TOSHIBA MACHINE

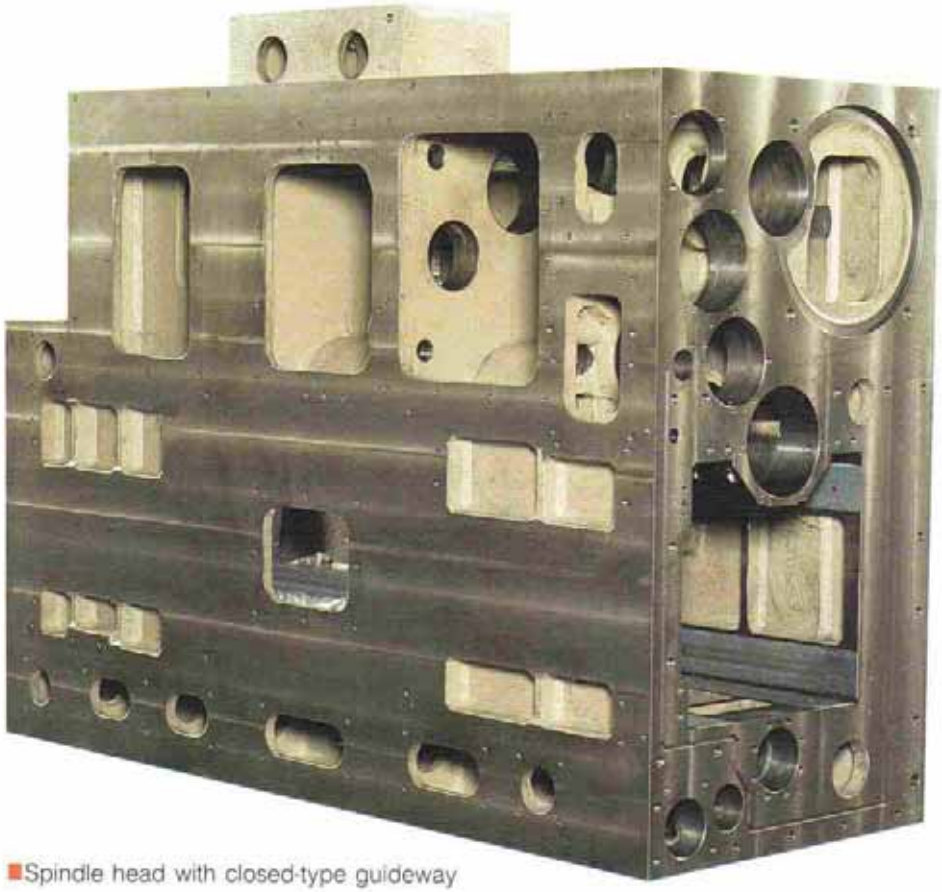
BSF series

Floor-Type Horizontal Milling and Boring Machine

Catalog BSF0074-CED-05

A series of high-performance, floor horizontal milling and boring machin equipped with a rigid square-type ra

A four-side guided closed-type (square-bore) ram guideway is built into the headstock for extra rigidity.



Unlike open-type guideways, the manufacture of closed-type guideways requires a high level of manufacturing technology and skill.
In developing for the BSF Series, we decided to adapt a ram-type headstock because of the many advantages that it offers—despite the fact that difficult manufacturing processes had to be employed in order to make certain that all of these benefits were fully realized.

As a result:

- High precision and accuracy to spare is achieved during machining at full power due to the great rigidity of the headstock.
- Stabilized accuracy is maintained along the Z-axis with the massive ram in long extension.
- Excellent approachability to the work and efficient cutting operations have been assured.

■Spindle head with closed-type guideway

■Square ram is assured by our high level of technology for a better machining performance.

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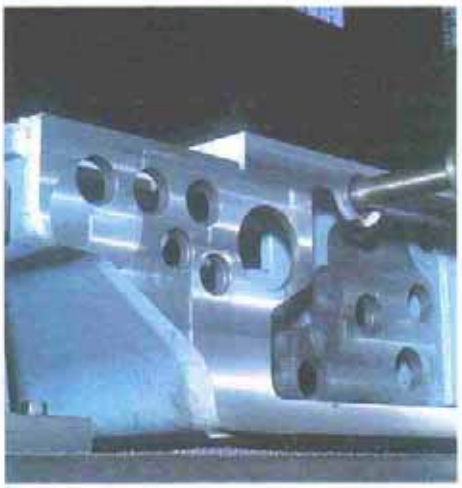
BSF
Series

Strong machines and high machining volume

Examples selected from large number of test data are introduced below.

Actual examples of boring efficiency

Machining Conditions	BSF-150B	BSF-160	BSF-180	BSF-200
Material	Cast iron			
Cutting diameter mm (in)	200 (7.87)	250 (9.8)	250 (9.8)	230 (9.05)
Cutting speed m/min (fpm)	75 (246)	118 (387)	118 (387)	111 (364)
Feed rate mm/min (ipm)	40 (1.57)	70 (2.8)	70 (2.8)	123 (4.8)
Cutting width mm (in)	12 × 2 tips (0.47 × 2)	10 × 2 tips (0.4 × 2)	10 × 2 tips (0.4 × 2)	20 × 2 tips (0.8 × 2)
Cutting volume cm^3/min (in^3/min)	532 (32.5)	1012 (61.8)	1012 (61.8)	1622 (99)
Boring spindle extension mm (in)	260 – 330 (10.2 – 13.0)	210 – 230 (8.3 – 9.1)	350 – 450 (13.8 – 17.7)	100 – 500 (3.9 – 19.7)



