

## The Mold Blade Operating And Sizing Mechanism

The body of the type is cast in a Composition Mold. The cavity into which the molten metal is introduced is formed by the Large Type Block, the Small Type Block, the Cross Block and the Mold Blade. The Mold Blade is the thickness of the point size of the type to be cast and is moved by the Mold Blade Operating Rod, in or out, to suit the varying widths, or "set" sizes, of the different letters. The Cross Block is connected to the Type Carrier and, after a type is cast, the Carrier moves to the right, pushing the Cross Block ahead of it, until the Carrier comes opposite the type just cast. The Mold Blade then moves forward, pushing this type into the Carrier, which moves to the left taking it away from the Mold, and bringing the Cross Block in front of the Mold again, closing it ready for the next character to be cast.

The type produced by the Monotype Composition Caster are cast to within a tolerance of .0002"—no trimming whatever is required. The Cross Block projects under the Type Blocks so that it forms the bottom of the cavity in which the type body is cast. The metal is forced by the Pump through an opening in the Cross Block into this space; the type is, therefore, cast with an extension, or "gate", which projects into the Cross Block. Before this Block is moved to the right, it is moved slightly to the left to cut this gate from the type. The Cross Block is provided with a mechanism for ejecting this gate from it into the Metal Pot where it is remelted.

The Mold Blade is moved by the Mold Blade Operating Rod, which passes through the Pin Block. The front end is coupled to the Mold Blade, while the rear end is engaged by the yoke on the Mold Blade Bell Crank. This is moved by the Mold Blade Connecting Rod, the left end of which is attached to the Mold Blade Cam Lever. To prevent any damage being done to the Mold or machine, in case the Mold Blade should stick, the forward movement of the Rod is effected through the Mold Blade Operating Rod Ejecting Springs. The Sizing Spring is provided to absorb any excess motion of the Bell Crank when the Rod moves to the rear to casting position.

The forward movement of the Blade is arrested by a Stop on the back of the Mold, which prevents the Blade being pushed forward so far as to be struck by the Cross Block and damaged; the backward movement is controlled by the Wedges which regulate the width, of set size, of the type to be cast.

To understand the action of the Wedges, the following points must be borne in mind. The characters at the Keyboard and in the Matrix Case are arranged according to their set size; that is, the smallest characters are in the vertical rows at the left and the largest at the right. In the Matrix Case these rows are perpendicular to its line of travel from left to right. If we divide one of the characters in the right hand vertical row into eighteen parts, the characters in the left hand row will contain five of these parts, or units, and the number of units in the different rows, counting from the left, is as follows: 5, 6, 7, 8, 9, 9, 9, 10, 10, 11, 12, 13, 14, 15, and 18, Standard S-5 Wedge.

Although this relation usually holds between the characters in the font, the size of similar letters of different fonts is, of course, capable of great variation. This variation is produced by using a different set Scale at the Keyboard and a different set Normal Wedge in the Casting Machine. All faces having the em the same width, set ways, are cast with the same set Normal Wedge; to produce a face with any other size em requires a different set Wedge. It will be noted that the set is absolutely independent of the point; thus, a very condensed ten point face might be run with the same set Wedge that an extended eight point face used.

The Normal Wedge is moved by the B Matrix Jaws so that it always occupies the same position relative to the Matrix Case. Thus, when the Matrix Jaws move the Case to the position to cast eighteen unit characters, that is, as far to the left as the Case will go, they, at the same time, move the Normal Wedge to the position that will cause the Mold to produce this size body.

After the Normal Wedge has been approximately located by the Matrix Jaws, it is accurately positioned by the Normal Wedge Locking Pin, which is moved down by the Centering Pin Lever, to engage the proper notch in the Wedge.

Just before a type is cast, the Mold Blade is pulled back to open the Mold to the size of this type by the Mold Blade Operating Rod. This Rod draws the Blade against the Mold Blade Adjusting Screw, which is carried by the Mold Blade Abutment Slide. The Mold Blade Abutment Slide Anvil bears against the proper part of the Normal Wedge to produce the type size required for type being cast. The type transfer wedge moves as far to the left as possible and backs up the Normal Wedge. When it is at the left end of its stroke; that is, when its further movement to the left is stopped by the Micrometer Wedge, the Type Transfer Wedge is backed up by the Normal Wedge Abutment. As soon as the Type Transfer Wedge has finished its stroke to the left, the Normal Wedge is locked by the descent of the Normal Wedge Locking Pin, which engages one of the notches in the Wedge. The Mold Blade is now drawn back and locked tight against the Normal and Type Transfer Wedges in this position, while the type is being cast. Before the next type is cast, the Mold Blade moves forward to eject this character, and the Wedges are, therefore, unclamped. The Transfer Wedge moves to the right, and the Normal Wedge Locking Pin rises so that no resistance is offered to the movement of the Normal Wedge to the position required by the next character.

