

The slide features a red header bar with the Everett Community College logo and the text 'EVERETT COMMUNITY COLLEGE Corporate & Continuing Education Center Expect Excellence'. To the right of the header, the text 'Aerospace Fiber Optics' is displayed. The main body of the slide is white and contains the title 'Aerospace Fiber Optics' in a large, dark red font. Below the title, the text 'AFO 101, Session 1' and 'Fiber Optic Familiarization' are centered. At the bottom of the slide, a grey footer bar contains the copyright notice '© Everett Community College. All rights reserved.' and the page number '1'.

5 min for slides 1-4

Welcome

Instructor Note: Bold text indicates facilitator instructions.

- **Display this slide prior to class so that students can make sure that they are in the right place.**
- When it is time to start class, pass out the roster and welcome students to the course.

Student Introductions

- Tell us:
 - Your name and a little about yourself
 - Why are you interested in this course

5 min for slides 1-4

Welcome

Ask students if they have all signed the roster.

Ask each of them to introduce themselves and to state how they plan to use the knowledge.

Learning Objectives

The purpose of Fiber Optic Training is to prepare you to work with fiber optics used in aerospace.

This Fiber Optic Training includes six segments:

1. *Fiber Optic Familiarization* - The purpose of this Fiber Optic Familiarization Training is to prepare you to work around fiber optic materials used on aircraft.
2. *Fiber Optic Assembly*– Will cover the installation and removal of fiber optic assemblies from connectors.
3. *Fiber Optic Routing and Installation* – Will cover the processes and procedures to properly route fiber optic cables on aerospace products.
4. *Fiber Optic Inspection* – Will cover the examination and evaluation of fiber optic end faces.
5. *Fiber Optic Cleaning* – Will cover the cleaning of fiber optic end faces.
6. *Fiber Optic Light Loss Testing* – Will cover fiber optic light loss testing.

Explain what each part will cover.

Introduction: Course Objectives

Participants who successfully complete the Aerospace Fiber Optics course will be able to:

- Describe and apply basic principles of how fiber optics work
- Work Safely with Materials used for fiber optic assembly, routing, installation, cleaning and testing
- Handle fiber optic material to protect the cables from damage during assembly, routing and installation, cleaning and testing
- Route and install fiber optic assemblies with proper routing, protection, tying, support, slack, and drip loops
- Inspect and evaluate fiber optic termini for cleanliness and damage
- Clean fiber optic termini
- Determine your light loss budget and test fiber optic cables

xx min. for yy

Course Introduction

Read the objectives and ask if there are any questions about them.

Course Objectives

At the completing this course, you should be able to:

- Identify your Engineering Authority
- Identify general requirements for working with fiber optics
- Describe fiber optic transmission principles
- Define common fiber optic terms
- List proper fiber optic handling procedures
- Identify fiber optic assemblies
- List safety hazards associated with fiber optics

xx min. for yy

Course Introduction

Read the objectives and expand as necessary. Ask if there are any questions.

Course Agenda

- **Authority (Controlling document)**
- **What is it**
- **History**
- **Material Handling**
- **Assembly Identification**
- **Do's and Don'ts**
- **Personal Safety**

xx min. for yy

Course Introduction

Say: Let us look at the objectives for this section or module.

Course Agenda

- **Authority (Controlling document)**
- What is it
- History
- Material Handling
- Assembly Identification
- Do's and Don'ts
- Personal Safety

xx min. for yy

Course Introduction

Say: First let's look at how we decide what is our controlling document.

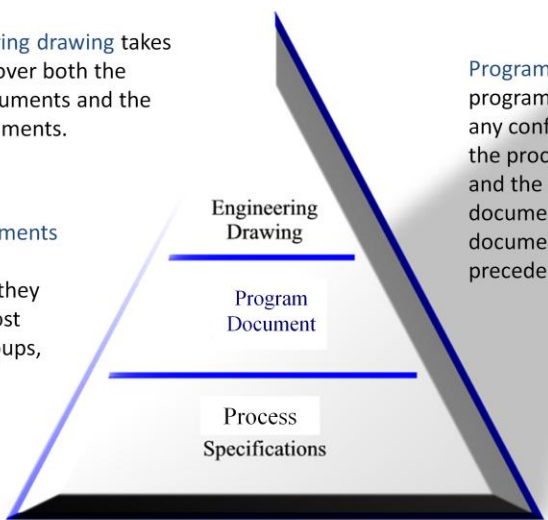
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Engineering Authority

The engineering drawing takes precedence over both the program documents and the process documents.

Program documents are program specific and any conflicts between the process documents and the program document, the program document will take precedence.

Process documents are general information, they pertain to most operating groups, divisions and programs.



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10 min for slides 5 - 11

Course Introduction

Explain the slide.

