers are better
- Look for: smoothness, no fluctuations, no overshoots
- Stable holding pressure is vital to part quality and high yield
- **XX-IIS** degrades response speed to avoid overshoots from higher system pressure

— Pres. — Cmd.

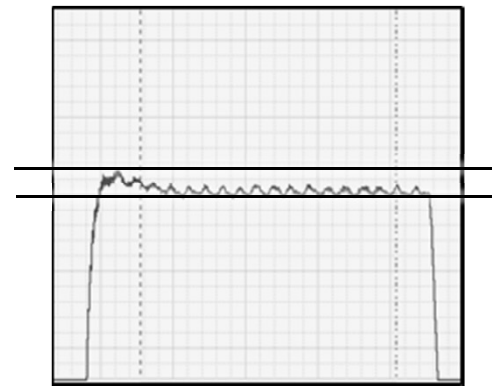
Pressure Control



XX1600II



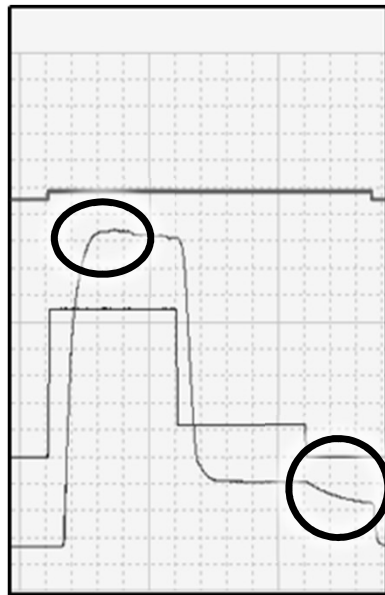
XX1600IIS



JM168-MK6

- Look for: smoothness, no fluctuations, no overshoots
- **XX-II/IIS** have lower quality pressure control – i.e. high fluctuations and overshoots
- MK6's innovative *Precision Hydraulics*[®] technology yields precise pressure control
- Precise pressure control is vital for demanding, pressure-sensitive applications such as optical parts

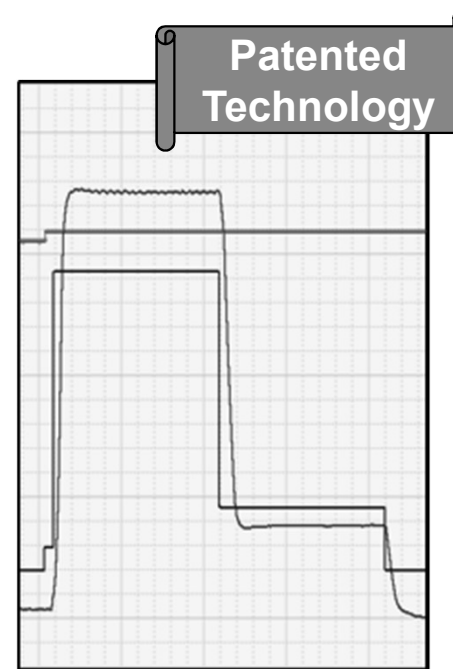
V/P Switch-Over Response



XX1600II



XX1600IIS



JM168-MK6

- Look for: smoothness, no fluctuations, no overshoots
- Precise and stable V/P switch-over is vital for demanding applications requiring precise dosing