Actual examples of milling efficiency

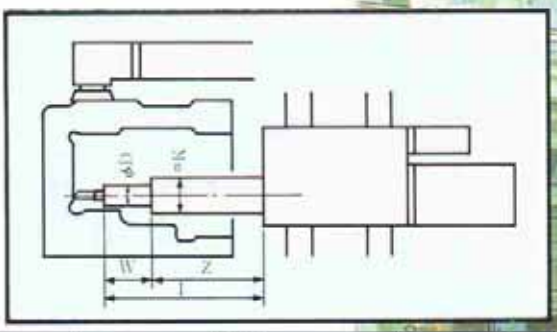
Machining Conditions	BSF-150B	BSF-160	BSF-180	BSF-200
Material	Cast iron			
Cutter diameter mm (in)	200 (7.9)	200 (7.9)	250 (9.8)	315 (12.4)
Cutting speed m/min (fpm)	100 (328)	107 (351)	138 (453)	148 (486)
Feed rate mm/min (ipm)	1100 (43.3)	1200 (47.2)	1400 (55.1)	1350 (53.1)
Cutting width mm (in)	180 (7.1)	180 (7.1)	210 (8.3)	255 (10)
Cutting depth mm (in)	8 (0.3)	10 (0.4)	10 (0.4)	10 (0.4)
Cutting volume cm^3/min (in^3/min)	1584 (96.7)	2160 (131.8)	2940 (179.4)	3442 (210)
Boring spindle extension mm (in)	100 (3.9)	50 (2.0)	170 (6.7)	100 (3.9)
Ram extension mm (in)	370 (14.6)	800 (31.5)	1000 (39.4)	400 (15.7)
Total extension mm (in)	470 (18.5)	850 (33.5)	1170 (46.1)	500 (19.7)

TOSHIBA MACHINE BSF Series Flo and Boring Machines provide num

BSF Series machines from TOSHIBA MACHINE boast the most suitable structural designs throughout thanks to the employment of leading-edge technologies that have been developed during the course of our many years of experience and achievements in this field.

1 The ram-type construction assures excellent approachability to the work and a wide range of machining applications.

The configuration of the ram minimizes interference with the work and permits operations to be performed deep into the machining area.
The ample sectional dimensions of the ram provide high rigidity and workability for stabilized machining even when the ram is fully extended.



Model	Boring spindle		Ram		Total travel I
	Diameter D	Extension W	Dimension K	Extension Z	
BSF-150B	150 (5.906)	max. 900 (35.4)	380 × 380 (15 × 15)	max. 900 (35.4)	max. 1800 (70.8)
BSF-160	160 (6.299)	max. 900 (35.4)	420 × 420 (16.5 × 16.5)	max. 1100 (43.3)	max. 2000 (78.7)
BSF-180	180 (7.087)	max. 1200 (47.2)	500 × 500 (19.7 × 19.7)	max. 1400 (55.1)	max. 2600 (102.4)
BSF-200	200 (7.874)	max. 1300 (51.2)	500 × 500 (19.7 × 19.7)	max. 1600 (63)	max. 2900 (114.2)

Units: mm (in)

r-Type Horizontal Milling rous superior advantages!

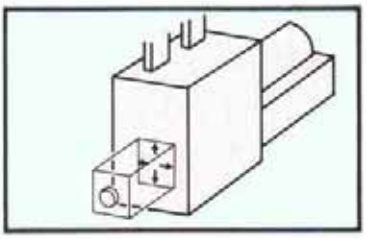
BSF Series

2 TOSHIBA MACHINE'S high precision large-sized machine tools constitutes the integration of it's advanced technology and engineering.

- High-performance oil mist lubrication system
- Hydrostatic slideways
- Backlash eliminator
- Gravity center displacement compensator for the headstock
- Attachment weight compensator
- Ram bending force compensator
- Synchronizing oil temperature controller to the machine
- Ram supporting force compensator

3 Rigid machine structures.

The closed-type ram guideway and the strong box-shaped structure of the headstock assure high machining volume and maintain machining accuracy.



