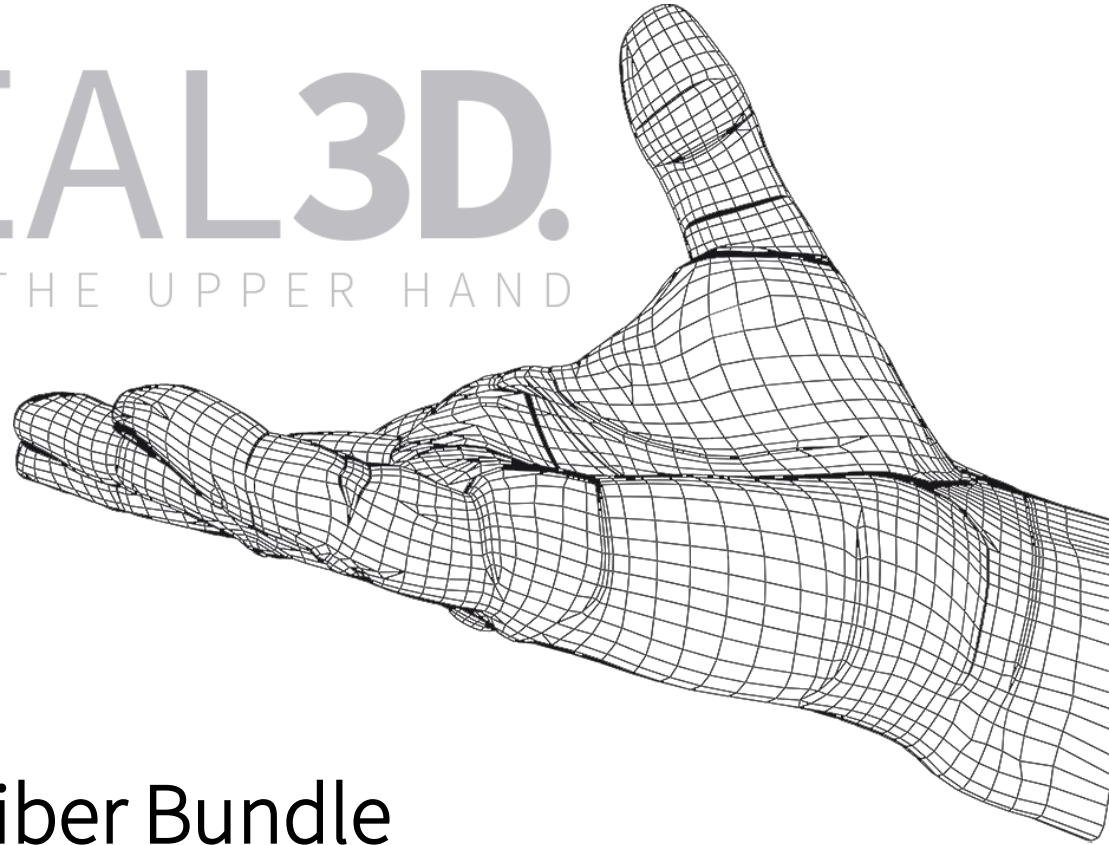


REAL3D.