— Injection Command
 — Actual Pressure
 — Pressure Command



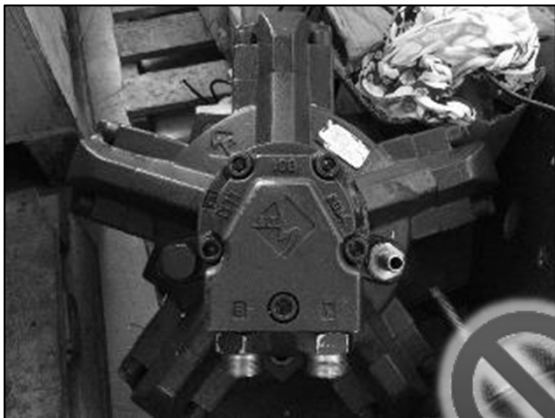
Plasticizing Performance

Comparisons of Specs &
Actual Measurements

INTERNAL ONLY

Plasticizing Motor Size and Torque

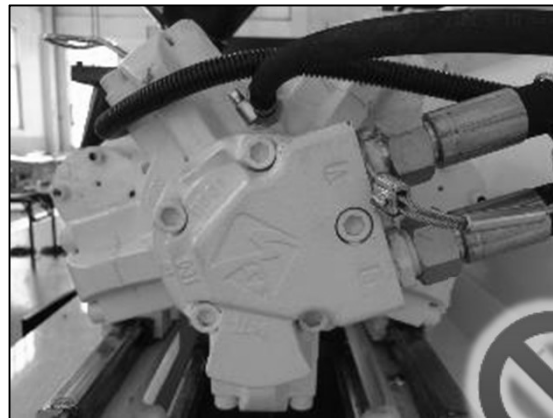
slow and weak



XX1600II

Size: 500cc
Unit torque: 66 Nm

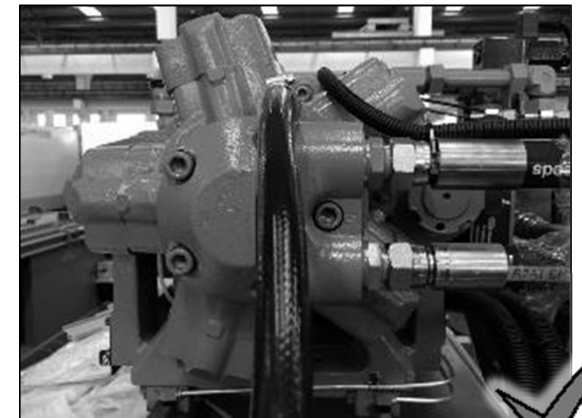
even slower and weaker!