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Course Agenda

- Authority (Controlling document)
- **What is it**
- History
- Material Handling
- Assembly Identification
- Do's and Don'ts
- Personal Safety

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xx min. for yy

Course Introduction

Say: Next we are going to give you a brief explanation on what fiber is and how it works.

Theory: Fiber Optic Basics

What is Fiber Optics?

How does it work?

Data signals are sent in beams of light through thin glass fibers.

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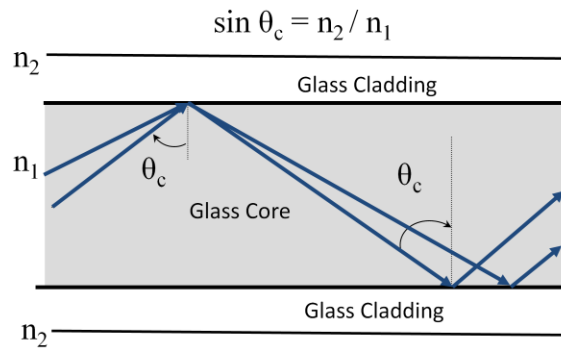
10

xx min. for yy

Theory Instruction

Theory: Fiber Optic Basics

Light rays are launched into the fiber at angles greater than the critical angle.



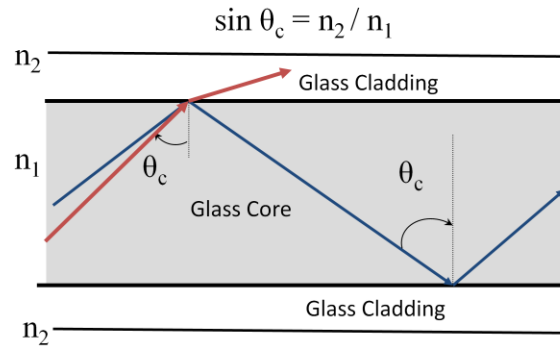
xx min. for yy

Theory Instruction

Read the bubble and display the graphic animation.

Theory: Fiber Optic Basics

If light is outside the critical angle it will be lost.



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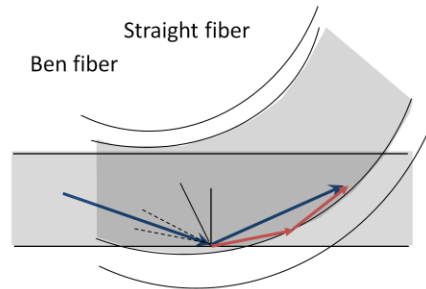
xx min. for yy

Theory Instruction

Read the bubble and display the graphic animation.

Theory: Fiber Optic Basics

Bending the fiber changes the angle and causes loss of reflection.



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xx min. for yy

Theory Instruction

Read the bubble and display the graphic animation.

Theory: Fiber Optic Basics

Isn't it easier to use copper wire?

Yes but, fiber optic cables:

- Transmit more data through hair thin glass rods
- Are immune to electromagnetic interference
- Make it safe to use near high-voltage equipment
- Don't spark
- Are difficult to tap

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xx min. for yy

Theory Instruction

Click to display the bubbles and read.

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Theory: Fiber Optic Basics



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xx min. for yy

Theory Instruction

Play the video.

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Fiber Terms

Term	Definition
Optical Fiber	Optical Fiber: Flexible transparent fiber, such as glass, through which light can be transmitted by successive internal reflections.
Fiber Cable	
Core	
Cladding	
Strength Members	
Cable Jacket	

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5 min. for slides 5 - 12

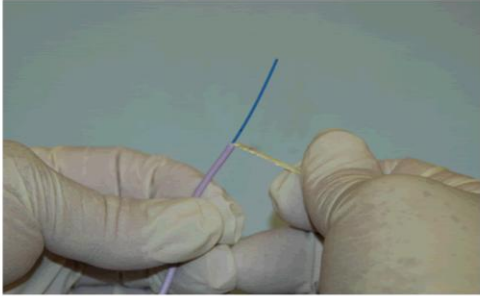
Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Fiber Terms

Term	Definition
Optical Fiber	
Fiber Cable	Fiber Cable: One or more insulated optical fibers that run inside a cable jacket along with the fillers and strength members.
Core	
Cladding	
Strength Members	
Cable Jacket	



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5 min. for slides 5 - 12


Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Fiber Terms

Term	Definition
Optical Fiber	
Fiber Cable	
Core	Core: The center optical layer of the glass fiber where light is transmitted. It measures from 5 μ m to 100 μ m in diameter.
Cladding	
Strength Members	
Cable Jacket	



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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Fiber Terms

Term	Definition
Optical Fiber	<p>Cladding: The outside optical layer in a fiber that traps the light in the core and guides it along. It is the rest of the glass and it measures from 125μm to 140μm. This is the size of some human hairs.</p>  <p>Cladding</p>
Fiber Cable	
Core	
Cladding	
Strength Members	
Cable Jacket	

