

FEEDING UNIT AND FEEDING METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a feeding unit and a feeding method and more particularly to a feeding unit and a feeding method capable of intermittent feeding at a higher speed.

Description of the Related Art

In case of forming a strip-shaped material that labels are pasted at predetermined intervals on a release liner extending in a strip-like shape, there has been conventionally used a feeding unit to feed the strip-shaped material intermittently to a given die cut unit. The feeding unit comprises a drive unit capable of feeding a strip-shaped material with predetermined intervals, a sensor for detecting marks inscribed at corresponding positions to each label on the strip-shaped material, a controller for controlling the drive unit based on output from the sensor. In this type of feeding unit, a stop position of the strip-shaped material fed intermittently is controlled so that a position of an outer edge of the label is aligned with the position of a die cut unit which performs a cut along the outer edge of the label.

Herein, as a method for controlling the stop position, there has been known method to stop feeding of a strip-shaped material on the spot of mark detection by a sensor (conventional method 1), or a method to stop feeding after predetermined overrun feeding following mark detection by a sensor (conventional method 2, refer to the patent literature 1).

[Patent Literature 1] Japanese Patent Laid-Open Publication No. HEI 7-170775

In the method 1, however, when a feeding speed of the strip-shaped material is set at a high speed, the strip-shaped material is fed during processing time between sensor detection and feeding stoppage, which often results in a deviation between an outer edge of a label and a processing position of the die cut unit. In addition, the deviation varies with feeding speed, whereby processing accuracy of the die cut unit disadvantageously decreases.

Further, in the method 2, the unit feeds the strip-shaped material by an overrun amount after detecting the mark and decreasing the feeding speed, whereby it is difficult to meet a demand of higher feeding speed satisfactorily.

Such a method is also conceivable that the distance from mark to mark determined at the printing process is used to control a feeding interval of the

intermittent feeding. In this case, however, printing conditions such as feeding speed of mark printing unit, temperature, humidity or the like, cause the deviation of distance between marks in the level of several microns, whereby the accuracy of the strip-shaped material stop position is deteriorated. For instance, when the distance between marks becomes short, even though the each deviation is in a minute scale, plurality of intermittent feeding operation accumulates errors, which brings about a disadvantage of significant deterioration of stop position accuracy.

SUMMARY OF THE INVENTION

The present invention is devised to solve the above problems, and it is an object of the present invention to provide such a feeding unit and a feeding method, while retaining an accurate position of strip-shaped material when carrying out a predetermined processing thereto, that enables to enhance the feeding speed of the strip-shaped material and to increase an operating efficiency.

In order to achieve the object, the present invention takes a strip-shaped material with marks inscribed thereon as a subject. In a feeding unit that feeds intermittently the strip-shaped material to the

predetermined position with reference to the marks, the feeding unit comprising: a sensor detecting the marks, a controller to perform a predetermined control through determining a distance between the marks based on input from the sensor output, and a drive unit for feeding the strip-shaped material with each feed interval setting, wherein the controller is arranged to control the drive unit in a predetermined manner through correction of deviation between the mark-to-mark distance and the feed interval setting.

Additionally, the present invention takes a strip-shaped material with marks inscribed thereon as a subject, in a feeding unit that feeds intermittently the strip-shaped material to the predetermined position with reference to the marks, the feeding unit can also comprise: a sensor for detecting the marks, a controller to perform a predetermined control through determining a deviation between the predetermined processing position and the mark based on input from the sensor output, and a drive unit to feed the strip-shaped material with each feed interval setting, wherein the controller is arranged to control the drive unit in a predetermined manner through the correction of said deviation.

In the feeding unit according to the present invention, the controller preferably has such an

arrangement that a determining function is provided to determine a subsequent feed interval setting by means of a predetermined correction factor against the predecessor feed interval setting.