XX1600IIS

Size: 400cc
Unit torque: 51 Nm

Fast and Strong



JM168-MK6

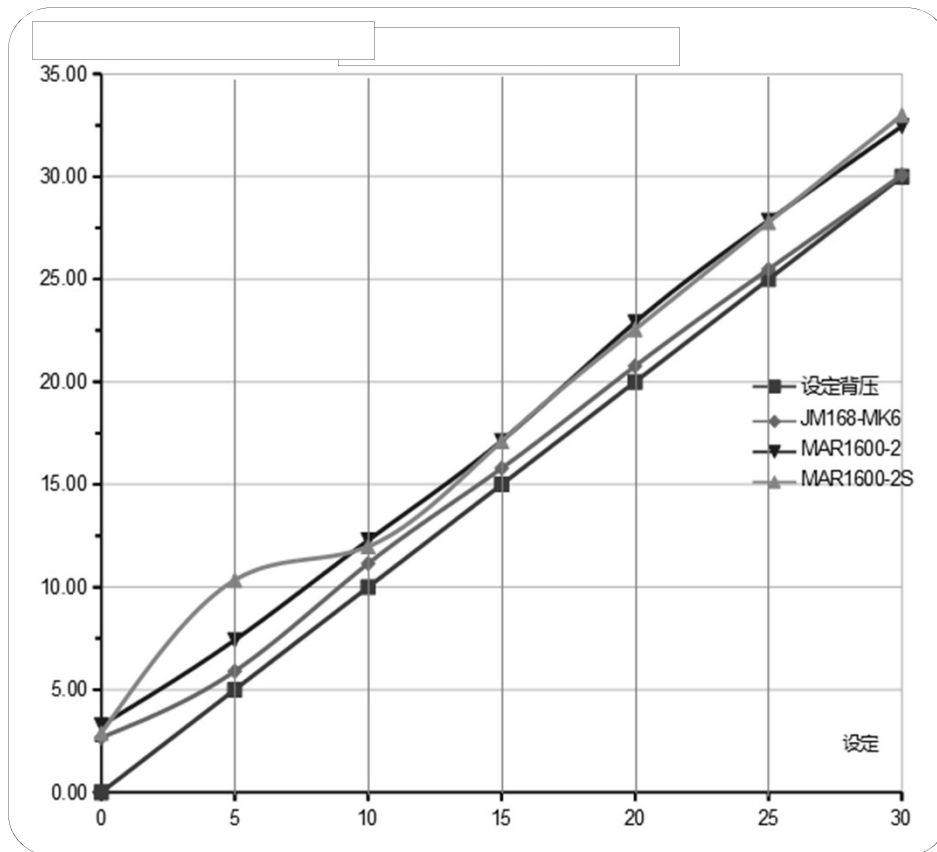
Size: 500cc
Unit torque: 80 Nm

Plasticizing Torque

Model	Screw Diam.	Flow Rate	Unit Torque	Max. Pressure	Max. Torque	
JM168-MK6	46mm	500cc	8	175 bar	1,400	
XX1600II	45mm	500cc	6.6	140 bar	924	↓ 34%
XX1600IIS	45mm	400cc	5.1	175 bar	714	↓ 49%

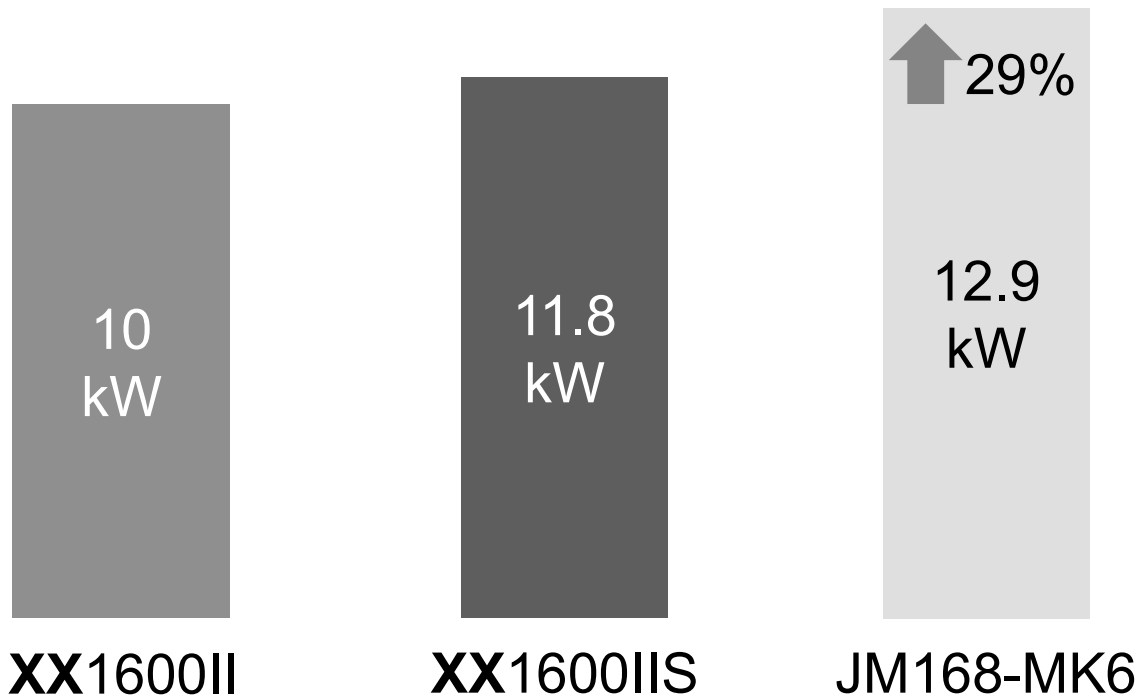
Due to reduced power-pack of the **XX-IIS**, the hydraulic motor is artificially made smaller to maintain plasticizing speed, at the expense of very low torque (bad for engineering resins)