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5 min. for slides 5 - 12


Course Introduction

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Fiber Terms

Term	Definition
Optical Fiber	
Fiber Cable	
Core	
Cladding	
Strength Members	Strength Members: Aramid (Kevlar) fibers used to add axial strength. While this adds strength axially it does not help with bending.
Cable Jacket	



Strength Member


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Course Introduction

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Fiber Terms

Term	Definition
Optical Fiber	
Fiber Cable	
Core	
Cladding	
Strength Members	
Cable Jacket	<p>Cable Jacket: A tough outer covering that protects all of the inner components. The purple color identifies the cables to be fiber optic. Flight test fiber is jacket is orange with purple flags.</p> <div style="text-align: center; margin-top: 10px;">  <p style="margin-top: 5px;">↑ Cable Jacket</p> </div>

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

Cable Terms

Term

Definition

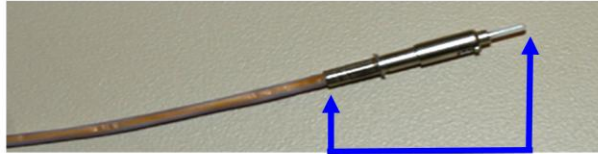
Terminus

Terminus: Device to set and hold an end of an optical fiber permanently in a location inside a connector. Ours are PC (Physical Contact), meaning that the end faces of each termini will make contact with its mate.

Ferrule

End Face

PC Polish

Cable
AssemblyFiber Optic
Bundle

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5 min. for slides 5 - 12



Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Cable Terms

Term	Definition
Terminus	
Ferrule	Ferrule: A mechanical fixture, generally a rigid tube, used to confine the stripped end of a fiber.
End Face	
PC Polish	
Cable Assembly	
Fiber Optic Bundle	

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Cable Terms

Term	Definition
Terminus	<p>End Face: Polished surface at the end of an optical fiber termini.</p> 
Ferrule	
End Face	
PC Polish	
Cable Assembly	
Fiber Optic Bundle	

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

Cable Terms

Term

Definition

Terminus

Ferrule

End Face

PC Polish

Cable
AssemblyFiber Optic
Bundle

PC Polish: Physical Contact Polish refers to the shape that the end face has after it is polished.

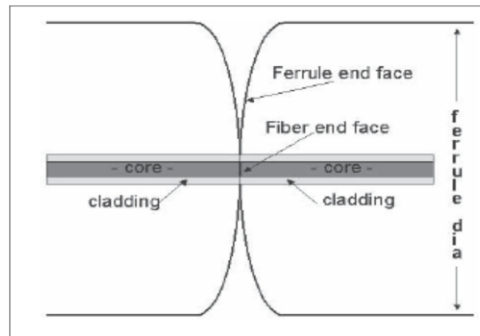


Figure 5. Physical Contact of Two Fiber Optic Termini
(Note Glass and Ferrule Are in Contact)

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Course Introduction

Click to display each definition one at a time. Read and explain the definitions.





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Cable Terms


Term	Definition
Terminus	
Ferrule	
End Face	
PC Polish	
Cable Assembly	<p>Cable Assembly: A single fiber optic cable with termini installed at both ends.</p> <div style="text-align: center; margin-top: 10px;">   </div>
Fiber Optic Bundle	

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Course Introduction

Click to display each definition one at a time. Read and explain the definitions.




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Cable Terms

Term	Definition
Terminus	<p>Fiber Optic Bundle:</p> <p>Assembly that contains either:</p> <ul style="list-style-type: none"> Two or more cables jacketed together. A jacketed duplex is shown. A group of cables or assemblies tied together. <div style="text-align: center; margin-top: 20px;">  </div>
Ferrule	
End Face	
PC Polish	
Cable Assembly	
Fiber Optic Bundle	
Fiber Optic Bundle	

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

Material Safety Terms

Term

Definition

Dust Cap

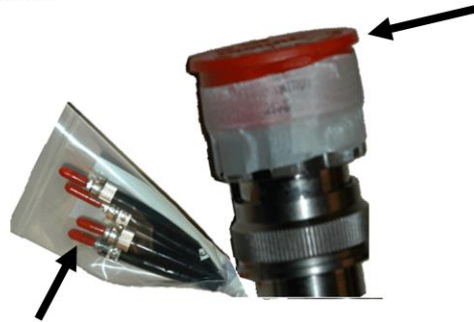
Discontinuity

High Vibration
AreaElastomeric
Insert

Tie

Support

Dust Cap: Device that protects the end face of a terminus or the front face of a connector from contamination and damage. A dust cap must be clean or they will contaminate the fiber optics.