4 TOSNUC 888, an advanced, user oriented, CNC system.

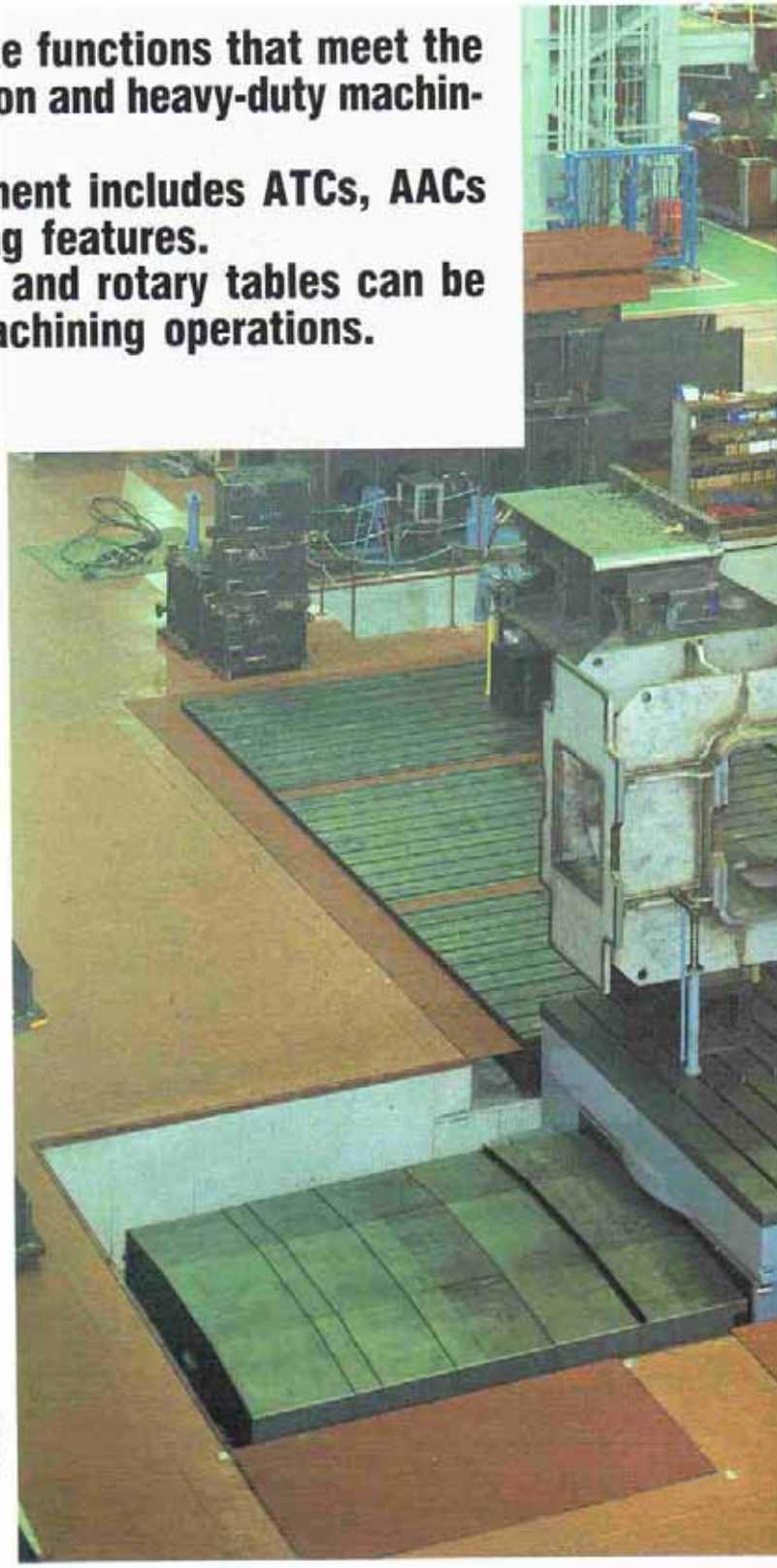
Based on our mechanical and electronic technology, this highly efficient CNC unit was designed and developed for precise, high speed multi-function machining.

Built throughout to handle tough machining assignments!

- **Loaded with machining-center-like functions that meet the new demands for further automation and heavy-duty machining applications.**
- **An abundant selection of equipment includes ATCs, AACs and other automated labor-saving features.**
- **A wide selection of attachments and rotary tables can be utilized for a large variety of machining operations.**

Major Specifications

Spindle diameter	180 mm (7.087")
Spindle travel	1200 mm (47.2")
Section of ram	500 × 500 mm (19.7 × 19.7")
Ram travel	1400 mm (55.1")
Allowable torque on milling spindle	9600 N·m {980 kgf-m} (7086 ft-lbs)
Max. spindle speed	1250 min⁻¹
Main motor	75 kW (100 HP)



• A BSF-180 equipped with a rotary table, a 90-tool ATC, an AAC for angle heads and universal heads, an AATC and other special accessories.