Further the controller may also have such an arrangement that a determining function is provided to determine a subsequent feed interval setting by means of multiplying a deviation arising from the feed interval setting by a predetermined correction factor against the predecessor feed interval setting.

Further, the controller may also have an arrangement so that the same detects the distance between the marks or the mark itself and thereafter, feeds a strip-shaped material by a predetermined amount, and then controls a drive unit to stop the feeding.

Further, in a intermittent feeding method of a strip-shaped materials with marks inscribed thereon with each predetermined interval via a drive unit, the present invention adopts such a feeding method comprising the steps of:

- detecting the marks by a sensor;

- determining a distance between the marks from the sensor output via a predetermined controller;

- comparing the distance between the marks with a feed interval setting of the strip-shaped material via the controller; and,

controlling a drive unit by the controller to correct a deviation between the mark-to-mark distance and the feed interval setting based on the comparison.

Further, in an intermittent feeding method of a strip-shaped material with marks inscribed thereon at each predetermined interval via a drive unit, the present invention also adopts such a feeding method comprising the steps of:

detecting the marks by a sensor;

comparing the position of the marks from output of the sensor with the position of predetermined processing via a predetermined controller; and,

controlling a drive unit by the controller to correct a deviation of feeding interval setting of the strip-shaped materials based on the comparison.

In the feeding method according to the present invention, a correction of the deviation is preferably performed by means of a correction factor set beforehand.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a partial schematic front view showing a feeding unit according to an embodiment of the present invention applied to a label-manufacturing apparatus;

Fig. 2 is an explanatory view showing a preparatory state before intermittent feeding of a

strip-shaped material for setting purpose;

Fig. 3 is an explanatory view showing a state before a first automatic intermittent feeding of the strip-shaped material;

Fig. 4 is an explanatory view showing a state after the first automatic intermittent feeding of the strip-shaped material;

Fig. 5 is an explanatory view showing a state after a second automatic intermittent feeding of the strip-shaped material; and

Fig. 6 is an explanatory view showing a state before the n^{th} automatic intermittent feeding of the strip-shaped material.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Embodiments of the present invention will be described below referring to the drawings.

Fig. 1 is an elevation view schematically showing a label manufacturing apparatus having a feeding unit applied thereto according to the present invention. In Fig. 1, the label manufacturing apparatus 10 comprises a printing unit 11 performing a predetermined printing on a surface of a strip-shaped material L, a die cut unit 13 disposed at a downstream side of the printing unit 11 (right side in Fig. 1), and a feeding unit 14 for feeding out the strip-shaped material L

from the printing unit 11 to the die cut unit 13 side.

The printing unit 11, as shown in Fig. 2, is arranged so that label printing portions P with substantially square-shape and marks M positioned below thereof on a label base sheet S that is placed on a surface of the strip-shaped material L are printed along a feeding direction X of the strip-shaped material at each predetermined interval. The label base sheet S is pasted on a surface of release liner (not shown) with adhesive. Each mark is inscribed at one end of the label base sheet S in the width direction thereof (bottom side in Fig. 2), and is formed on a line extending from a centerline C1 of each printing portion P in the feeding direction X. The interval between the adjacent marks M to each other, namely, each distance W between the marks is set in the printing unit 11 so that each interval has an identical distance. The strip-shaped material L that completes printing process by the printing unit 11 is fed out to the die cut unit 13 through a buffer area 16.

In the printing unit 11 according to the present invention, as shown in Fig. 1, after printing a label printing portion P and a mark M on a strip-shaped material L, a protective film FL is pasted thereon. The protective film FL, in the original roll state, is supported by a feed-out roller 18 disposed above

the die cut unit 13 and fed out from this roller 18. After the release liner B is peeled off, the protective film FL passes between a pair of nip rolls 19 to be pasted on the printing side of the label sheet. The release liner B is wound by a winding roller 21.

