» New Products

Compact Ribbon Fiber Mass Fusion Splicer S001M4 and Ribbon Fiber Cleaver S327

1. INTRODUCTION

The demand for high-speed and stable optical fiber communications has been increasing due to the expansion of the remote work and the growing use of video distribution services. In the domestic market, the installation of an aerial service cable and an in-premise cable has been increasing with the increase of FTTH users since 2010. Since the aerial service cable installation requires works in limited space such as on poles, there is a growing need for a compact mass fusion splicer with a function for splicing a drop cable. We have developed a more compact and a lighter mass fusion splicer to meet customer needs as a successor to the compact mass fusion splicer NJ001M4. At the same time, as a successor to the optical fiber cleaver, S326, we have developed an optical fiber cleaver with easily replaceable cutting blades. Furukawa Electric has a history of 139 years, starting with the copper smelting and the cable manufacturing. To link with this long history, we adopted an innovative design with a copper color scheme for both products (Figure 1).

Figure 1 Picture of the S001M4.

2. COMPACT MASS FUSION SPLICER S001M4

2.1 Product Concept

This product was planned to target optical fiber installation applications in Japanese domestic market. There are two main categories of installation work. One is performed underground or above ground, and another is performed overhead. We had lined up the S124 series fusion splicer for the former and the NJ001 series fusion splicer for the latter. In addition, since the aerial work is sometimes performed in the bucket of an elevating vehicle, as well as on poles and ladders, the equipment must be smaller and lighter. Furthermore, as we listened to voices of our customers, we found that, especially during fault repairs or relocation works, the length of optical fiber that must be spliced is extremely short, so the optical fiber fusion splicer must sometimes be pulled close to the optical fiber cable to perform the work. For this reason, we have found that there is a latent need to hold the optical fiber fusion splicer with one hand and to bring it close to the optical fiber cable.

Therefore, we designed the NJ001M4 to be thoroughly compact and lightweight, and to be easy to held in the hand, while retaining the advantage points of the NJ001M4, which had been well-appreciated. As shown in Figure 2, the new NJ001M4 has a T-shaped thin body that is easy to hold in the hand. A weight of approximately 750 g (25% less than the conventional model) and a volume of approximately 916 cm^3 (20% less than the conventional model) have been achieved.

Figure 2 Compact mass fusion splicer for the ribbon fiber, S001M4.

The LCD screen with touch panel and frequently used operation switches are located in the center of the machine, making it possible to work even when the LCD screen is difficult to see due to the work in the bright sun, when the touch panel does not respond well due to rain, or when wearing gloves.

Since a sufficient space is secured in the rear section, giving a priority to the workability in the fusion splicer

mechanism, the optical fiber holder can be inserted easily and the workability is not lost.

The front section is equipped with a slot-in battery that can be replaced without the use of tools.

2.2 Attentive and Convenient Functions

We have received many valuable comments such as “The equipment could do more things like this or that.” from our customers. The fusion splicer S001M4 is a compact machine with a full range of attentive functions. Here, we introduce some of them.

2.2.1 Optical fiber holder magnetic attraction plate

In response to on-site voice of “A temporary storage space for the optical fiber holder is difficult to find”, a magnetic attraction plate has been placed on the side of the equipment to serve as a temporary storage location (Figure 3).

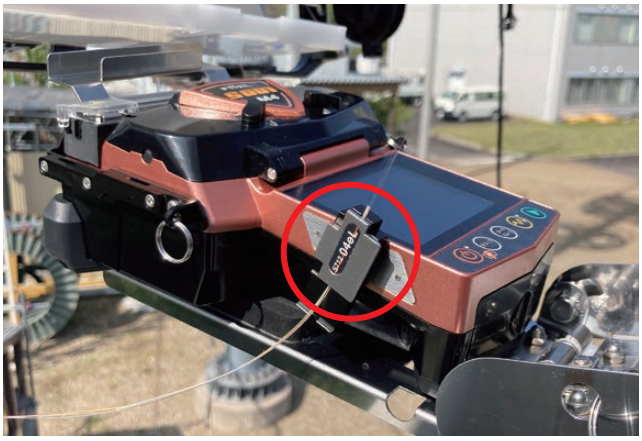

Figure 3 Optical fiber holder magnetic attraction plate.