SF-180

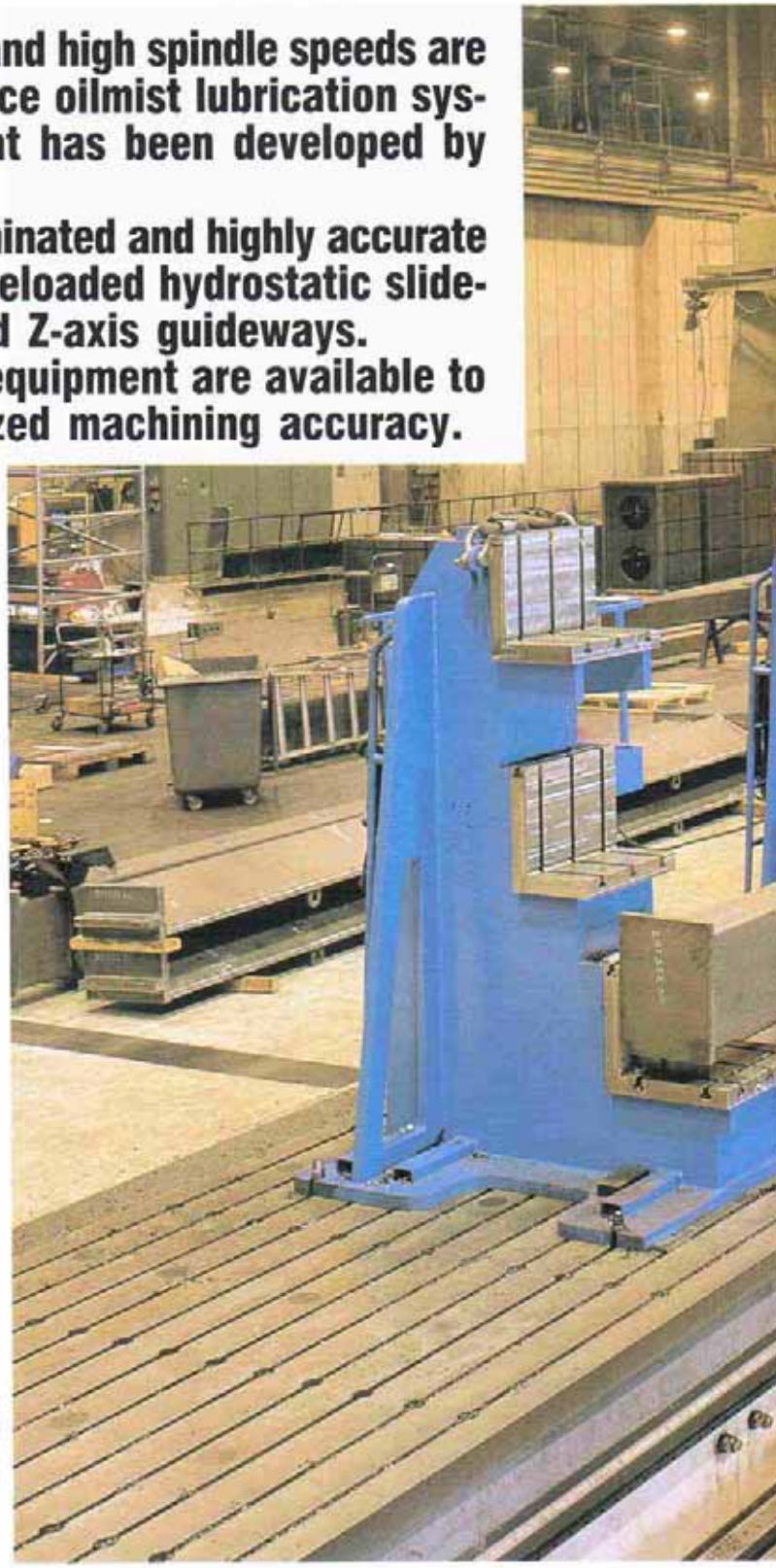
BSF
Series

Newly designed to meet the machining demands for higher speeds and accuracies!

- **Temperature rises are minimized and high spindle speeds are facilitated by the high-performance oilmist lubrication system for the spindle bearings that has been developed by TOSHIBA MACHINE.**
- **Stick/slip problems have been eliminated and highly accurate positioning are assured by the preloaded hydrostatic slideways provided for the X-, Y- and Z-axis guideways.**
- **Various types of supplementary equipment are available to achieve greater levels of stabilized machining accuracy.**

Major Specifications

Spindle diameter	160 mm (6.299")
Spindle travel	900 mm (35.4")
Section of ram	420 × 420 mm (16.5 × 16.5")
Ram travel	1100 mm (43.3") [1400 mm (55.1")]
Allowable torque on milling spindle	5880 N·m {600 kgf-m} (4340 ft-lbs)
Max. spindle speed	2000 min^{-1}
Main motor	55/45 kW (74/60 HP)



* A special BSF-160 with an extra-long X-axis travel of 39 meters. It has been provided with accessories that include a 120-tool-capacity ATC/AATC, a 10-tool SATC, an AAC and an AAI.

BSF-160

BSF
Series

Developed to meet the demand for a reasonably-priced floor-type horizontal milling and boring machine!

BSF-150B

BSF Series

- **Very efficient compound machining can be carried out by equipping it with an ATC, AAC, AAI and various other automated features and attachments.**
- **High-precision positioning accuracy is guaranteed by low-friction slideway materials on the X-, Y- and Z-axis guideways.**

BSF-150B

Major Specifications

Spindle diameter	150 mm (5.906")
Spindle travel	900 mm (35.4")
Section of ram	380 × 380 mm (15 × 15")
Ram travel	900 mm (35.4")
Allowable torque on milling spindle	3430 N·m {350 kgf-m} (2532 ft-lbs)
Max. spindle speed	2000 min^{-1}
Main motor	Cont. 30/37 kW (40/50 HP)

Lubricating systems that allow large machines to operate at high speeds with excellent accuracy!

High-performance oil mist system

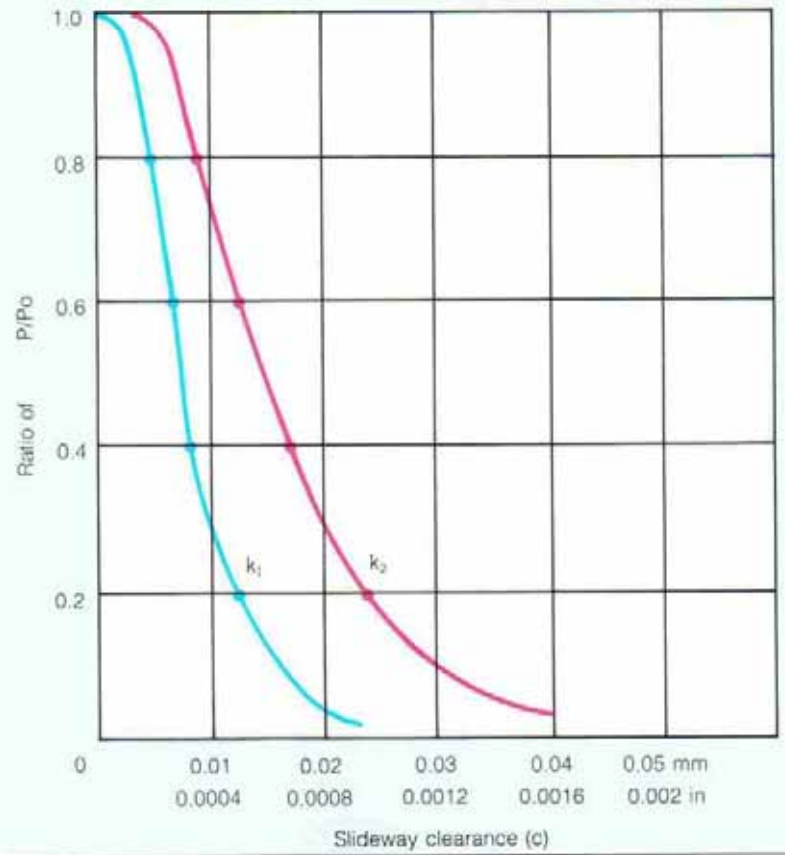
This efficient TOSHIBA MACHINE-developed system supplies fine amounts of oil in mist form to lubricate the spindle bearings. It minimizes temperature rises to allow the spindle to revolve at very high speeds. In addition, by keeping heat generation to a minimum, the system restrains thermal deformation and thus maintains high machining accuracy at all times.