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Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

Material Safety Terms

Term

Definition

Dust Cap

Discontinuity

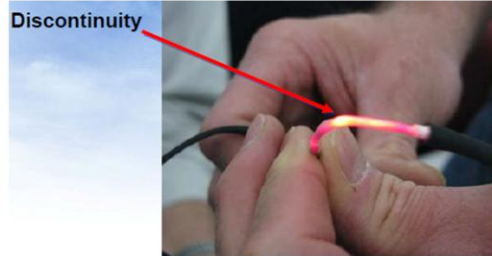
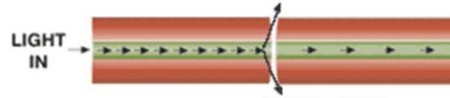
High Vibration Area

Elastomeric Insert

Tie

Support

Discontinuity: Point at which an optical fiber breaks or has a crack.



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5 min. for slides 5 - 12

Course Introduction

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Material Safety Terms

Term	Definition
Dust Cap	
Discontinuity	
High Vibration Area	High Vibration Area: Typically include, but are not limited to, the wing, engine strut, sailboat, wheel well, landing gear, and empennage.
Elastomeric Insert	
Tie	
Support	

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5 min. for slides 5 - 12


Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

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Material Safety Terms

Term	Definition
Dust Cap	Elastomeric Insert: Cylindrical device which has an opening along its side wall, it protects the fiber optic cable from the clamp or tie.
Discontinuity	
High Vibration Area	
Elastomeric Insert	
Tie	
Support	




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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

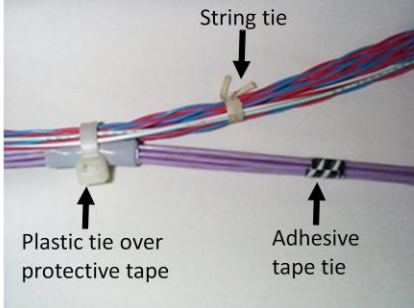


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Aerospace Fiber Optics

Material Safety Terms


Term	Definition
Dust Cap	
Discontinuity	
High Vibration Area	
Elastomeric Insert	
Tie	<p>Tie: A means of holding the components of a cable bundle securely. Ties may be tape, plastic, or string.</p> <div style="text-align: center; margin: 10px 0;">  </div>
Support	

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.





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Material Safety Terms

Term	Definition
Dust Cap	<p>Support: A means of connecting fiber optic cables and bundles to the aircraft structure, such as clamps, ring posts, race ways, etc.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
Discontinuity	
High Vibration Area	
Elastomeric Insert	
Tie	
Support	
Support	

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5 min. for slides 5 - 12

Course Introduction

Click to display each definition one at a time. Read and explain the definitions.

Course Agenda

- Authority (Controlling document)
- What is it
- **History**
- Material Handling
- Assembly Identification
- Do's and Don'ts
- Personal Safety

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xx min. for yy

Course Introduction

Say: Now let's take a brief look at the history of fiber optics.

Fiber Optic History

- In the 1700's A.D. many French theaters were using sun or candle light directed onto puddles or streams of water to add ambience to the settings.
- 1790 Claude Chappe invented an OPTICAL TELEGRAPH used in the French Army until 1850.
- In the 1840's Jacques Babinet and Daniel Colladon were already thinking of ways to direct light using water or containers filled with water.
- 1840 Guiding Light (Babinet)
- 1841 Fluid flow through various holes & breaking up water jets (Colladon)

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Read and expand on each bullet point.

It is often assumed that the optical telegraph was using water or glass as a medium but it was actually signal flags from towers.

Babinet and Colladon were the first to show that light could traveling through streams of water ergo "The guiding Light"

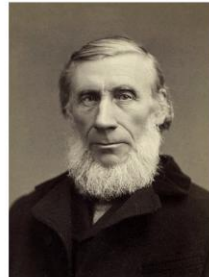
Fiber Optic History

From here *Guiding Light* became very popular:

In 1853 Colladon used *Guiding Light* in the theater. By using red glass tubes filled with water to add a little extra effects to the ballet.


But it was John Tyndall in 1854 that demonstrated to the Royal Society that light could be conducted through a curved stream of water, proving that a light signal could be bent.

In 1898, American David Smith applied for a patent on a bent glass rod device to be used as a surgical lamp.



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Colladon used his “Guiding Light” for revenue and in 1854 Tyndall demonstrated to the Royal Society that light signals could be bent in a stream of water.




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Aerospace Fiber Optics

Fiber Optic History



In 1970, "Optical Waveguide Fibers" were patented making it possible to carry 65,000 times more information than copper wire and coining the phrase "Contained Transmission of Light".

In 1975, fiber optics were used to link the computers in the NORAD headquarters.

In 1977, the first optical telephone communication system was installed.