The die cut unit 13 comprises a moving unit 23 disposed in the lower portion of frame F, a cutter die 25 which is provided in a movable manner in the upper and lower directions with a predetermined stroke by the moving unit 23, and is equipped with a blade 24 on the bottom face thereof to make a cut in the label base sheet S with the protective film FL glued thereon, and a cutter die receiving plate 26 disposed on the reverse side of the strip-shaped material L under the cutter die 25. The cutter die 25 is supported by a slider (not shown), and is arranged in such a manner that the slider enables the same to slide along in the feeding direction X and also the slide movement can be restricted by a stopper (not shown).

The moving unit 23 comprises a servomotor 29 provided with a gear head 28 as a speed reduction unit, a gear box 33 connected with an output shaft 30 of the servomotor 29 via a timing belt 32, and lifting shafts 34, which are connected with the gear box 33 and fixed with the above mentioned cutter die 25 at the upper end portion thereof. Four lifting shafts 34 in all

are employed, which are located at the adjacent portion of the respective corners of the cutter die 25. The gear box 33 comprises an eccentric shaft and a gear train (not shown) and is arranged so that the rotation of the servomotor 29 is converted into a vertical linear movement of the lifting shaft 34 via a known crank shaft and crown rod and the like.

The strip-shaped material L passed through the die cut unit 13 is intermittently fed by the feeding unit 14 with each feed interval setting. The feeding unit 14 comprises a sensor 36, a drive unit 37 disposed in downstream side of the cutter die 25 (right side in Fig. 1), giving a feed motion force to the strip-shaped material L, a controller 38 connected to the sensor 36 and the drive unit 37, and an input unit 39 disposed above the drive unit 37, being composed of a touch panel or the like capable of input a predetermined setting value to the controller 38.

The sensor 36 comprises a mark detecting sensor 40 for detecting mark M disposed in an upstream side of the cutter die 25 (left side in Fig. 1) and an encoder 41 mounted to a motor of the drive unit 38, which will be described later. The mark detecting sensor 40 is arranged to output a detected signal to the controller 38 when detecting the mark M of the strip-shaped material L being fed, while the encoder 41 is arranged

to output a pulse signal to the controller 38 corresponding to the rotation of the motor. Consequently, it is arranged so that a feed motion amount of the strip-shaped material L is detected by counting the pulse signals at the controller 38, and a distance W between the marks M is detected by counting the pulse signals at the controller 38 between the output timings of the detection signal of each mark M to the controller 38.

The drive unit 37 comprises a motor 43, which is intermittently driven, an output shaft 44 of the motor 43 and a nip roll 45, which is pressed toward the peripheral surface of the output shaft 44. The drive unit 37 is arranged to input a value of a feed interval setting outputted from the controller 38 and feed the strip-shaped material L intermittently at each predetermined feed interval setting.

The controller 38 comprises a memory function to store a feed interval setting of an intermittent feeding entered by the input unit 39 and a correction factor which will be described later, a determining function to determine a distance W between the marks by inputting data from the mark detecting sensor 40 and the encoder 41, comparing function to compare the intervals between mark-to-mark distance W and a feed interval setting of an intermittent feeding,

determining function to determine a subsequent feed interval setting by means of the comparison results and the correction factor against the predecessor feed interval setting, and controlling function to control the intermittent feeding of the strip-shaped material L by outputting an amount of a subsequent feed interval setting to the drive unit 37.

Then, a method for intermittent feeding of the strip-shaped material L and a label manufacturing according to the embodiment of the present invention will be described with reference to Fig. 2 through Fig. 6. In these figures, when seen as a planer shape, the blade 24 for the cutter die 25 overlapped with the strip-shaped material L is shown as being offset upwardly.

Firstly, a setting operation before manufacturing labels will be carried out as follows. This operation starts with a situation as shown in Fig. 2, followed by intermittent feeding for setting operation (described as "an intermittent feeding for setting" hereinafter), which results in setting state as shown in Fig. 3.