2.2.2 Heater lid that does not close when tilted

The lid of the heater is designed not to close under its own weight even when the equipment is used in an upright position in situations where fusion splicing must be performed close to the optical fiber cable (Figure 4).

Figure 4 Rocker type heater lid.

2.2.3 Independent left and right optical fiber set position correcting levers

When an optical fiber is misaligned because it is not firmly placed on the positioning section, this lever corrects the position by mechanically moving the left and right fiber clamps up and down individually without touching the optical fiber (Figure 5).

Figure 5 Optical fiber position correcting levers.

2.2.4 Windshield angle switching function

When the windshield (lid), which protects the mechanism from wind and rain, is opened, the angle can be changed. (Figure 6). The windshield can be set at a large angle for easy viewing during the daytime, or slightly closed for the work in the dark, so that the mechanism is illuminated by the high-brightness LEDs installed inside the windshield.

Figure 6 Windshield with adjustable opening angle.

2.2.5 Dedicated switch for function call-only

A switch is provided to straighten out bends in the optical fiber coating to make splicing easier, and a one-button switch is provided to change to a setting for splicing of drop cables (Figure 7).

Figure 7 A button for splicing the drop cable and a button for removing the fiber curl.

2.2.6 Touch panel switch display changing function

The display position of the touch panel switch can be changed according to the dominant hand. Hands do not block the screen when operating switches (Figure 8).

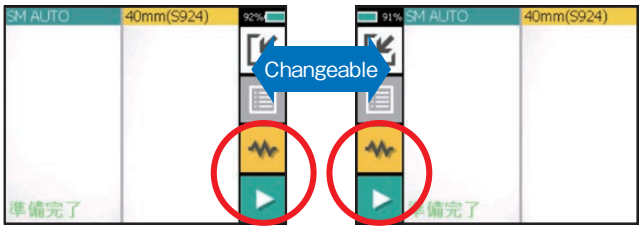

Figure 8 Display position changeable touch panel switch.

2.3 High Speed Operation

The total time required for fusion splicing and reinforcement of the fusion point (4 fiber ribbon) is 1.2 times faster than that of our conventional products. The former was achieved by increasing the speed of the motor, and the latter was achieved by optimizing the control of the heating device used for reinforcement (Figure 9).

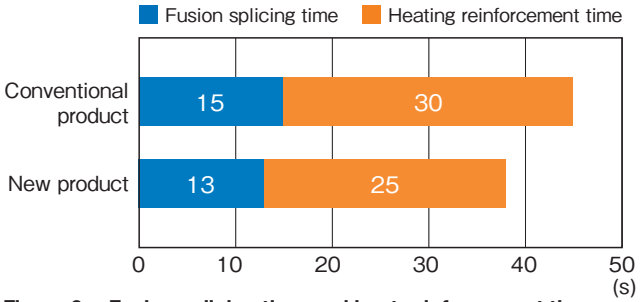

Figure 9 Fusion splicing time and heat reinforcement time.

2.4 Product Specifications

Table 1 shows the main specifications of the S001M4.

Table 1 Main specifications of the S001M4.

Items	Specification
Applicable fiber type	SMF, MMF, DSF, NZDSF, BIF
Applicable cladding diameter	125 μm (fiber cutting length: 10 mm)
Splicing loss	SMF: 0.05 dB
Battery	Slot-in type lithium ion
Main unit dimensions	120 W × 165 D × 65 H mm
Main unit mass	750 g (including battery)

3. RIBBON FIBER CLEAVER S327

3.1 Product Concepts

As same as the fusion splicer, the optical fiber cleaver must be compatible with a variety of work environments. Therefore, we have designed it in a manner that is easy to operate both at a desk and with one hand, and also, the opening angle of the lever section can be changed according to the size of the hand (Figure 10).