Before considering the action of the Wedges, when the machine is casting justifying spaces, the following points about the Keyboard should be understood. The Justifying Space Key is used for the spaces between words. When the last character has been put in the line, the operator strikes the justifying keys, the red numbered keys at the top of the Board, indicated by the Justifying Scale Pointer. Since the ribbon winds up as it passes through the Keyboard, the last line set at the Keyboard is the first line to be cast, and furthermore, since the Justifying Keys are the last keys in the line to be struck, their perforations are the first of the line to be presented to the Caster. Therefore, the first operation of the machine in casting a line is to set the space sizing mechanism; that is, the two Justification Wedges, to produce the proper size spaces to justify the line about to be cast. Whenever a space is required in this line, the Matrix Jaws place the Normal Wedge in the six unit position, at the same time presenting the space Matrix to the Mold. The lower or Type Transfer Wedge is moved out of position to the right, and the upper or Space Transfer Wedge moves into casting position. The Normal Wedge then abuts against this Space Transfer Wedge, which abuts against the two combined Justification Wedges, the back one of which bears against the front end of the C Pin Block. When the Mold Blade is now drawn back, until the Mold Blade Abutment Slide Anvil is against the Normal Wedge, in the six unit position, a very different size character is produced than when the lower Transfer Wedge is in place, for the size of this character is now affected by the position of the Justification Wedges. Thus, the further the Justification Wedges are to the right the smaller will be the size of the space produced.

The Transfer Wedges are moved by the Transfer Tongs, through the Transfer Rods. The longer of the Tongs is attached at the lower end to the Transfer Wedge Spring Box, and at the upper end to the Space Transfer Wedge Operating Rod. The lower end of the shorter Lever is connected to the Link to the longer Lever, and its upper end is attached to the other Type Transfer Wedge Operating Rod. The Transfer Tongs Cam Lever Extension is connected by a Link to the shorter Lever. When casting type the upper, or Space Transfer Rod is locked at the right end of its stroke. Therefore, when the Transfer Wedge Cam Lever moves to the left, the Type Transfer Wedge is drawn into position to engage the Normal Wedge, for, since both ends of the long Lever are fixed and the lower end of the short Lever is held from moving, the upper end of this Lever must move to the left. When however, the Type Transfer Rod is locked at the right end of its stroke and the Space Rod is free to move, the Space Wedge is drawn into position to support the Normal Wedge; for the upper end of the shorter Lever is held fast and the lower end must move to the left with the Cam Lever. As it moves it causes the upper end of the longer lever to move to the left, the lower end being held by the Transfer Wedge Spring Box. This Box permits the Cam Lever to travel further than the amount required to seat the Wedges, the additional movement being absorbed by its Spring. It also insures that the Wedges are held tight against the Micrometer Wedge by the pressure of these Springs.

Either Rod may be locked out of position by the Transfer Wedge Shifter through which they pass, and one Rod must always be engaged by the Shifter. When characters are being cast, the Shifter is held at the bottom of its stroke by the Transfer Shifter Spring. In this position it engages a notch in the Space Transfer Wedge Operating Rod and locks that Rod with the Space Wedge out. As long as the Shifter is down, the Transfer Wedge Cam Lever will, through the Tongs, move the Type Transfer Wedge in and out of casting position. When a space is required, the Shifter is raised from the notch in the Space Transfer Rod and engaged in a similar notch in the bottom of the Type Transfer Rod, locking the Type Wedge out and allowing the Space Wedge to move in.

It will be noticed that, when the Justifying Space is struck at the Keyboard, two perforations are made in the paper, one of these is the regular Punch for a character in the six unit row; this perforation sets the machine to cast a six unit space. The second perforation admits air to the Space Air Pin and causes the machine to cast with the Space Wedge in, consequently altering the size of the six unit space to correspond with the position of the Justifying Wedges. When this Pin is blown up it throws the Shifter Lever Arm Rod forward so that its Nut is engaged by the Centering Pin Lever. On its up stroke, the upward movement of the Rod raises the Transfer Wedge Shifter Lever to which it is attached; this compresses the Shifter Spring so that, as soon as the notch in the lower Rod comes into position, the Shifter snaps up into it, locking this Rod and releasing the upper, or Space Transfer Rod which is then free to move the Space Wedge into casting position.