Plasticizing Back Pressure Control



- Tracking closer to optimal (blue line) better
- Precise back pressure control is vital for processing sensitive resins
- MK6 almost tracks optimal perfectly, even at low pressure
- **XX-II/IIS** consistently overshoots and cannot achieve low back pressure

Max. Heater Power



- Bigger numbers are better
- Inadequate heating power reduces plasticizing quality and efficiency, lengthens cycle time



Clamp Performance

Comparisons of Platen and
Toggle Designs, Specs &
Actual Measurements

INTERNAL ONLY

Dry Cycle Time

3.4 sec. (+80%)

XX1600IIS

3.5 sec. (+84%)

XX1600II

Japanese Hydraulic
& Mechanical Tech.

1.9 sec.

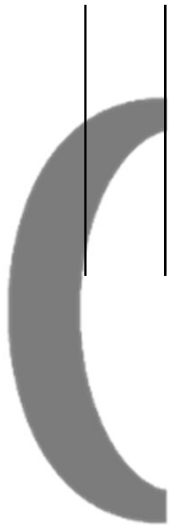
JM168-MK6

- Smaller numbers are better
- Look for: smooth motion, no fluctuations, no overshoots
- MK6's toggle mechanism and hydraulic circuit is based on advanced Japanese designs, enabling ultra-high speed operations