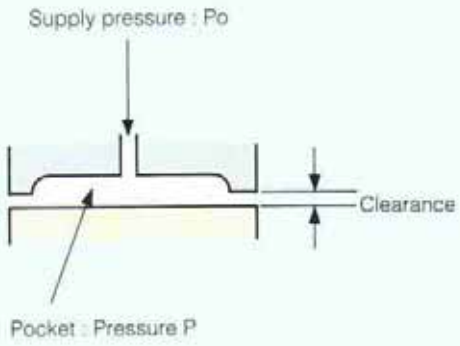
Hydrostatic slideways

Since the preloaded hydrostatic slideways that are best for large-size machines have been provided for the X-, Y- and Z-axis guideways on the BSF-160 and BSF-180, positioning are performed with excellent accuracy and smooth stick/slip-free slide movements are assured. The dynamic rigidity of the slide movements results in stabilized machining and the improved wear-resistant characteristics preserve accuracy over a long period of time.
For the relatively smaller BSF-150B, low friction slideway material has been provided for the X-, Y- and Z-axis guideways.

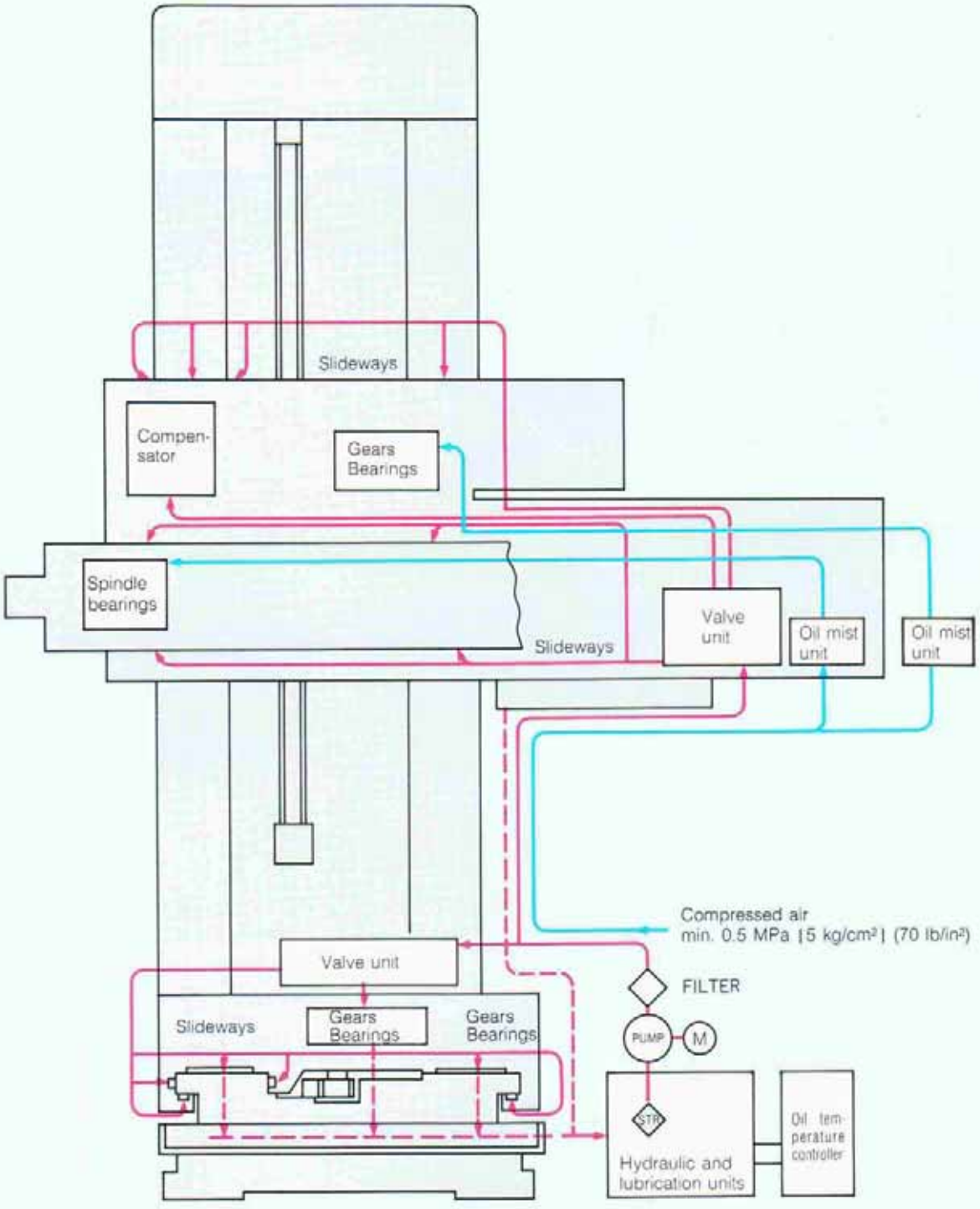
The guideway for the ram has been given another TOSHIBA MACHINE-developed lubrication system that employs a special throttle valve that preserves a constant slideway gap — regardless of the load variations caused by the degree of ram extension or the use of various attachments — in order maintain stable and accurate ram-extension operations.
NOTE: X-axis: Column horizontal travel
Y-axis: Headstock vertical travel
Z-axis: Ram travel