A feed interval setting K_0 of an intermittent feeding for a setting purpose is defined beforehand. The feed interval setting K_0 can be used when the value is previously stored in the controller 38, and also

may be manually input to the controller 38 via the input unit 39. Then, as shown in Fig. 2, the strip-shaped material L is set so that a position of any mark M, the label printing portion P and the center position C2 of the blade 24 are aligned roughly, and the sensor 40 is positioned approximately at the midpoint of adjacent marks M, without overlapping with mark M. Then, an intermittent feeding for a setting purpose is carried out by the drive unit 37 at the feed interval setting K_0 . When the intermittent feeding for a setting is in a halt mode, a cut is formed on the label base sheet S by the die cut unit 13, then a position deviation between the cut position and the label printing portion P are checked visually, then the cutter die 25 is manually adjusted along the feeding direction X by the slider and the stopper (not shown) to eliminate the position deviation, and then a subsequent intermittent feeding for a setting is carried out. Thus in the course of intermittent feeding for a setting purpose for several times, for instance from 5 to 10 times, as shown in Fig. 3, when the mark M and the center position C2 are aligned each other, namely, when the state has been confirmed that a positional deviation between the blade 24 and the label printing section P does not exist, an intermittent feeding for a setting is stopped to

complete the setting operation.

In the intermittent feeding for a setting purpose, the number of output pulse from the encoder 41 is counted from the time when the mark detecting sensor 40 detects the mark M to the time when the operation stops as described above. The feeding amount of the strip-shaped material L during this operation is detected to store to the controller 38. Herein, the feeding amount at the completion of the setting operation is referred as code R_1 (see Fig. 3).

After the setting operation has been completed, an automatic intermittent feeding begins to produce labels. Herein, for convenience in explanation, as shown in Fig. 3, a mark positioned at the center position C2 of the blade 24 before an automatic intermittent feeding operation is referred as code M_1 . As shown in Fig. 4 through Fig. 6, the marks M are referred as code $M_1, M_2, M_3, M_4 \dots$ from right to left in order as in the drawing. Also, the n^{th} round of a feed interval setting of automatic intermittent feeding is referred as code K_n , and a distance between the detected marks is referred as code W_n ("n" is a natural number).

Before starting the automatic intermittent feeding, a correction factor h , which will be described later, and a feed interval setting K_1 , which is the first automatic intermittent feeding are to be entered

via the input unit 39. When a feed interval setting K_1 is identical with a feed interval setting K_0 of an intermittent feeding for a setting, an input operation may be omitted.

When starting an automatic intermittent feeding, the output signal from the controller 38 to activate the drive unit 37, starts rotation of the output shaft 44 of the motor 43, and as shown in Fig. 4, a first automatic intermittent feeding of the strip-shaped material L with an amount of a feed interval setting of K_1 is commenced. Upon beginning of the intermittent feeding operation, the controller 38 counts the number of output pulses from the encoder 41 to determine the feeding amount R_2 while the mark detecting sensor 40 detects the mark M_2 and determines a distance W_1 between the marks by adding up the feeding amount R_2 and the aforesaid feeding amount R_1 . Also the controller 38 determines the feeding amount R_3 between a detection of the mark M_2 by the mark detecting sensor 40 and the stop position of the intermittent feeding and store the amount.

When the drive unit 37 feeds the strip-shaped material L by an amount of the feed interval setting K_1 , the controller 38 stops an operation of the drive unit 37 to halt a feeding travel of the strip-shaped material L and finishes the first automatic

intermittent feeding. In a state of a halt condition of the strip-shaped material L, the blade 24 of the die cut unit 13 makes a cut along the outer circumference of the label printing section P.