Today more than 80 percent of the world's long-distance traffic is carried over optical fiber cables.

10 billion digital bytes of information can be sent per second per fiber.

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Touch on the significance of each of these milestones.

Course Agenda

- Authority (Controlling document)
- What is it
- History
- **Material Handling**
- Assembly Identification
- Do's and Don'ts
- Personal Safety

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xx min. for yy

Course Introduction

Say: Now we will discuss proper handling procedures to ensure the fiber does not get damaged.

Material Handling

Why Important?

First, let us look at how we can keep the end faces of fiber optic cables clean.

Our goal in material handling is to keep fiber optic cables clean and to prevent damage to the fragile glass fibers.

Dirty or damaged fiber optic cables do not transmit enough light. This causes increased attenuation or system failure.

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Xx min for yy

Material Handling Instruction

Material Handling

Keep Fiber Optic Material Clean

- Fiber optic cables have zero tolerance for dirt. Airborne particles not only scratch connectors, they absorb light. This causes light loss (attenuation).
- If you see a cable without a dust cap, obtain a **CLEAN** dust cap or a **CLEAN** plastic bag and put it over the connector if a bag was used tape it on. Then alert QA to the connector/s in question.



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Xx min for yy

Material Handling Instruction

Say: It is very important to keep the end face of termini and assemblies clean.

If you notice that a cable does not have a dust cap, put on a CLEAN one.

Please don't use a dirty dust cap.

Keep Fiber Optic Material Clean

What do you do if a dust cap is not available?

- Put the connector inside a clean plastic bag.
- Put a piece of adhesive tape on the plastic bag and wind it around the cable to seal the bag to the cable.



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Xx min for yy

Material Handling Instruction

Say: The tape will create a seal that prevents airborne dirt from getting inside of the bag while string my break the fiber.

Keep The Area Clean

- Protect the connectors from dust, rain, internal combustion engine exhaust, spray paint or other airborne contamination.
- Ensure that the area is clean prior to opening dust cap or protective bag.

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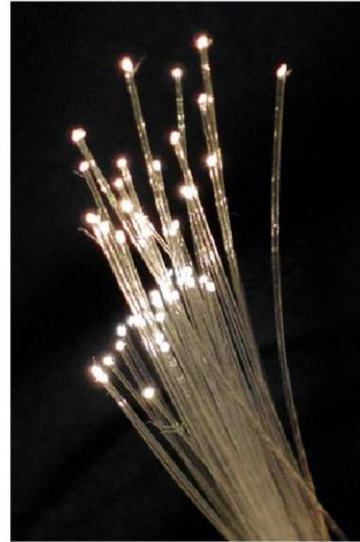
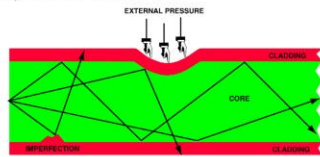
Xx min for yy

Material Handling Instruction

Say: If you remove a dust cap from a connector in an area that is dirty or if there are airborne contaminants such as paint or dust, then you would cause contamination of the connector. Make sure that there is nothing happening in the work area that could cause contamination.

Protect From Damage

- Fiber optic cables are fragile because they are made out of glass.
- You do not have to break the cable to render it inoperative. Improper clamping or tying could do it.
- Fiber optic cables that do not transmit enough light will cause system failures.



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Xx min for yy

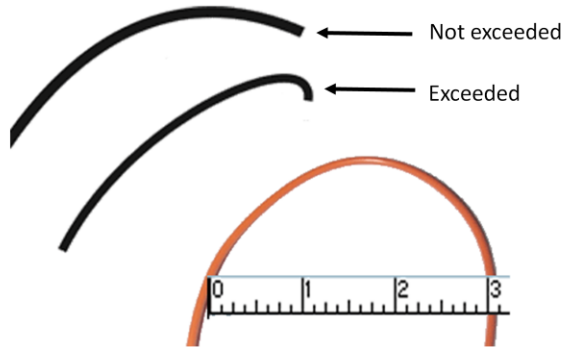
Material Handling Instruction

Say: You are looking at a micro bend that was caused by a tie as you can see not all of the light can get through. What do you think some other causes of micro bends might be?

Bend Radius Minimum

- **DO NOT** ever bend fiber optic cables to a bend radius that is less than 1.5"!

3" diameter = 1.5" radius



- If you bend a cable to a radius smaller than 1.5", the fibers may break or the cladding may become damaged and reflect light back instead of through the cable.