GAIN THE UPPER HAND



Fiber Bundle

Setup and Requirements

pmdtechnologies – 2015-10-05

Overview

Fiber Bundle Setup incl. ferrules

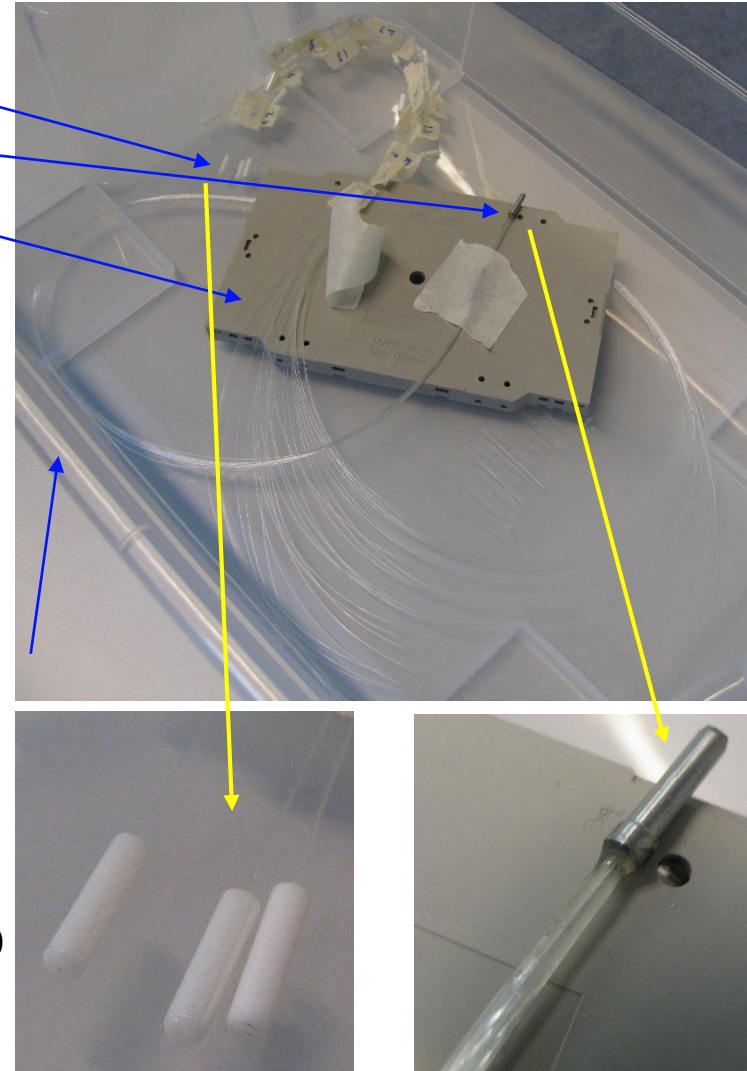
- individual ferrules with polished ends
- collecting ferrule with 30 polished ends
- splice box for adjustment of length differences
- 30 fibers of different lengths
+ at least 2 spare fibers as
backup (5m length)

Optical fiber:

Graded-Index Multimode Fiber,
Ø62.5 µm Core, Ø125 µm Cladding, (OM1)
supplier e.g.:
“<http://www.fs.com/>”, Part No: SFC-A1bLC9
62.5/125µm Multimode Corning Fiber

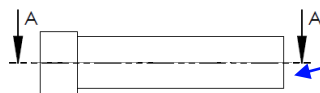
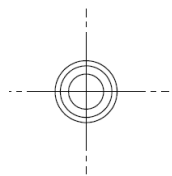
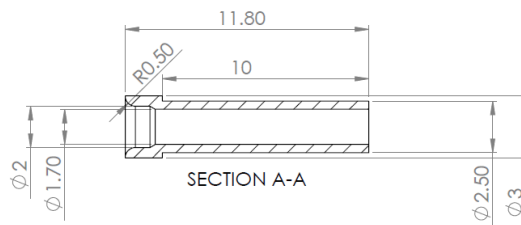
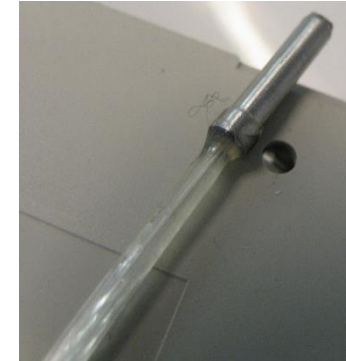
Single fiber ferrules:

Ø2.5mm ceramic ferrules, Ø128 µm hole size
supplier e.g.:
“<http://www.thorlabschina.cn/>”, Part No: CF128-10
(alternative: ferrules with better protection,
see page 7)