Herein, in the controller 38, the distance W_1 between the marks is compared with the feed interval setting K_1 and a second feed interval setting K_2 is determined by the following formula.

$$Z_1 = W_1 - K_1,$$

$$H_1 = Z_1 \times h,$$

$$K_2 = K_1 + H_1, \text{ wherein}$$

Z_1 : deviation as error (a feeding direction represents positive, while the reverse direction of the feeding direction represents negative. Deviation after n^{th} round of an intermittent feeding is described as Z_n hereinafter), H_1 : correction amount (a feeding direction represents positive, while the reverse direction of the feeding direction represents negative. Correction amount after n rounds of automatic intermittent feeding is described as H_n hereinafter), and h : correction factor ($0 < h < 1$).

According to the above formula, a correction amount H_1 is determined by multiplying a deviation amount Z_1 by a constant rate (a correction factor h) and the second round of the feed interval setting K_2 is corrected by the amount of H_1 added to the predecessor

feed interval setting K_1 .

Deviation Z_n (herein, a deviation Z_1) is equivalent to the deviation (error) between the mark responding to a label printing portion P with a cut formed (herein, mark M_2) and the center position C2 of the blade 24.

After cut formation by the die cut unit 13, the controller 38 outputs a signal to activate the drive unit 37 and the second automatic intermittent feeding of the strip-shaped material L begins. Upon beginning of the intermittent feeding operation, as shown in Fig. 5, the controller 38 counts the number of output pulses from the encoder 41 while the sensor 40 detects the mark M_3 and determines the feeding amount R_4 from the time of the second automatic intermittent feeding start and the mark M_3 detection, and distance W_2 between the marks by adding up the feeding amount R_4 and the stored feeding amount R_3 . Feeding amount R_5 from the time of the mark M_3 detection to the time when the automatic intermittent feeding stops is also detected.

When feeding of the strip-shaped material L by the amount of feed interval setting K_2 is completed, feeding motion of the strip-shaped material L is ceased via the controller 38 and the drive unit 37, which is the end of the second time of an intermittent feeding. The controller 38 then compares the distance W_2 between

the marks with a feed interval setting K_2 to determine the third feed interval setting K_3 by the following formula;

$$Z_2 = W_2 - K_2 + Z_1$$

$$H_2 = Z_2 \times h$$

$$K_3 = K_2 + H_2$$

As is the case of the second automatic intermittent feeding, a third or further automatic intermittent feeding is operated. The n^{th} round of feed interval setting K_n and deviation Z_n is determined as follows,

(1) In case of $n=1$

(i) A feed interval setting K_1 is manually input or stored in the controller 38 beforehand.

(ii) Deviation $Z_1 = W_1 - K_1$

(2) In case of $n=2$

(i) Feed interval setting K_2

$$H_1 = Z_1 \times h$$

$$K_2 = K_1 + H_1$$

(ii) Deviation $Z_2 = W_2 - K_2 + Z_1$

(3) In case of $n \geq 3$ (refer to Fig. 6)

(i) Feed interval setting K_n

$$Z_{n-1} = W_{n-1} - K_{n-1} + Z_{n-2} \dots (a1)$$

$$H_{n-1} = Z_{n-1} \times h \dots (a2)$$

$$K_n = K_{n-1} + H_{n-1}$$

(ii) Deviation $Z_n = W_n - K_n + Z_{n-1}$

Following the above formula, as shown in Fig. 6, a deviation Z_{n-1} is determined by subtracting a feed interval setting K_{n-1} from a distance W_{n-1} between the marks, which is detected at the $(n-1)^{th}$ round of an automatic intermittent feeding, and adding the predecessor deviation Z_{n-2} . A correction amount H_{n-1} is obtained by multiplying deviation Z_{n-1} by the correction factor h , which results in the correction of the n^{th} round feed interval setting K_n by the added increment of H_{n-1} to the predecessor feed interval setting K_{n-1} against the feed interval setting K_{n-1} .