— Clamp Speed
— Clamp Position

Platen Deformation

0.166mm



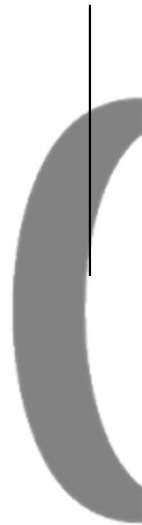
XX1600II

0.148mm



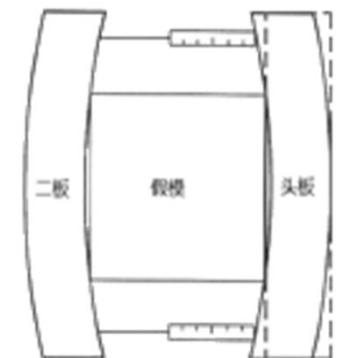
XX1600IIS

0.15mm

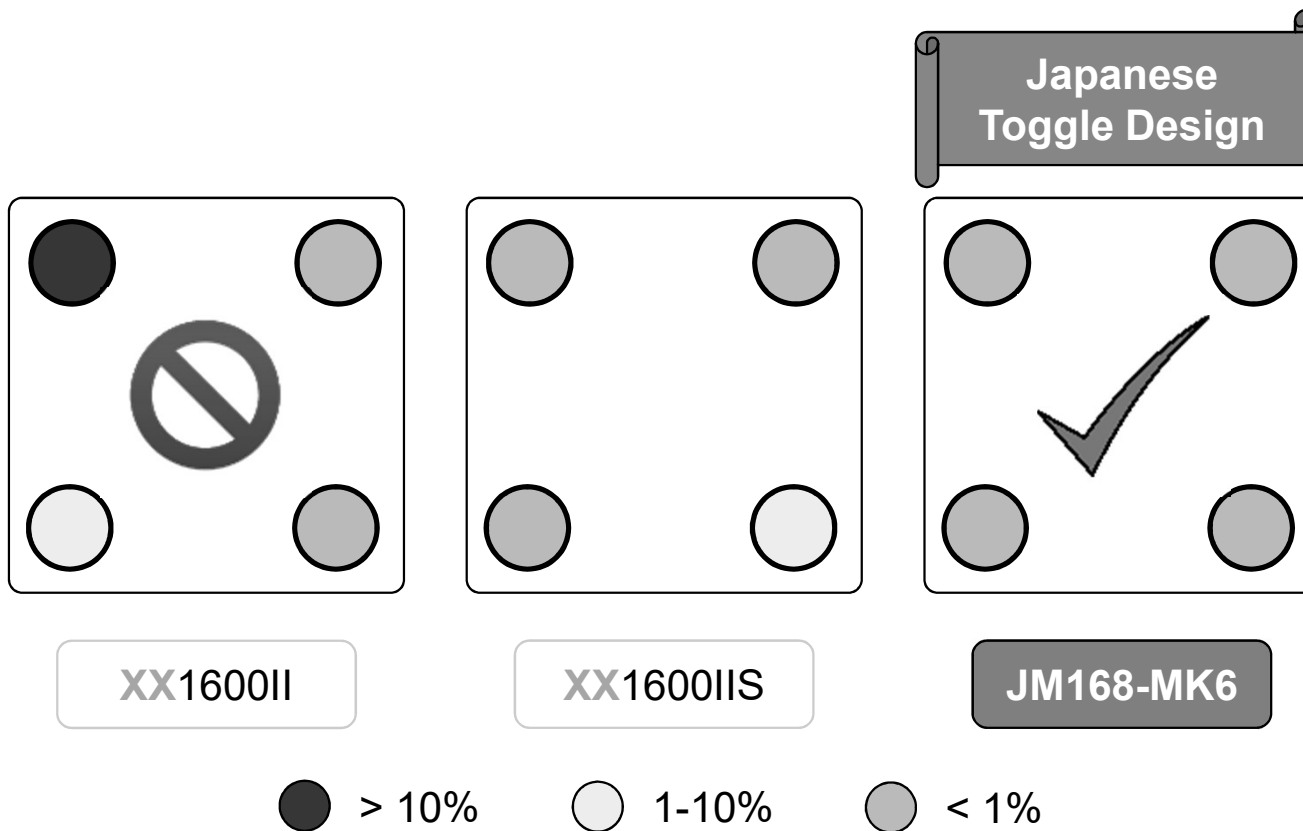


JM168-MK6

- Smaller numbers are better
- Large deformations can cause flashes
- MK6 v.next will target <math><0.1\text{mm}</math> deformation



Uniformness of Tie-Bar Deformations



- All four tie-bars must deform equally, or uniformly, for the best part quality without flashes and internal stresses
- Only MK6's special toggle design based on advanced Japanese technology guarantees absolute uniformity

