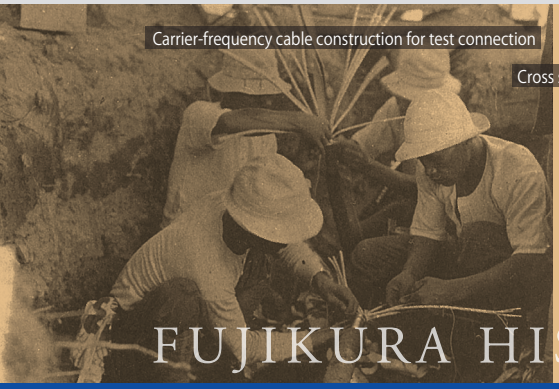


Carrier-frequency cable construction for test connection

Cross section of Fujikura coaxial cable

FUJIKURA HISTORY

Best Technology and Rapid Progress: Transition from mainstream carrier-frequency cable to coaxial cable.Fujikura developed a new-type cable and awarded two patents as the fruit of years of research. Fujikura's business rapidly advanced on the basis of harmony between the staff and active development of proprietary technologies. They were used for various projects including those on NHK and Horyuji.

Shaping the future with "Tsunagu" Technology.

FUJIKURA NEWS 2018 No.443 6

Power & Telecom

Release of New Optical Fiber Tape Cleaver

Fujikura has developed a new optical fiber tape cleaver to cut coated optical fibers for use in telecommunications and is coming on the market in the summer of 2018.

This cleaver has improved impact resistance compared to previous models. In addition, this product enables users to replace the rubber component to hold the blade and optical fibers on their own, which is expected to dramatically cut time and costs spent on maintenance. For existing cleavers, when part of the disc cleaving blade is worn due to repeated cleaving, they require detaching of the blade after releasing, rotating to an unworn area and reattaching it using a wrench.

On the other hand, our new cleaver automatically revolves its cleaving blade using its motor according to the status of cleaving optical fibers on a fusion splicer through wireless communications. In addition, this product also offers useful functions, such as displaying the remaining life of the cleaver on the screen of a fusion splicer.

Furthermore, the lever placed on the upper part of the cleaver opens at an angle of more than 90 degrees so as to ease the setting of optical fibers at the cleaving part. The cleaver also has an inter-dependent mechanical system to move the disc cleaving blade back/forth with the lever opening/closing, which completes cleaving including cleaning dusts by one operation.

Example of product specifications

Model Name	CT50
Fiber number	1 to 12
Clad diameter	125 μm
Wireless communication	Bluetooth 4.1 LE
External dimensions	120㎜(W)×95㎜(D)×58㎜(H)
Weight	320 g
Drop impact strength	76 cm vertical drop on metal surface

●CT50

Precision Equipment Division info-splicer@jp.fujikura.com

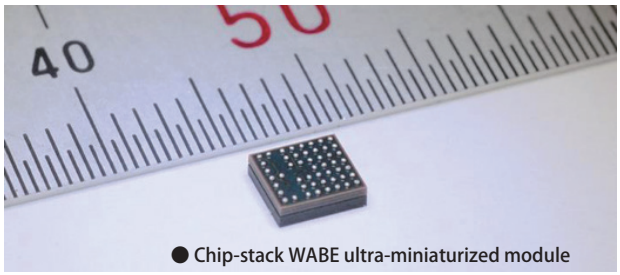
Website dedicated to splicerz https://www.fusionsplicer.fujikura.com/jp

R&D

Commercialization of Chip-stack WABE® Package

Fujikura has put Chip-stack WABE® technology to embed IC chips into a substrate in a stacked configuration to practical use, aiming at further miniaturizing high-functionality electronic circuits. The technology of fabricating the product has been recognized by some customers, and the mass-production will begin in the second half of fiscal 2018.

Our WABE packages containing two-stack ultra-thin IC chips enable drastic reductions in their footprints while minimizing their thicknesses despite the multiple number of built-in IC chips. In addition, the packages suffer lower transmission loss and provides higher performance of electronic circuits since the distance between lines connecting ICs is shortened. This product is the first of its kind in the world to be successfully commercialized by developing technologies to accurately align the layers and establish highly reliable via connections as well as to form highly precise patterns on polyimide substrates. We will continue to broaden the applications of Chip-stack WABE® technology.