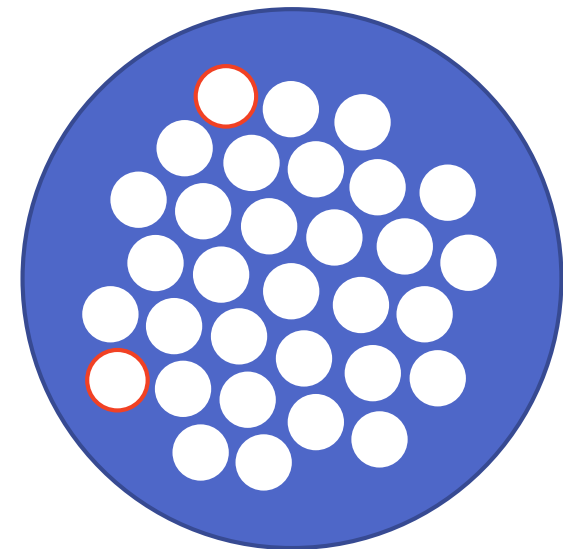


Collecting Ferrule

- arrangement of fibers in the ferrule is not important and can be arbitrary
- the fibers shall be as centric and tight and parallel as feasible
- all ends need to be polished
- the spare backup fibers shall also be integrated into the collecting ferrule so that they can be cut and used afterwards if necessary; these spare fibers will have an open end on the other side then
- do not remove the coating so as to maximize the mechanical stability
- shrink hose up to 3 cm after the collecting ferrules to simplify handling



fiber end



fibers in collecting ferrule
(orange: optional fibers)

Fibers

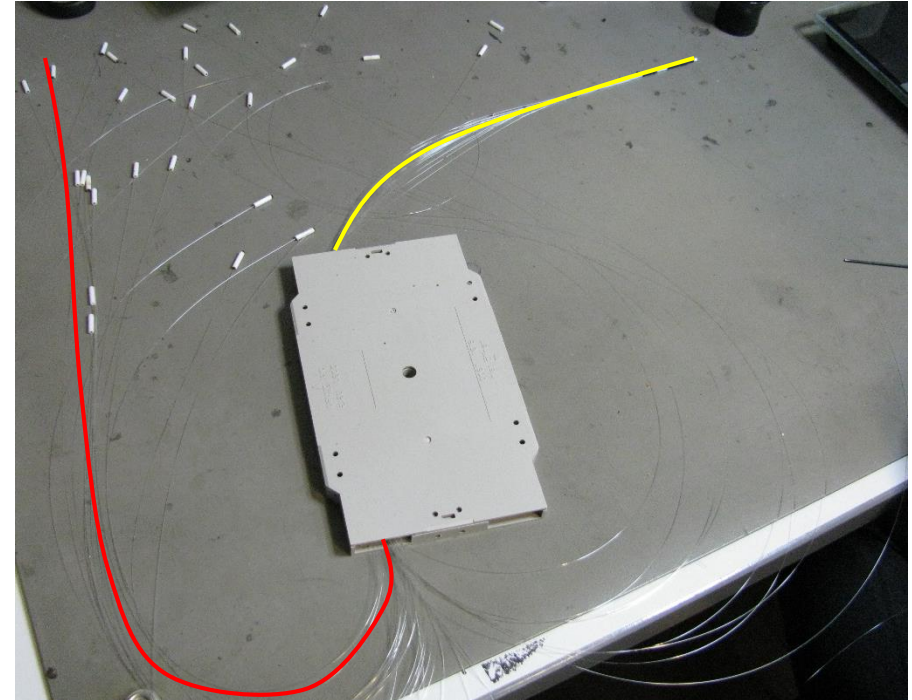
- Each fiber must be cut to a certain length with a tolerance of ± 1 cm . The tolerance applies to the total length from the single ferrules' ends to the collecting ferrule's end. Spare fibers should have a length of 5m.
- stripping is not required
- label the fibers with their numbers
- Note: These lengths apply when the modulation frequencies 80 and 60MHz are used. Lower modulation frequencies require larger total lengths.
- fiber ends polished
Thorlabs. (2016, 1 16). Retrieved from Guide to Connectorization and Polishing Optical Fibers: <http://www.thorlabs.de/thorcat/1100/FN96A-Manual.pdf>
- use a ferrule with not too much space
- anti-bend protection reasonable
- avoid too much damping by taking care of polishing the ends
- ensure enough mechanical stability

Total length	92.025 m		
tolerances	+/- 0.010 m		
Fiber #	length	Fiber #	length
1	1.400 m	16	3.125 m
2	1.515 m	17	3.240 m
3	1.630 m	18	3.355 m
4	1.745 m	19	3.470 m
5	1.860 m	20	3.585 m
6	1.975 m	21	3.700 m
7	2.090 m	22	3.815 m
8	2.205 m	23	3.930 m
9	2.320 m	24	4.045 m
10	2.435 m	25	4.160 m
11	2.550 m	26	4.275 m
12	2.665 m	27	4.390 m
13	2.780 m	28	4.505 m
14	2.895 m	29	4.620 m
15	3.010 m	30	4.735 m