Bushings for the Moving Platen

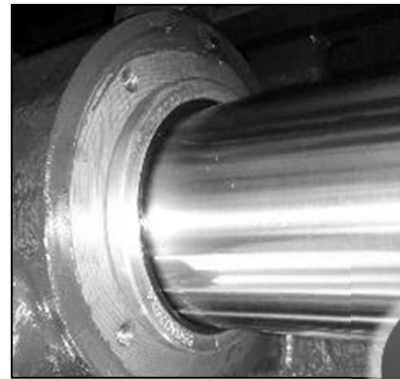
metallic



XX1600II

high friction

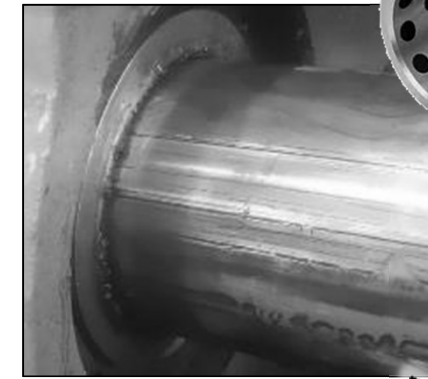
metallic



XX1600IIS

high friction

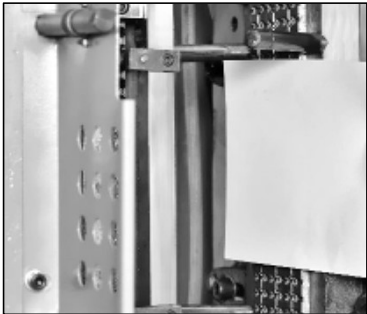
Oil-less Bushings



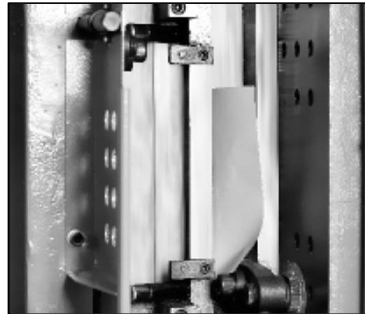
JM168-MK6

Smooth motion
Low friction

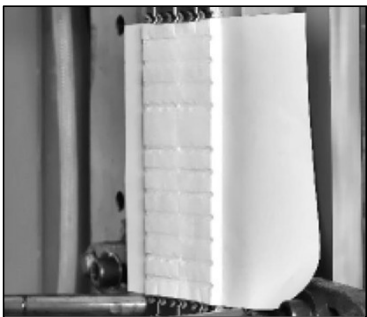
MK6 – “A4” Mould Protection Feature



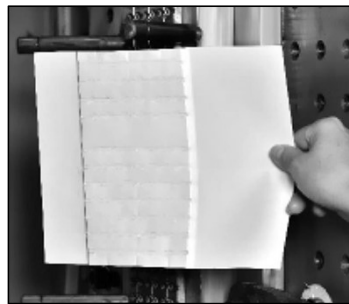
Place sheet of A4 paper inside clamp



Close clamp at 99% speed & pressure!



Clamp bounces open and alarm sounds



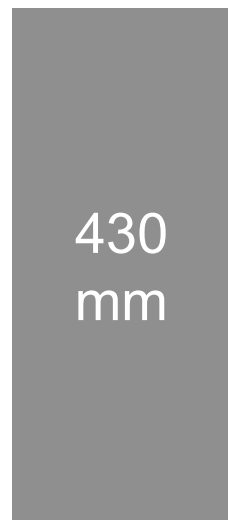
Inspect paper: it is not even punctured through!

- MK6 delivers the ultimate in mould protection – a single sheet of A4 paper, at 99% clamp speed and pressure settings
- *Precision Hydraulics*[®] at works here
- **XX-II/IIS** has no equivalent mould protection feature

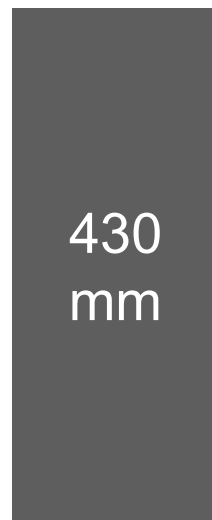
Reopening a Locked Clamp

Locked Period	Model	XX1600II	XX1600IIS	JM168-MK6
1 hour	Pressure	140 bar	150 bar	< 100 bar
	Status	Large noise Hard vibration	Large noise Hard vibration	Silky Smooth
60 hours	Pressure	140 bar	150 bar	< 100 bar
	Status	Large noise Hard vibration	Large noise Hard vibration	Silky Smooth

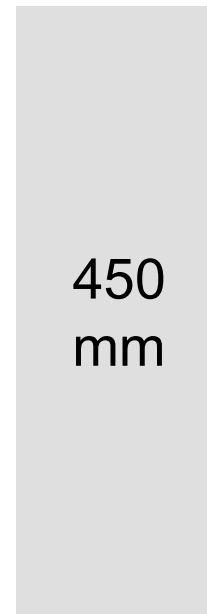
Opening Stroke



XX1600II



XX1600IIS



JM168-MK6

- Bigger numbers are better
- Larger opening strokes enable production of deep-cavity parts

