Correct the deviation of printing drums in micron increments.

**Printing machine industry**

The client is a major printer manufacturer that produces industrial rotary presses. A representative of the design engineering division consulted us on "positioning" of the printing drums.

**Client's Issues**

The client has a trouble with the deviation of CMYK-color drums by few microns during printing. Even a slight deviation can greatly affect the quality of print, causing printing unevenness.

"Optical fiber sensors" have been used to control drum positions, however, because of the low accuracy of 20µm, the deviation cannot be corrected in micron increments.

We received an inquiry through an internet search for "precision positioning sensors".

**Rotary press**

The main focus of the issues

- A slight deviation of printing drums results in lowering printing quality.

**Metrol's suggestions**

"Optical fiber sensors" has a 20µm dead zone between the signal set position(ON) and the signal return position(OFF) called "movement differential", where detection cannot be made. Therefore these sensors are not suitable for positioning that requires high precision.

Metrol's "High-precision Positioning Switches" are free of movement differential by their precision mechanical switch structure, achieving 1µm repeatability. The deviations of printing drums can be corrected in micron increments and improvement in printing quality can be realized.

In addition, Metrol's "High-precision Positioning Switches" are available at relatively low price, which is about the half of "optical fiber sensors".
Improvements

- Improvement in printing quality can be realized by precision positioning of the printing drums.

Comment from Metrol representative

“High-precision Positioning Switches” introduced here have been widely adopted for applications such as “stable detection of the bobbin position” for the automated knitting machine and “precision positioning of the object on the conveyor” that are difficult for “optical fiber sensors”.

If you are having trouble with “sensors” or “positioning”, please feel free to contact us.

For further information about the products used in this application

Ultra-small Precision Positioning PT-Touch Switch

The world's smallest. M5 x 17mm.
Realize high precision positioning with 1µm repeatability.
Client's Issues

The client used the inspecting table (XY table) and had a trouble with the gaps of the XY axes in micron level due to self-heating by aging.

The staring point by "photo micro sensors" is not sufficient to correct thermal displacement in micron level because of low repeatability, 10µm.

He did a search using keywords, "thermal displacement" "correction" and found Metrol's products and contact us.

The main focus of the issues

- XY axes of tables deviate by few microns due to self-heating.
- Photo micro sensors are not capable of accurate starting point.

Metrol's suggestions

Although photo sensors such as "photo micro sensors" or "photoelectric sensors" is suitable for presence detection, they are unsuitable for high-accuracy starting point.

Also, as the inspection table, the sensor causes temperature drift due to self-heating in its amp, and it cannot use the accuracy on the catalog specification.

Because Metrol's "precision positioning switches" are precision mechanical type and does not use amp, it does not cause temperature drift and uses a stable repeatability of 0.5µm even after the three million-times use.
By attaching precision position switches directly to the X- and Y-axis edge faces of tables and setting the ON/OFF switching point as the starting point, the thermal displacement can be corrected in micron level.

**Improvements**

- Realization of correcting the thermal displacement in micron level for the X- and Y-axes by high-accuracy starting point.

**Comment from Metrol representative**

Using "Precision position switches" for starting point in driving makes it possible to drive the stage accurately on the XY tables with inexpensive pulse motors as well as tables with servo motors.

We have achieved remarkable cost reduction at a major semiconductor manufacturer. Please feel free to contact us.
A replacement of the contact-type displacement sensor reduced the cost significantly

**Electronic device industry**

Cost Reduction  Positioning Switch

A device manufacturer that produces desktop soldering robot essential for small and multiple types of model production. A representative of the development of dispenser for smartphones inquired us about “height measurement” of the nozzle in applying adhesive.

**Client's Issues**

The “contact-type displacement sensor” has been used for measuring the height of the nozzle of dispenser with adhesive, however, the device was expensive and this was a financial burden.

The nozzle height measured before applying adhesive is provided for the feedback on the values to the machine, however, the 1 µm or better high accuracy is required also for controlling the amount of application precisely.

With the adhesion application of tempered glass for smartphones expanding, the client’s company found a sensor that can measure the nozzle height at low cost and contacted us.

**The main focus of the issues**

- Contact displacement sensor is expensive.
- Repeatability of 1µm or more is needed.

**Metrol’s suggestions**

For a measurement in automated lines for detecting constant positions, the number display (displacement measurement) is often unnecessary, and “Contact-type displacement sensor” gives the dispenser overperformances for such application in many cases.
Metrol's "precision positioning switch" can detect the nozzle height with high accuracy ON/OFF signals. Though the accuracy of the switch is the same as that of contact-type displacement sensor, the switch can reduce the cost to about 1/10.

Furthermore, the contact tip material can be changed to resin to reduce the contact force, so there is no risk of scratching the tempered glass for smartphones.

Improvements

- Reduced the cost to 1/10 by eliminating the number display.
- Realization of repeatability of 0.5µm.

Comment from Metrol representative

Is the number display really necessary for positioning in automated lines and in-lines?

As stated already, in many cases, a significant cost reduction has been achieved by replacing expensive "contact-type displacement sensor" with Metrol's "precision positioning switch".

If you are in trouble with the higher cost of "contact-type displacement sensor", do not hesitate to contact us.
Realization of a stable detection of 0.5 mm minute actions

Transportation equipment industry

<table>
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<tr>
<th>Minute Actions</th>
<th>Positioning Switch</th>
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<tr>
<td>A brake manufacturer that produces disk brakes for a large-size elevator.</td>
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<td>A representative of the design department inquired us about the switches used for brake pad &quot;confirmation of opening / closing&quot;.</td>
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Client's Issues

The "Limit switch" has been used for confirmation of opening / closing disk brakes, but there was some trouble in detecting stably "minute actions by 0.5 mm" of brake pad.

To detect the slight movement of the brake pad, a "Size-enlargement mechanism" was provided to the operating part to enlarge and detect the minute actions, however, the installation maintenance and waste in the size-enlargement mechanism may cause accidents.

The client got to know us by the visit our booth in M-tech.

The main focus of the issues

- Stable detection of 0.5 mm minute actions
- Size-enlargement mechanism is not suitable because of its low safety

Metrol's suggestions

Conventionally, the "Limit switch" is a flat-spring-system snap action mechanism and there is a dead zone called "movement differential" generated between ON and OFF, which prevents the minute actions from being detected.

Metrol's "precision positioning switch" is a plunger-type precision machine and has no "movement differential" and can stably detect "0.5 mm or less minute actions".

Also, directly attaching the switch to the brake pad eliminates the need for the "size-enlargement mechanism"
and significantly improves the maintainability and safety.

**Improvements**

- Realize stable detection of 0.5 mm minute actions
- Enhance safety by not using size-enlargement mechanism.

**Comment from Metrol representative**

Like this case, many brake manufacturers has decided to adopt the “precision positioning switch” after the national notification regarding elevator safety.

*A size-enlargement mechanism to detect minute actions has to be developed*
*A adjusting the installation just took a plenty of time*

Many of our clients have similar troubles in stable detection of minute actions.

We also provide sampling rental service for evaluating the prototype. Please feel free to contact us.