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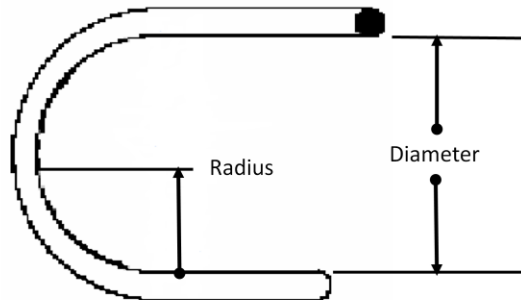
10 min for slides 16 - 24

Material Handling Instruction

- Explain that the fibers in fiber optic cables are made of glass and are very fragile. The fibers are encased in Kevlar for their protection, but they can be damaged if not handled carefully.
- It is easy to confuse radius with diameter.
- .75" radius = 1.5" diameter.
- Demonstrate bending a fiber optic cable around a 1.5" diameter cylinder.

Bend Radius Minimum

DO NOT bend a fiber optic cable to a bend radius that is less than 1.5 inch.



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5 min. for slides 16 - 22

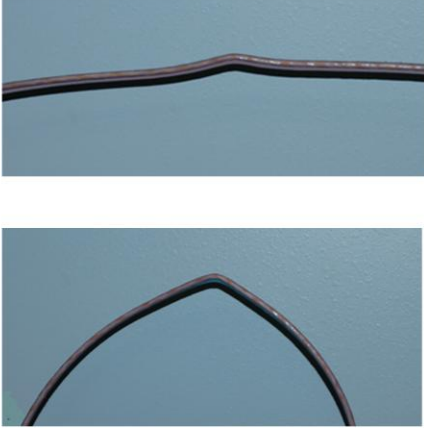
Material Handling

- Explain that the fibers in fiber optic cables are made of glass and are very fragile. The fibers are encased in Kevlar for their protection, but they can be damaged if not handled carefully.
- It is easy to confuse radius with diameter. 0.75" radius = 1.5" diameter.
- Bend a fiber cable to a radius greater than 0.75" as a demonstration.

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Bend Radius Minimum

- If you see a kink in an uninstalled cable: Contact your quality representative. Do not ignore it!



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10 min for slides 16 - 24

Material Handling Instruction

Demonstrate this with a good cable and a damaged cable so that the students can see the difference.

Pass the damaged cable around the room so that they can see the damage up close. Ask the students to bend the cable to 3" diameter and see the result of the damage.

Stores and Shipping

- Protect packaging from hazards.



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10 min for slides 16 - 24

Material Handling Instruction

Ensure all fibers are packaged and stored correctly.

Stores and Shipping

- Make sure the packaging has not been compromised, i.e. bags, boxes or spools.



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10 min for slides 16 - 24

Material Handling Instruction

If you receive anything and the packaging looks this report it to QA and or Management.

Stores and Shipping

- **DO NOT** step on fiber.



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10 min for slides 16 - 24

Material Handling Instruction

Ask the students what might happen if a fiber gets stepped on.

Stores and Shipping

- **DO NOT** store fiber on bare wire shelves.



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10 min for slides 16 - 24

Material Handling Instruction

Explain that if anything is set on top of the fibers on a wire shelf each wire could cause a micro bend.

Stores and Shipping

- **DO NOT** store fiber optic cables so the can fall.



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10 min for slides 16 - 24

Material Handling Instruction

If a fiber falls it may break

Course Agenda

- Authority (Controlling document)
- What is it
- History
- Material Handling
- **Assembly Identification**
- Do's and Don'ts
- Personal Safety

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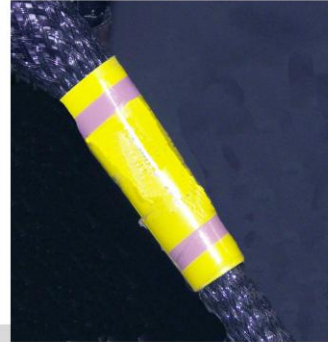
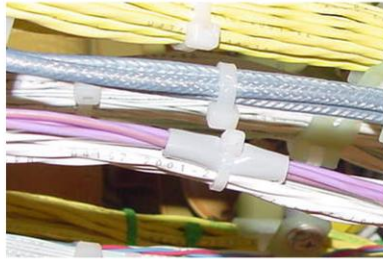
xx min. for yy

Course Introduction

Say: Let us look at how we identify fiber.

Fiber Optic Cable Identification

Purple or violet colored tracers, tags or cable jackets are used for aerospace fiber optic cable identification.



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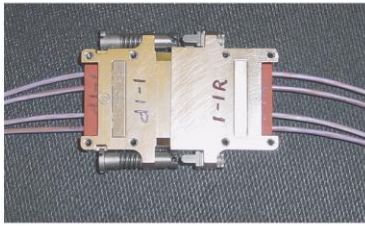
Xx min for yy

Identification Instruction

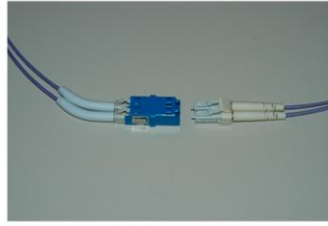
Read the question.