Minimum Mould Height



XX1600II



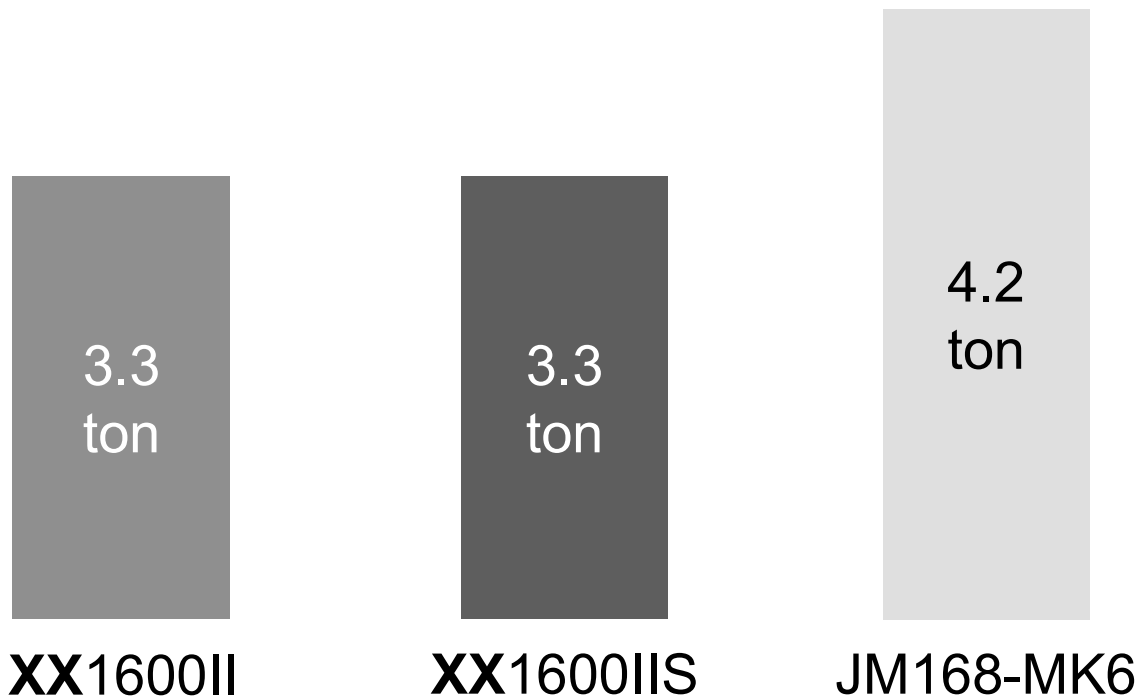
XX1600IIS



JM168-MK6

- Smaller numbers are better
- Smaller minimum moulding height enables production of thin-walled parts

Ejector Force



- Bigger numbers are better
- Larger ejector force enables production of deep-cavity/extra-long parts



Mould Adj. Performance

Comparisons of Specs &
Actual Measurements

INTERNAL ONLY

Automatic Clamping Force Adjustment

Model	Time Needed	Set Clamp Force	Set Clamping Pressure
JM168-MK6	29 sec.		not needed
XX1600II	27 sec.		
XX1600IIS	28 sec.		

- Due to complex non-linear relationship between clamping pressure and clamping force, achieving accurate clamping force usually requires experience and certain “black arts”
- MK6 allows intelligent automatic adjustment of clamping force (at the time expense of 1 second), eliminating guess-work and the needs for experts