Characteristics of hydrostatic slideways





Lubrication System



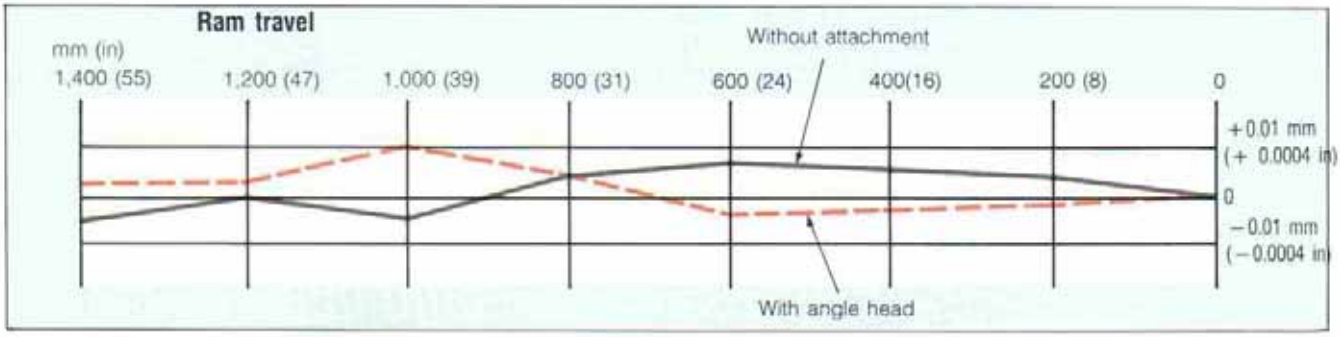
Lubrication system for the BSF-160

Compensation systems

Various compensation systems hold the ram-extension accuracy within 0.015/1,000 mm.

The highly rigid headstock with the four side guided closed-type guideway and a structural design for the ram that minimizes variations in the position of the center of gravity serve to guarantee stabilized accuracy for the ram-extension movements.
This total system consists of compensators for shifts in the position of the center of gravity, for ram deflection, and for the weight of attachments. Other measures have been employed to compensate for the physical variations in accuracy caused by the extension of the ram so that great precision is achieved every time that it is extended.

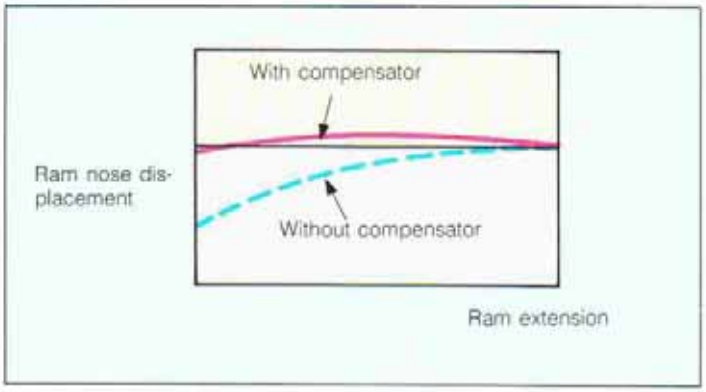
Ram travel (Z-axis) accuracy on BSF-180

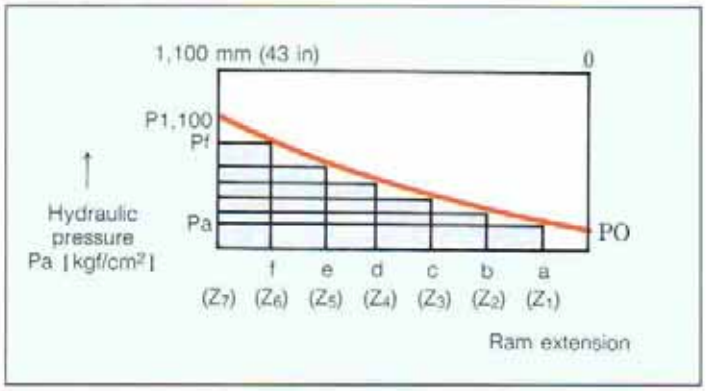


BSF Series

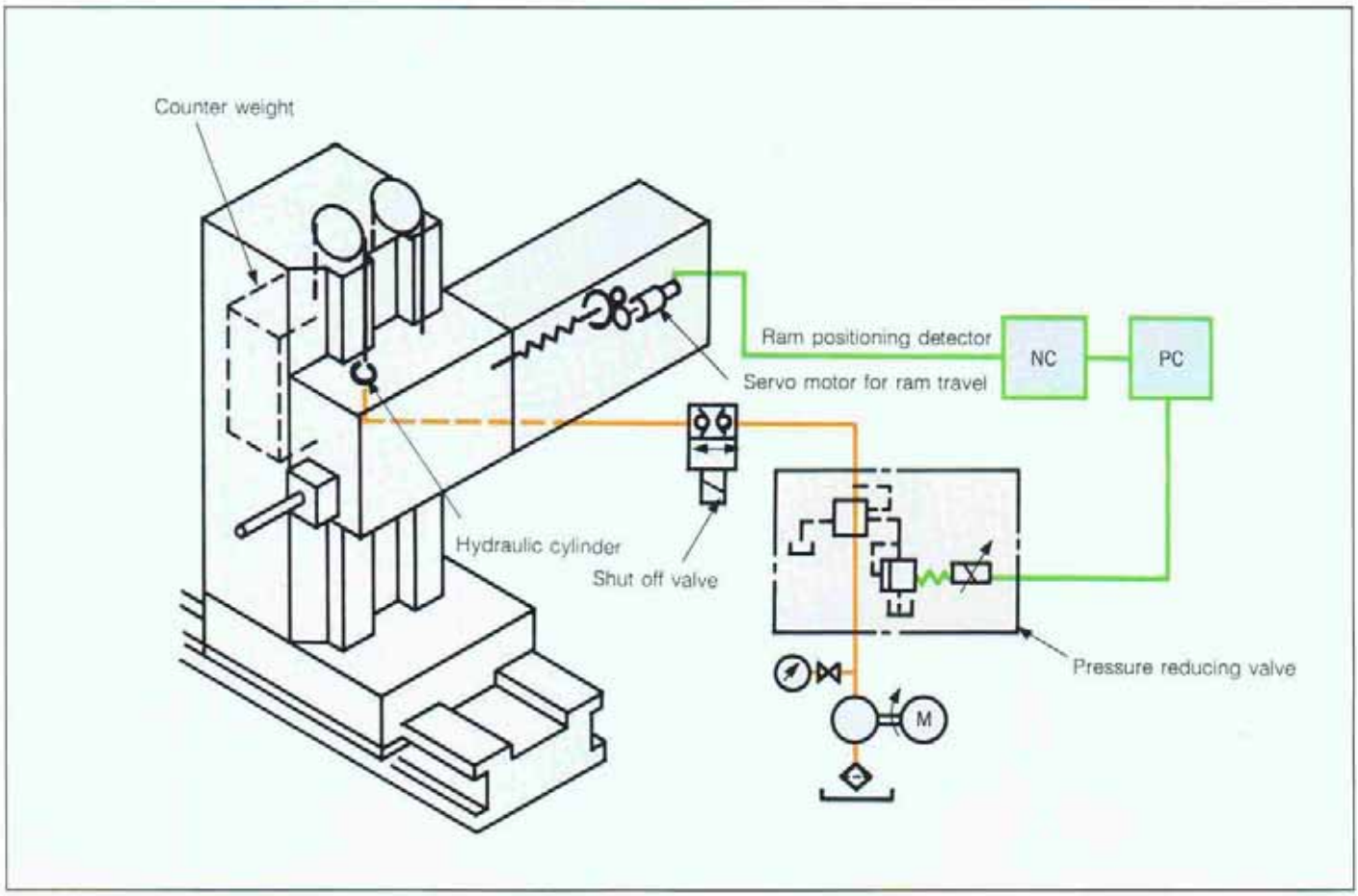
1 Gravity center displacement compensator for the headstock