Ask for students to identify which cables in the photograph are fiber optic cables.

Identification: Connector Types



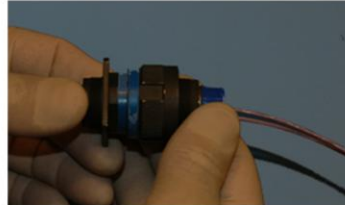
MTCT Connectors



LC Connectors



ARINC Connectors



D38999 Connectors

Xx min for yy

Identification Instruction

Say: These are examples of connectors used with fiber optic cables.

Course Agenda

- Authority (Controlling document)
- What is it
- History
- Material Handling
- Assembly Identification
- **Do's and Don'ts**
- Personal Safety

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xx min. for yy

Course Introduction

Now let's look at the some very important precautions.

Material Handling Do's and Don'ts

Handle fiber optic cable assemblies carefully:

- **DO NOT** step on fiber optic cable assemblies or allow anything to fall on them.
- **DO NOT** put anything on a fiber optic cable assembly.
- **DO NOT** allow the connectors to fall on the floor or a hard surface.
- **DO NOT** hang shop lights or other equipment from a fiber optic bundle.
- **DO NOT** use fiber optic bundles as a hand hold.
- **DO NOT** stress the fiber in any way. Such as folding a connector back over the cable.
- **DO NOT** touch the end face of a fiber optic terminus with anything.



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Read the slide and explain what might happen for each one of these conditions.



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Material Handling Do's and Don'ts

- If you are working **around** fiber optic cables:
 - Be aware of potential collateral damage.
 - Follow all documented procedures to protect the cables from damage.
 - Make sure that the cable insulation is not cut, cracked, split or flattened.
 - Make sure that the cable does not have any kinks.
 - Make sure that the connectors are protected.
 - If damage is noticed, mark the area on the cable and report the discovery.

- If you are working **with** fiber optic cables:
 - Obtain certification for the work.
 - Use the quality control requirements for each procedure.

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Xx min for yy

Quality Control Instruction

Say:

The most important thing in working around fiber optic cables is to prevent damage.

When you are working around fiber optic cables, if you notice damage. Make sure to mark the spot and report the damage so that a certified person can replace the cable.

Support General Requirements

- **DO NOT** support or tie fiber optic cables without protection!
- **DO NOT** use plastic ties or lacing tape under support.



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Explain how to identify the fibers and touch on protection.

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Aerospace Fiber Optics

Consequences of mishandling

What is wrong with these cables?

No dust cap

Broken ferrule

Cable damaged from exceeded bend radius

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Xx min for yy

Quality Control Instruction

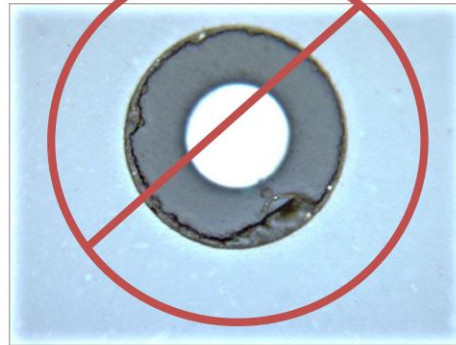
Say:

What's wrong with this picture?

Click to display the problems.

Consequences of mishandling

This is a result of mishandling a fiber optic cable. Notice the cracks in the cladding that reach all of the way to the core.



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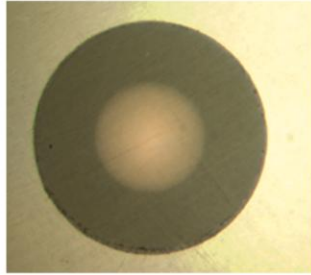
Xx min for yy

Identification Instruction

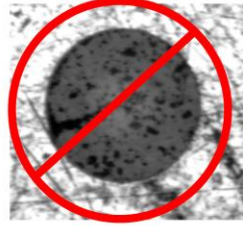
Point out the areas of the end face and the rejectable criteria in the photograph.

Consequences of mishandling

- Clean, acceptable end face



- End face – dirty from wear



- End face – dirty from touching



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Xx min for yy


Identification Instruction

Point out the dirty areas.

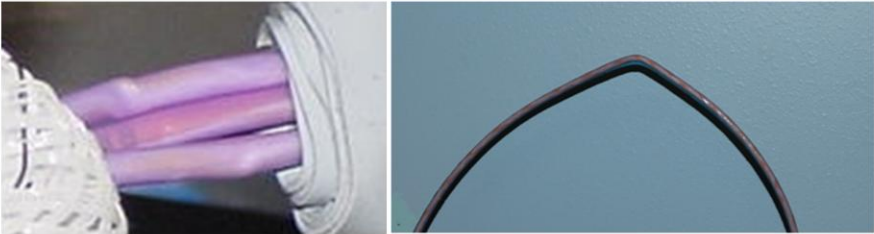
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Consequences of mishandling

Undamaged Cable



Damaged Cables



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Xx min for yy

Identification Instruction

Point out the damaged areas and explain how the cables in the photograph got damaged.