Electricals

Comparisons of Specs &
Standards

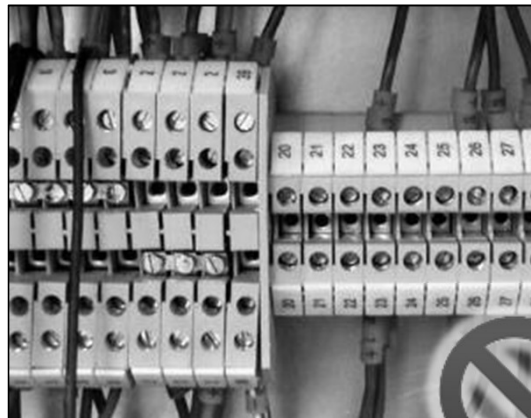
INTERNAL ONLY

Low-Voltage Terminals



XX1600II

traditional terminals



XX1600IIS

traditional terminals



JM168-MK6

CE-standard
spring-type terminals

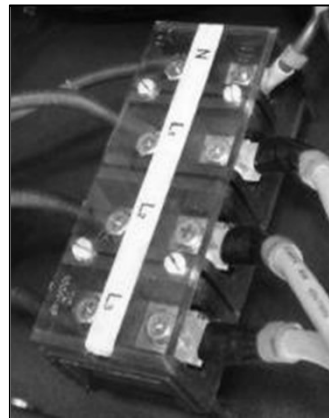
Power Connection Terminals



XX1600II



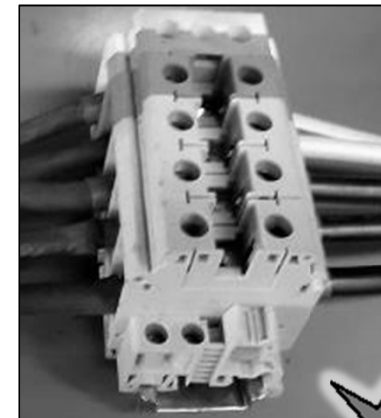
normal terminals
not compliant
to safety regs



XX1600IIS



normal terminals
not compliant
to safety regs



JM168-MK6

CE-compliant terminals



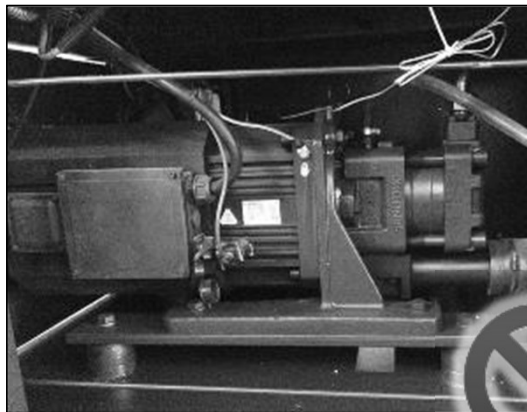
Power Pack

Comparisons of Specs

INTERNAL ONLY

Maximum Sustainable Power Output

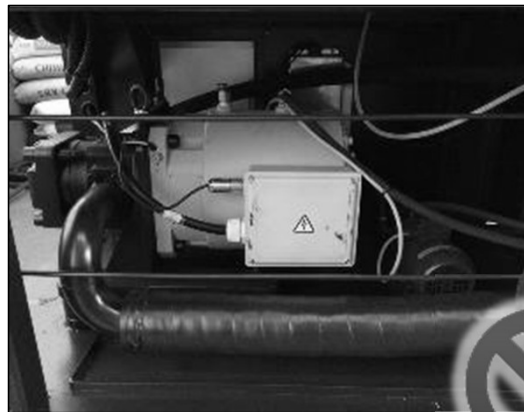
low power (15kW)



XX1600II

Pump: 64cc (China)
Servo: self-made
Max. power: 15kW

slow, low power (15kW)



XX1600IIS

Pump: 50cc (China)
Servo: self-made
Max. power: 15kW

Fast, High Power (22kW)



JM168-MK6

Pump: 64cc (Germany)
Servo: Phase, Innovance
Max. power: 22kW

Impact of Maximum Power Output on Application Processes

Power Demand by Process	5kW	10kW	15kW	20kW
JM168-MK6	✓	✓	✓	✓
XX1600II	✓	✓	not energy efficient!	trips alarm!
XX1600IIS	✓	✓	not energy efficient!	trips alarm!

- Different applications require different power outputs (e.g. engineering resins and thin-walled parts require more power)
- If process power demand exceeds servosystem limit, alarm is tripped and machine stops
- Energy efficiency drops significantly when power output is close to limit
- Notes: As a servo-pump system can achieve 0 rpm, *ACTUAL* energy consumption is *NOT* related to max. power limit