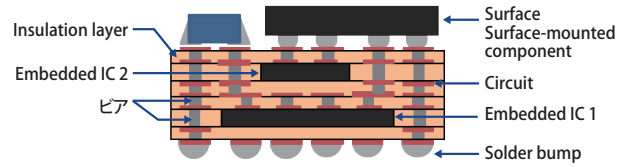
● Chip-stack WABE ultra-miniaturized module

● Cross sectional structure

● Dimensions and structure of typical chip-stack WABE package

Items	Dimensions/Structure	
Thickness	0.4mm (7 layers)	0.7mm (12 layers)
Line/Space	40 μm/40 μm	
Via pitch	300 μm (all-layer IVH)	
Via diameter	80 μm	
Embedded IC size	0.9-8.0mm	
Option	Surface mounting, solder bump	

● Example of chip-stack WABE package structure



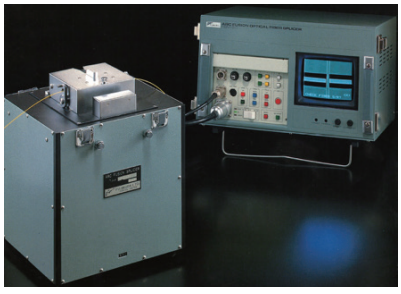
New Business Development Center askwabe@jp.fujikura.com

Information

Fujikura's Optical Fiber Splicer Registered on Chiba's Industrial Technologies 100

Chiba Museum of Science and Industry has created documents describing the history and the role of industrial technology in each area of the prefecture. The museum also has been carrying out a project of selecting 100 industrial technologies since 2017 so as to contribute to arousing public interest in science and technology and their understanding of the local industries within the prefecture. Among the 10 technologies registered in 2017, was Fujikura's optical fiber splicer (FSM-20). The selection includes the following criterion: 1. historical role in the development of the prefecture and each local area; 2. remarkable contribution to the development of industry or technology; and 3. educational aspects in learning about the community for elementary school and about jobs for junior-high and high schools. Our product was recognized for its necessity in daily life in establishing optical fiber communications network while keeping the top share in the world and also for a long history of research, which is a valuable industrial technological material. All about this matter is posted on Chiba Museum of Science and Industry's website.

http://www2.chiba-muse.or.jp/www/SCIENCE/contents/1518491068713/index.html



● FSM-20

● Testimonial

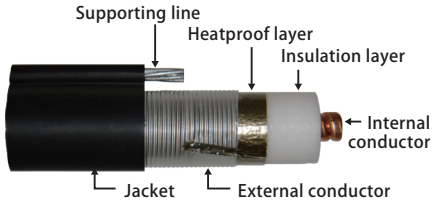
Corporate R&D Planning Center wwwadmin@jp.fujikura.com

Power & Telecom

High-foamed Insulation LCX registered in the Ministry of Land, Infrastructure, Transport and Tourism's New Technology Information System

The High-foamed Insulation LCX, which Fujikura Dia Cable manufactures and sells, has been registered in NETIS (New Technology Information System) of the Ministry of Land, Infrastructure, Transport and Tourism (NEITS register No: KK-180001-A). The ministry established NETIS, aiming at sharing of information on new technologies. Only the technologies that were recognized by the ministry as being excellent are listed and disclosed to the public.

● Cable structure



● Appearance of connector

The high-foamed insulation LCX of Fujikura Dia make was registered because of the following excellent features:

1. **Lighter in weight** (20% reduction compared to existing product)
2. **More flexible** (30% increase compared to existing product)
3. **Shorter connector manufacturing time** (25% reduction compared to existing product)

This is the first of its kind in the industry to have been registered in the system.
The three points mentioned above are expected to bring improved workability and shortened work time at cable installation sites.

* LCX: leaky coaxial cable

Fujikura Dia Cable Ltd. https://www.fujikura-dia.co.jp/contact/

R&D

Development of Wide-band Few Mode Fiber for Long-distance High-capacity Communications

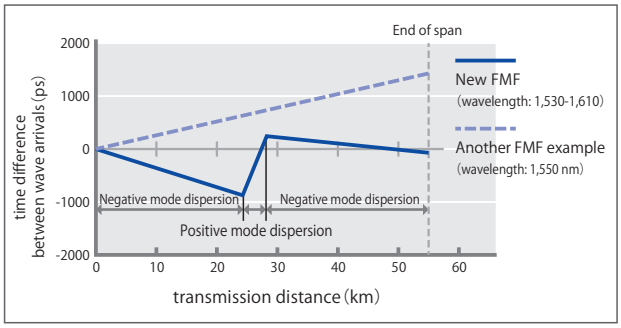
Fujikura has successfully fabricated a few mode fiber, which allows wide-band division multiplexing (WDM) transmission. The results of long-distance high-capacity transmission tests on this fiber were published by National Institute of Information and Communications Technology (NICT) at the Optical Networking and Communication Conference & Exhibition (OFC). This is the largest international academic society related to information and communications and was held in March in San Diego, USA.* This paper was highly regarded and was accepted as a post-deadline paper.**

Currently, communication traffic volume is growing worldwide, and in the near future, optical system that uses existing optical fibers will reach the limit of transmission capacity. To break this limit, FMF, which propagates multiple modes with a single core, and multi-core fiber (MCF), which has multiple cores in one fiber, have been studied actively. Against such a background, we have been studying the FMF and the MCF as the next generation optical fibers. Our new optical fiber has an outer diameter of 125 μm, the same as that of general optical fibers for communications use, and is designed to enable wide-band division multiplexing transmission in three modes. We contributed to the success of the long-distance high-capacity transmission tests of sending 159 terabytes of data for 1045 km (55 km×19 times) by making a 55 km-long optical fiber. For conventional FMFs, long-distance transmission was thought to be difficult because mode dispersion (time difference between standard mode and higher mode arrivals in multiple modes used for signal transmission) increases in proportion to transmission distance.