Course Agenda

- Authority (Controlling document)
- What is it
- History
- Material Handling
- Assembly Identification
- Do's and Don'ts
- **Personal Safety**

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xx min. for yy

Course Introduction

Let us look at the safety concerns with working around fiber optics.

Warning: Personal Safety

- If the fiber cable gets cut, the fiber may piston out of the cut end and injure personnel.
- Fiber optic cable can cause skin punctures and may separate below the skin following puncture.
- For fiber optic cables that inadvertently get cut, place tape as flags on both cut ends to capture any fiber that may piston out.



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Xx min for yy

Safety Instruction

Even though they are not terminating the cables, the hazard exists. The glass pieces of fiber optic cables are very small and difficult to see.

Warning: Personal Safety

The light from functioning optical fibers resides in the **non-visible infrared spectrum**. This is out of our perceivable visual range.



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10 min for slides 12 - 15

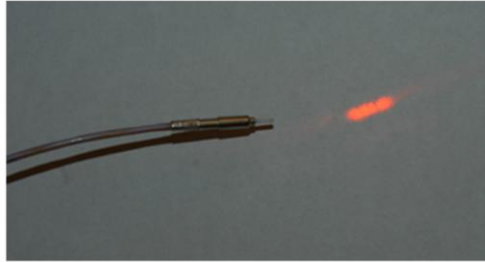
Safety Instruction

Explain that this photograph shows a light that was directed through the prism. You can not see the light that is transmitted through fiber optic cables. This is why it is so dangerous.

Warning: Personal Safety

The light from functioning optical fibers is *invisible* and **can cause damage to your eyes.**

- **Do not look into the end of a connected cable.**
- Do a very thorough lock-out tag-out or disconnect the cable at both ends and put on clean dust caps.



This light is from a visible laser not from equipment this will also damage your eyes!

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Xx min for yy

Safety Instruction

Explain that this photograph shows a laser beam that was directed through the cable. You can not see the light that is transmitted through fiber optic cables. This is why it is so dangerous.

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Review

How much do you remember?

PC in relation to fiber optics refers to:

- A. Personal Computer**
- B. Physical Contact**
- C. Point of Contact**
- D. Politically Correct**


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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

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Aerospace Fiber Optics

Review

How much do you remember?

What is the minimum bend radius for single fiber optic cables?

- A. .75"**
- B. 1.5"**
- C. 6X the diameter of the cable**
- D. 10X the diameter of the cable**


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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

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Aerospace Fiber Optics

Review

How much do you remember?

One of the greatest safety hazards around fiber optic work is:

- A. Glass slivers**
- B. Skin rash**
- C. Eye damage**
- D. Organ damage**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

Review

How much do you remember?

How do you prevent eye damage?

- A. Wear safety glasses at all times.**
- B. Never look at the end of a fiber unless it is not connected to a light source or the power has been turned off.**
- C. Wear sun glasses.**
- D. Ground yourself out to earth ground.**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

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Aerospace Fiber Optics

Review

How much do you remember?

Are fiber optic cables safe to use around high-voltage?

- A. Yes**
- B. No**
- C. Only on weekends**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

Review

How much do you remember?

What happens when you bend a fiber optic cable?

- A. Nothing it is just better routing practices not to bend your fibers.**
- B. It changes the angle of light transmission and causes some light loss, if you bend the cable too far, you can break it.**
- C. The light may escape and become a safety hazard.**
- D. It may cause the cable to over heat due to too much resistance.**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

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Aerospace Fiber Optics

Review

How much do you remember?

Why is it so important to keep the end face clean?

- A. A dirty end face is less presentable.**
- B. A dirty end face is more susceptible to picking up something else.**
- C. A dirty end face will reduce light transmission.**
- D. A clean end face is easier to manage.**


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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

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Aerospace Fiber Optics

Review

How much do you remember?

What color is the outer jacket on fiber optic cables (not flight test)?

- A. Blue**
- B. Orange**
- C. Purple**
- D. Yellow**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

Review

How much do you remember?

If you are working around fiber optic cables what should you do? Select all that apply.

- A. Be aware of potential collateral damage.**
- B. Make sure the cable does not have any kinks.**
- C. Make sure the connectors are protected.**
- D. Set the fiber optic cables on the floor so they don't fall.**

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xx min. for yy

Review Game

Read the question and possible answers.

- Read the objectives.

Conclusion

How can we prepare for the next session