This system serves to assure the accuracy of the ram's straightness as a hydraulic system automatically changes the lifting force ratio of front and rear wire ropes that support the weight of the headstock in order to compensate for changes in the position of the center of gravity in the headstock as the ram is extended.





Note : Hydraulic pressure-adjusting line is set by combining seven lines.



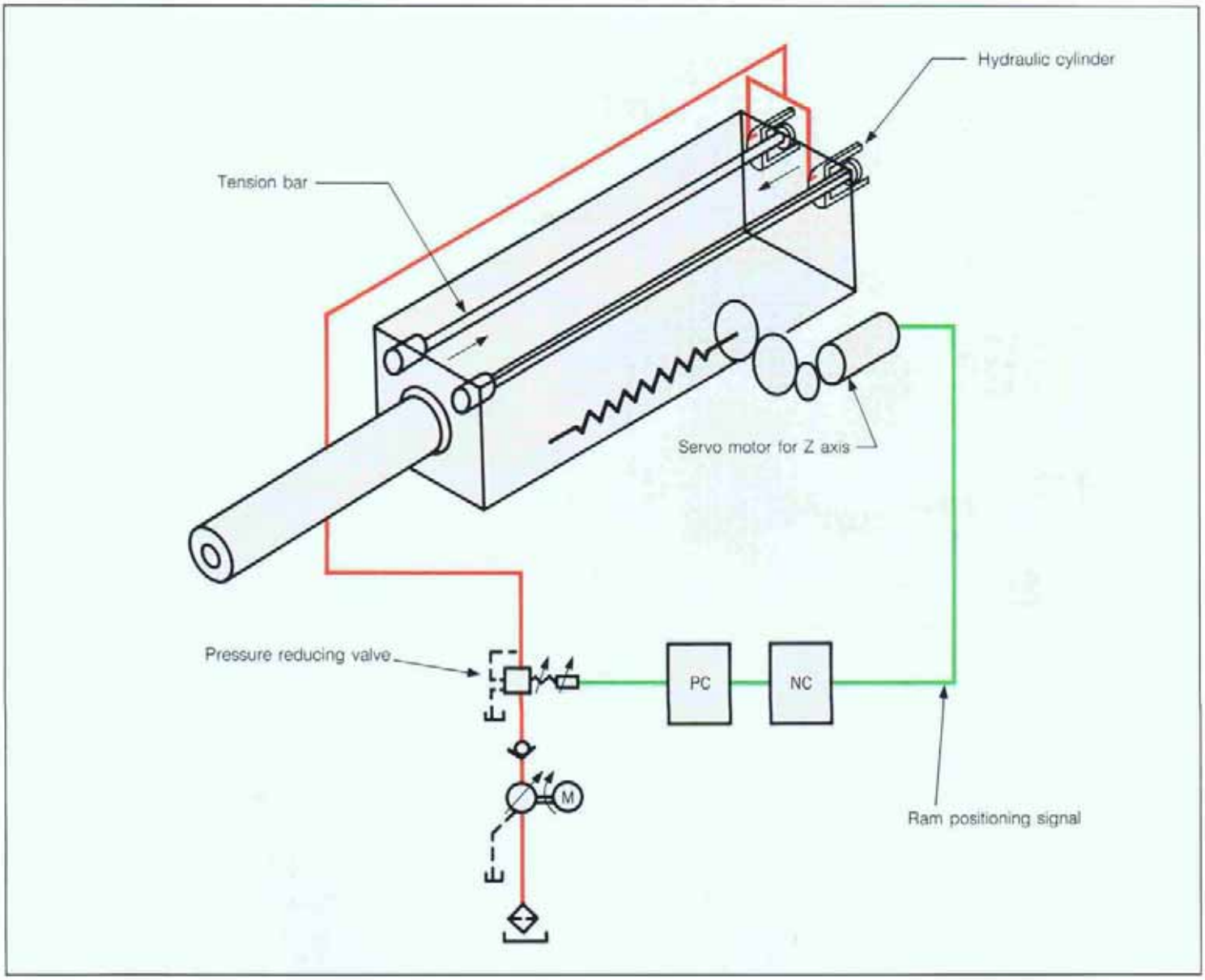
Compensation systems

2 Attachment weight compensator

This system compensates for changes in the position of the center of gravity in the headstock when an attachment is mounted through the command of the appropriate M-code that changes pressure in the hydraulic system as required. Settings for seven kinds of attachments are provided for BSF-160, BSF-180 and BSF-200 machines. (See the graph on page 14.)