The mode dispersion at the receiving end was controlled at a quite low level over a wide band by optimally designing the core so as to combine FMFs of which mode dispersions are positive and negative.

We will conduct research and development with commercialization of products in mind toward achieving future high-capacity optical network that supports the ongoing development of broadband services.

* G. Rademacher et al., OFC 2018, Th4C.4 (2018)
** Papers that are accepted after the deadline for general submission. Only studies highly rated can have opportunities to report.



● Relationship between transmission distance and time difference between wave arrivals in span

Advanced Technology Laboratory fjk.ocdept@jp.fujikura.com

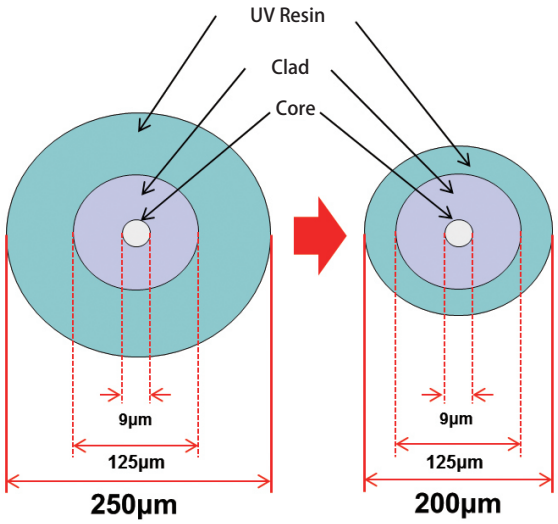
Power & Telecom

Release of Ultra-high Fiber Count Cable 3456F Wrapping Tube Cable™ with 200 μm Fiber

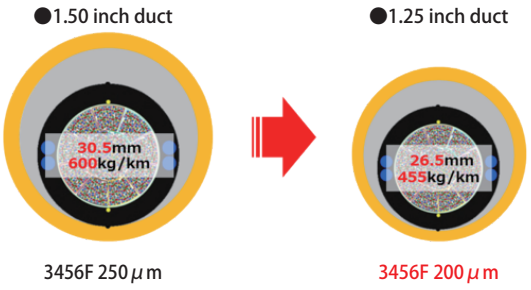
Fujikura has released the 3456 fiber Wrapping Tube Cable (WTC™) with 200 μm fiber which is used for Fujikura's original optical fiber ribbon called Spider Web Ribbon™(SWR™). This 200 μm-3456F WTC is 25% smaller of cross-section dimension, 13% smaller of outer diameter and 24% lighter of gross weight than 250 μm-3456F WTC. Also, the existing fusion splicers can be used for mass fusion splicing with both 200 μm fiber and 250 μm fiber because 200 μm SWR and 250 μm SWR consist of same fiber pitch structure. Of course it is available to mutual fusion splice of 200 μm SWR by the existing fusion splicers.

While video and cloud services are expanding in current years, the large volume of optical fiber network has been requiring because of 5G and Iot technologies. Especially, the further demand of ultra-high fiber count cable installation into limited conduit space at the world's large city has been increasing extraordinarily. The standard sub duct sizes for telecom cable installation into underground conduit are 1.25 inch, 1.50 inch and 2.00 inch. This 200 μm-3456F WTC's outside diameter is 26.5 mm and it is installable into 1.25 inch conduit space. Fujikura continues to develop ultra-high fiber count cable with 200 μm for contributing to grow optical fiber network and society globally.

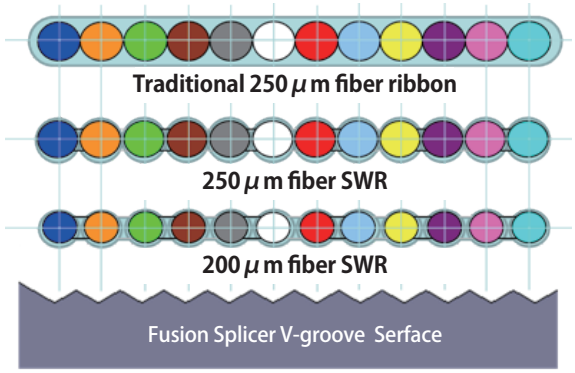
● Comparison of 250 μm Fiber and 200 μm Fiber



● Comparison of 3456F WTC with 250 μm and 200 μm



● 12F SWR Fiber Pitch Structure



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