Before starting to cast a line the two Justification Wedges must be set to produce the proper size spaces for that line. When a Justifying Key is struck at the Keyboard two perforations are made in the paper; first, the regular perforation of the Unit Row in which the Key is located, and, second, a special perforation to designate the upper or lower row of Justification Keys. Note that these perforations are larger, to indicate to the operator the end of the line. When either of these Justification perforations is presented to the Caster, one of the Justifying Air Pins, depending upon which row perforation is presented, is blown up. This throws the corresponding Justification Wedge Lever Arm Rod into the path of the Centering Pin Lever, so that the Lever, on its up stroke lifts the Rod. At the same time, the forward movement of the Wedge Bell Crank that moves this Rod carries the Space Operating Arm Rod forward, so that it also is engaged by the Centering Pin Lever; for when either one of the Wedge Bell Cranks moves forward a lug on its side strikes the center, or Shifter Bell Crank, and carries it with it. The Transfer Shifter is thus lifted, so that the Space Wedge can move out. The rise of the Justification Wedge Lifting Arm lifts one

of the two Justification Wedge Levers depending upon whether the right or left Rod be engaged. This lifts the Justification Wedge high enough to clear the Justification Wedge Centering Tooth unlocking the Wedge and enabling its lug to be engaged by the B Matrix Jaws and moved to the unit position determined by the other perforation. The second Wedge is set in the same manner on the next revolution.

**NOTE:** The student should proceed no further unless he has a very clear understanding of Monotype Mathematics. This basic knowledge is needed to understand the description below. If any question should arise, be sure and ask the Instructor.

When the Wedges are as far to the right as possible; that is, in the 1-1 position, the machine will cast justifying spaces two units of twelve set less than the six unit body produced with the same Normal Wedge. Figure 1 is a section through the Mold Blade Abutment Slide when the Mold Blade is pulled back as far as possible to cast a six unit character; that is, with the Type Transfer Wedge in casting position, and the Normal Wedge in the six unit position. Let the distance from the end of the Mold Blade to the Normal Wedge Abutment be A. The Space Transfer Wedge and Justification Wedges are so designed that, when the Normal Wedge is in the 6 unit position and the two Justification Wedges in the 1-1 position A will be increased to .0184". At this time the Mold Blade is pulled back as far as possible. And the Space Transfer Wedge properly adjusted. Therefore, when the Normal Wedge is in the six unit position and the Justification Wedges are in the position of no justification, the space cast with the Space Transfer Wedge in will be two units of twelve set smaller than the characters cast with the Type Transfer Wedge in.

Every notch the back Justification Wedge 11D is moved to the left adds .0005" to the size of the space, and each notch for the front Wedge 10D adds .0075". The greatest amount the Back Wedge can add is  $.0005" \times 14 = .0070"$ , and the greatest increase the Front Wedge can produce is  $.0075" \times 14 = .1050"$ . The total maximum increment for both Wedges is  $.1050" + .0070" = .1120"$ . Thus the smallest justifying space that can be cast with a twelve set Wedge is six units of twelve set minus two units of twelve set, that is  $.0556" - .0184" = .0372"$ , and the largest, that is with the justification for both No. 15 Justification Keys added, is  $.0372" + .1120" = .1492"$ .

It is essential that no characters be cast while the machine is setting the Wedges for the next line and a means of locking the Pump to prevent the Mold from receiving metal during the setting of these Wedges is provided. This was explained in the material supplied for the Pump Mechanism.

Consider now the movement of the Cross Block which is coupled to the Type Carrier. When the Mold is in casting position the Type Carrier is at the left end of its stroke ready for the Type Pusher to eject the character previously cast and place it in the Type Channel, the space between the Type Channel Blocks where the lines are assembled before delivery to the Galley.

When the character has been cast and the Matrix Case has lifted, and freed the type from the Matrix, the Carrier moves to the right and up into position to receive the type just cast. At the same time the Type Clamp opens so that the type may be pushed in to the Carrier by the Mold Blade making a forward motion. The type in the Carrier is prevented from falling forward by the Type Support Spring. When the Carrier moves to the left the Type Clamp stands still until the type is brought against it by the Carrier and pinched.

Just before the Carrier reaches the left end of its stroke the Type Support Spring withdraws from in front of the type, so that, as soon as the Carrier stops, the Type Pusher may pass through it, pushing the type from the Carrier into the Type Channel where it is prevented from falling back into the Carrier by the Latches. The type in the Type Channel is supported by a rib on the right hand Type Channel Block over which the nick in the type fits. If the line be long enough to reach past this Block the type is held by the Line Support which slides in the Column Pusher and moves forward as types are added to the line by the Type Pusher.

In order that no injury may be done to the machine in case a type turns and prevents the Type Pusher from making its full stroke forward, the Pusher is flexibly connected on its forward stroke. Thus, if the resistance to its movement be too great, it will not move and the movement of the Type Pusher Cam Lever will be absorbed in compressing the Type Pusher Connecting Rod Spring. The back stroke of the Pusher, however, is positive.