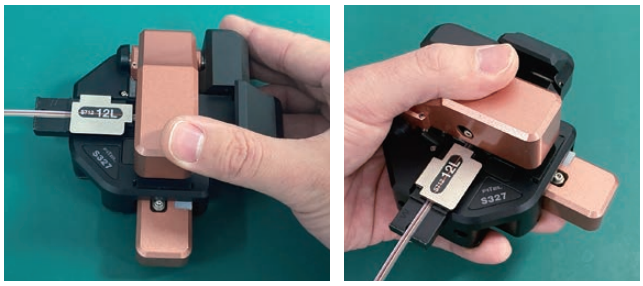

Figure 10 How to operate the S327 (left: at the desk, right: in the hand).

The cutting blade, which is used to cut optical fibers, is a consumable item. To minimize problems such as “Fiber cannot be cut due to the damage of the cutting blade.” at installation sites, the number of possible cuts per cutting blade has been increased, and also, the blade position can be revised without tools even when worn out. In addition, the replacement of a blade that has used up all of its positions is now done by customers themselves in about 1 minute, whereas the previous product needed to be brought to a service center.

3.2 New Cutting Blade Rotation Mechanism

In the conventional product, the positioning of the cutting blade was performed by gripping the center hole of the cutting blade with a shaft, and to absorb concentricity and diameter errors between the center hole and the cutting blade, it was necessary to adjust the depth of cut into the optical fiber during the cutting blade replacement process. This product is based on a method (patented) to control the depth of the cut by directly positioning the tip of the cutting blade instead of the center hole. Therefore, the effects of these errors can be eliminated. This eliminates the need to rotate the cutting blade or adjust the depth of the cut when replacing the blade, so that customers can replace the cutting blade by themselves.

The cutting blades are circular in shape as shown in Figure 11, with blades formed on all circumference sections, and can cut approximately 2,500 optical fibers per section. Even if one part is worn out, turning the cutting blade about 14 degrees with the dial will restore sharpness. Since cutting can be performed at 26 locations per

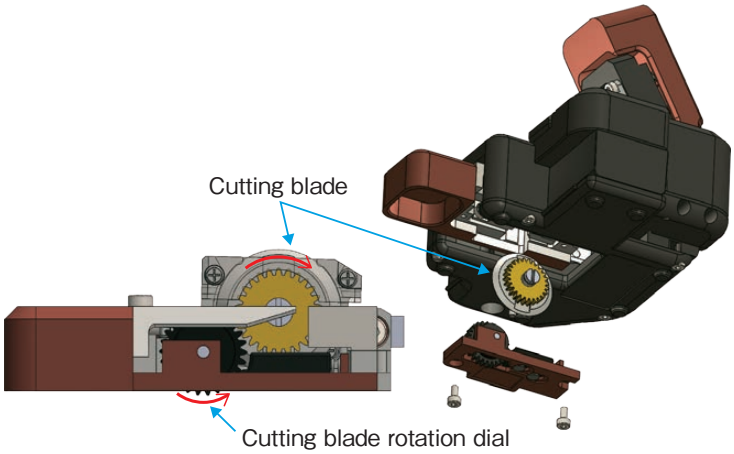

Figure 11 Cutting blade rotation mechanism and replacement method.

circumference, approximately 65,000 optical fibers can be cut per cutting blade. Used cutting blades can be removed and replaced by simply removing two screws.

3.3 Product Specifications

Table 2 shows the main specifications of the S327.

Table 2 Main specifications of the S327.

Items	Specification
Applicable fiber	Single to 12 fiber ribbon (coating diameter 250 μm) Single to 16 fiber ribbon (coating diameter 200 μm)
Applicable cladding diameter	125 μm
Cutting blade rotation	No tool required
Cutting blade replacement time	Approx. 1 min.
Cutting blade life	65,000 times
Waste collection function	Equipped
Main unit dimensions	88 W × 93 D × 57 H mm.
Main unit mass	Approx. 320 g

For more information, please contact:
Fiber-optic Instrument Department,
Optical Fiber and Cable Products Division,
Communications Solutions,
Furukawa Electric Co. Ltd.
Contact form for optical fiber fusion splicer:
https://www.furukawa.co.jp/srm/form/index.php?id=enfusion