Herein, in the range of $0 < h < 1$, as the correction factor h becomes larger, the amount of an absolute value of the correction amount H_{n-1} against the calculated deviation Z_{n-1} increases, which results in that subsequent feed interval setting K_n is widely corrected, while as the correction factor h becomes smaller, the amount of an absolute value of the correction amount H_{n-1} against the calculated deviation Z_{n-1} decreases, which results in that a subsequent feed interval setting K_n is corrected a little.

Therefore, according to the above embodiments, since the drive unit 37 automatically feeds the strip-shaped material L intermittently at each feed interval setting K_n predetermined by the control unit 38, it is possible to constrain the deviation between

the feed interval setting K_n and actual feeding interval, even when the feeding speed is changed, lessening influence of the change. Thus, even when the feeding speed for the strip-shaped material L is set at a higher speed, it is possible to improve the label manufacturing efficiency while maintaining accuracy of label cutting processes.

In addition, in each time of the automatic intermittent feeding of the strip-shaped material L , the subsequent feed interval setting K_n is determined in such a manner that K_n is obtained with an addition of an amount based on the predecessor automatic intermittent feeding interval setting K_{n-1} and the detected distance between the marks, the amount being multiplied by a correction factor, which results in that as the number of times of the automatic intermittent feeding increases, a feed interval setting K_n comes closer to an approximation of the average of a distance W_n between the marks, thereby it is possible to lessen the deviation between them.

Optimal arrangements and methods for implementation of the present invention have been disclosed in the above description, but it is not intended to limit the invention to them.

Namely, specific embodiments of the present invention are particularly illustrated in the drawings

and explained, and those skilled in the art may make various changes and modifications in the shape, quantity, and other details of structure without departing from the spirit and scope of the invention.

The foregoing description that is limiting the shape or the like has been illustrated for purpose of understandings of the invention readily, and it is not intended to specify limits of the invention, consequently, it will be recognized that the description by the designation of structural members eliminating a part of limitations of the shape and the like or the whole limitations is included in the scope of the present invention.

The feeding unit 14 may be applied to, for instance, a unit to perform a printing process or a label pasting process at each predetermined interval.

A shape or a forming position of the label printing portion P and the mark M are variously changeable in design as far as they are formed along the feeding direction X with each predetermined interval, and relative position of the label printing portion P to the corresponding mark M is always identical.

Further, in the above feeding method, correction amount H_{n-1} may be determined by the following formulas (b1) and (b2) in lieu of the formulas (a1) and (a2).

$$J_{n-1} = W_{n-1} - K_{n-1} + H_{n-2} \dots (b1)$$

$$H_{n-1} = J_{n-1} \times h \dots (b2)$$

$$(K_n = K_{n-1} + H_{n-1})$$

In the above formulas (b1) and (b2), J_{n-1} is a preliminary correction amount, which is determined by subtracting a feed interval setting K_{n-1} from the distance W_{n-1} between the marks detected at an $(n-1)^{th}$ round of an intermittent feeding and adding the predecessor correction amount H_{n-2} . A correction amount H_{n-1} is determined by multiplying a preliminary correction amount J_{n-1} by a correction factor h .

The deviation Z_{n-1} of the feeding method described above may be determined by a different way from the embodiment, for instance, in lieu of the formula (a1), in the occasion of each automatic intermittent feeding, the amount Z_{n-1} may be determined by subtracting a feeding amount R_1 (a distance between the mark detecting sensor 40 and the center position C2 of the blade 24 in a state that the intermittent feeding is in a halt condition) from a feeding amount between the time of mark M detection and the time when an automatic intermittent feeding stops. In this manner, a subsequent corrected feed interval setting K_n may be determined without the determination of the distance W between the marks.

Further, a method for determining a feed interval setting K_n is not limited to the above formulas, and

also they are changeable in various ways as far as an error or deviation between the mark-to-mark distance W and a feed interval setting K_n are controlled for correction.