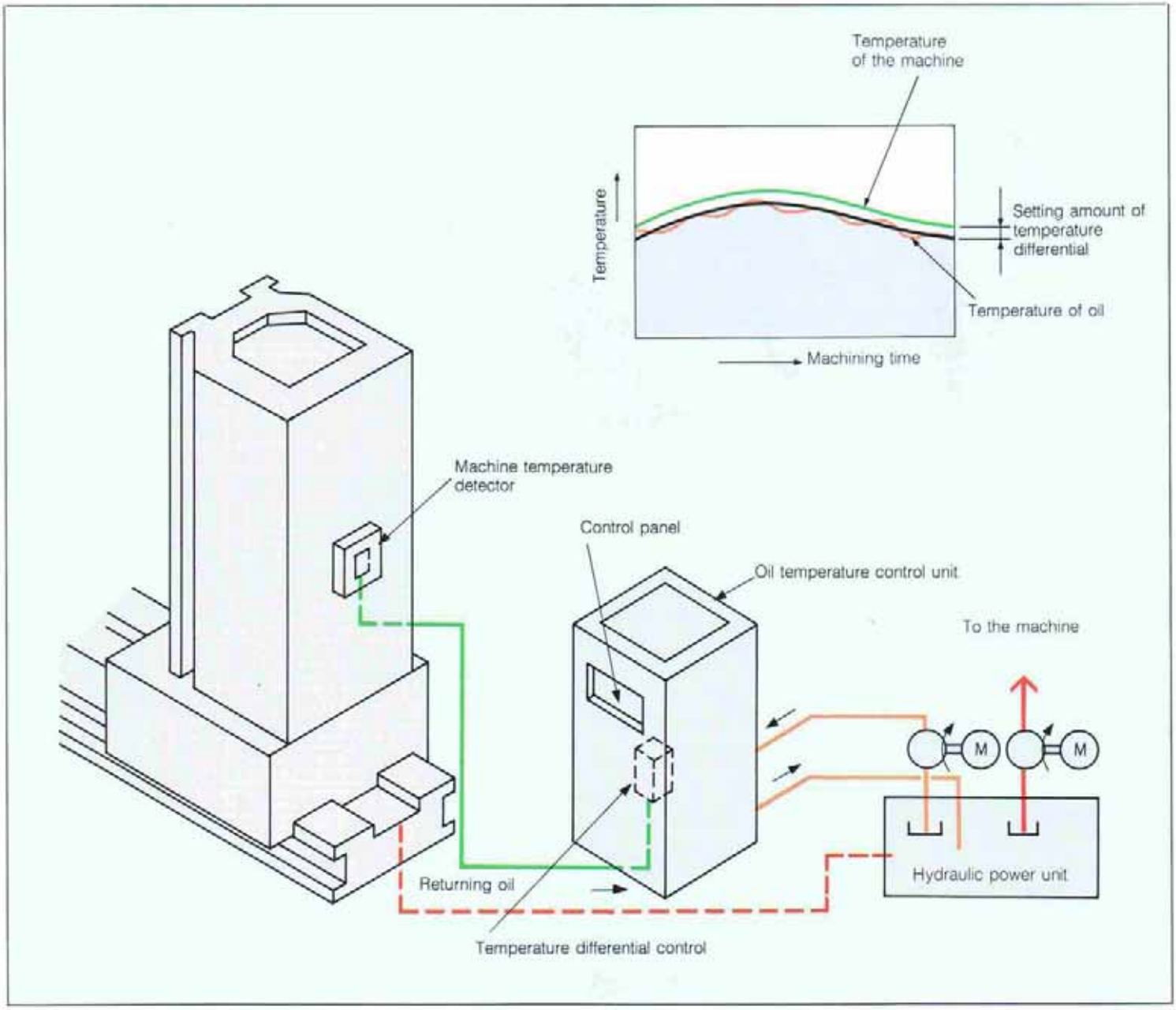
3 Ram bending force compensator

When no compensation is provided, the ram will tend to incline under its own weight when it is extended. The amount of this deflection will be magnified when an attachment has been mounted. For this reason, a system that compensates for this ram deflection has been provided for BSF-160, BSF-180 and BSF-200 machines. In this system, hydraulic pressure is employed to control tension on two tension bars (located in the upper part of the ram) in accordance with the ram extension in order to prevent deflection.



4 Synchronizing oil temperature controller to the machine (optional)

In this system, an oil-temperature controller is used to maintain temperature consistencies between the temperature of the oil at the sources of heat generation of the machine — i.e., the headstock drive mechanism and the hydrostatic slideways — and the temperature of the machine, so that the oil temperature will follow the variations in the machine temperature. In this way, thermal displacement in the machine is minimized and high machining accuracy is maintained.



A wide assortment of functions (option provide additional automation and labor-saving advantages!

Automatic attachment changer (AAC)

- Upon the receipt of an NC command, the AAC automatically releases the old attachment, selects the newly-designated attachment for the next machining operation from among those that are stored in the attachment stocker, and then mounts the new attachment on the ram.

Attachment stocker

- Ample working space can be effectively used along the X-axis since the attachment stocker is designed to minimize the dead space in that direction. In addition, the standard automatically opening/closing door protects the attachments from chips, coolant, etc. and thus assures accuracy every time a new attachment is mounted on the ram.