According to the present invention, the feeding amount is controlled in accordance with at each feed interval setting corrected so that it is possible to eliminate the need of controlling a feeding motion upon sensor output as required in a conventional way and avoid stop position deviation of a strip-shaped material affected by feeding speed. Namely, even when a feeding speed is set at a high speed, it is possible to meet a higher feeding speed satisfactorily while keeping the stop position of the strip-shaped material for processing in good accuracy.

When a deviation occurs between mark-to-mark distance and a feed interval setting, an intermittent feeding is performed after correction of the predecessor feed interval setting, thereby the stop position accuracy of the strip-shaped material is improved.

Further, the deviation produced with the predecessor feed interval setting will be reflected to the subsequent feed interval setting in a cumulative way through multiplication by a correction factor, thus while performing the intermittent feeding thereafter,

the feed interval setting can come closer to the distance between the marks step by step. Moreover, even when a significant deviation occurs during a plurality of intermittent feedings, it is possible to converge the deviation through modifying thereafter the feed interval setting progressively.

Also the strip-shaped material is arranged to be fed out at each predetermined distance after detecting a distance between the marks or the mark, even when the deviation of the distance between the marks becomes large, it is also possible to detect a mark securely at each feed interval setting.

The present invention is mainly utilized in a manufacturing apparatus to perform a predetermined process such as making a cut at each predetermined interval on a strip-shaped material which is fed intermittently.

WHAT IS CLAIMED IS

1. A feeding unit of a strip-shaped material, taking a strip-shaped material with marks inscribed thereon as a subject, that feeds said strip-shaped material intermittently to a predetermined processing position with reference to said marks, comprising:

a sensor to detect said marks;

a controller to perform a predetermined control through determining an amount of a distance between marks taking as input the sensor output; and

a drive unit to feed out said strip-shaped material at each feed interval setting, wherein

said controller performs predetermined control of said drive unit to correct a deviation between said mark-to-mark distance and the feed interval setting.

2. A feeding unit for a strip-shaped material with marks inscribed thereon at each predetermined interval, wherein said strip-shaped material is intermittently fed to a predetermined processing position with reference to said marks, comprising:

said sensor to detect said marks;

a controller to perform a predetermined control through determining an deviation between said predetermined processing position and the mark taking as input the sensor output; and

a drive unit to feed out said strip-shaped material at each feed interval setting, wherein

said controller performs predetermined control of said drive unit to correct said deviation.

3. The feeding unit as defined in claim 1 or 2, wherein said controller has a function of determining a subsequent feed interval setting by means of a predetermined correction factor against the predecessor feed interval setting.

4. The feeding unit as defined in claim 1 or 2, wherein said controller has a function of determining a subsequent feed interval setting against the predecessor feed interval setting by means of an amount determined by multiplying an amount of a deviation arising from said feed interval setting by a predetermined correction factor.

5. The feeding unit as defined in any of claims 1, 2, 3, or 4, wherein

after said controller detects said distance between the marks or the mark, feeds out the strip-shaped material by a predetermined amount, and controls the drive unit to stop said feeding out.

6. A feeding method to feed intermittently a strip-shaped material with marks inscribed thereon with each predetermined interval via a drive unit, said method comprising the steps of:

detecting said marks by a sensor;

determining a distance between the marks from said sensor output via a predetermined controller;

comparing said distance between the marks with a feed interval setting of the strip-shaped material via said controller; and

controlling a drive unit by said controller to correct a deviation between the mark-to-mark distance and the feed interval setting based on said comparison.

7. A feeding method to feed intermittently a strip-shaped material with marks inscribed thereon with each predetermined interval to a predetermined processing position with reference to said marks by a drive unit, comprising the steps of:

detecting said marks by a sensor;

comparing a position of the mark from said sensor output with said predetermined processing position via a predetermined controller; and

controlling a drive unit by said controller to correct a deviation of a feed interval setting of the strip-shaped material based on said comparison.

8. The feeding method as defined in claim 6 or 7, wherein

said correction is made by a correction factor set beforehand.