Splice box

- mount the fibers in a splice box → fibers have a common length from the box to the collecting ferrule and to the fiber mounting plate
 - length box to collecting ferrule (yellow): 40 cm
 - length box to individual ferrules (red): 55 cm



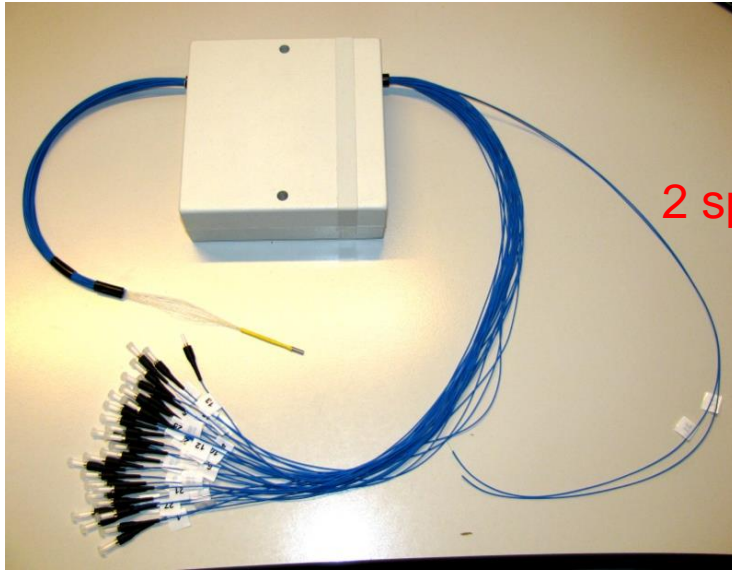
Task List Fiber Bundle Production

1. cut 30 fibers to the lengths defined in the table (see above); ± 1 cm tolerance
2. cut spare fibers to a length of 5 m
3. put all fibers into ferrules and label them appropriately
4. glue the other ends of all fibers in a common collecting ferrule
5. polish all fiber ends carefully
6. mount the fibers into the splice box

confidential

External supplier

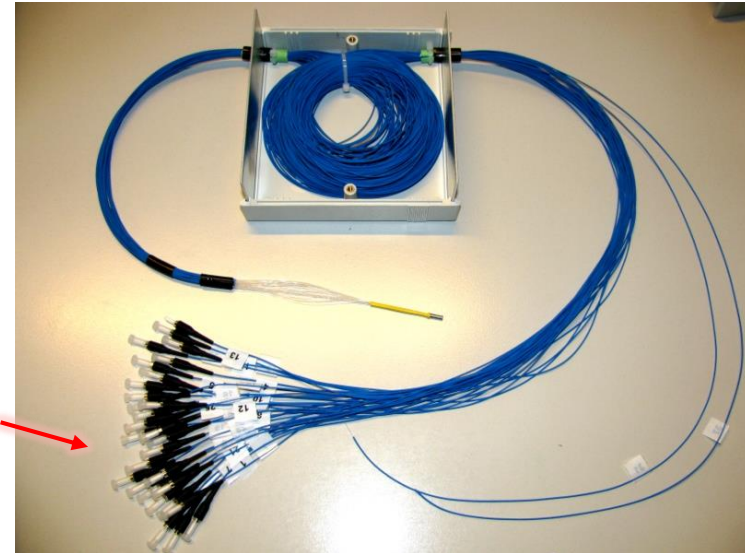
Fiber bundle produced by a third party manufacturer:



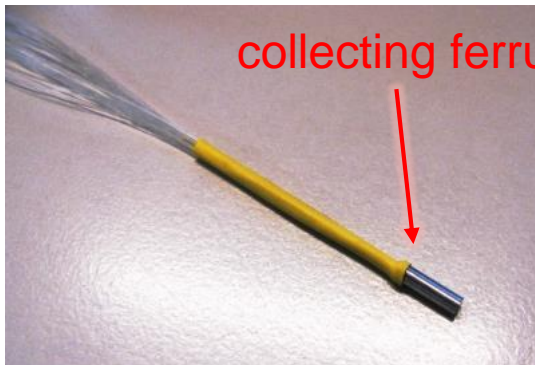
62.5/125μm
OM1 cable

2 spare fibers

30 polished
single fibers



2.5 mm single fiber ceramic ferrule
(FC flat angle finish)

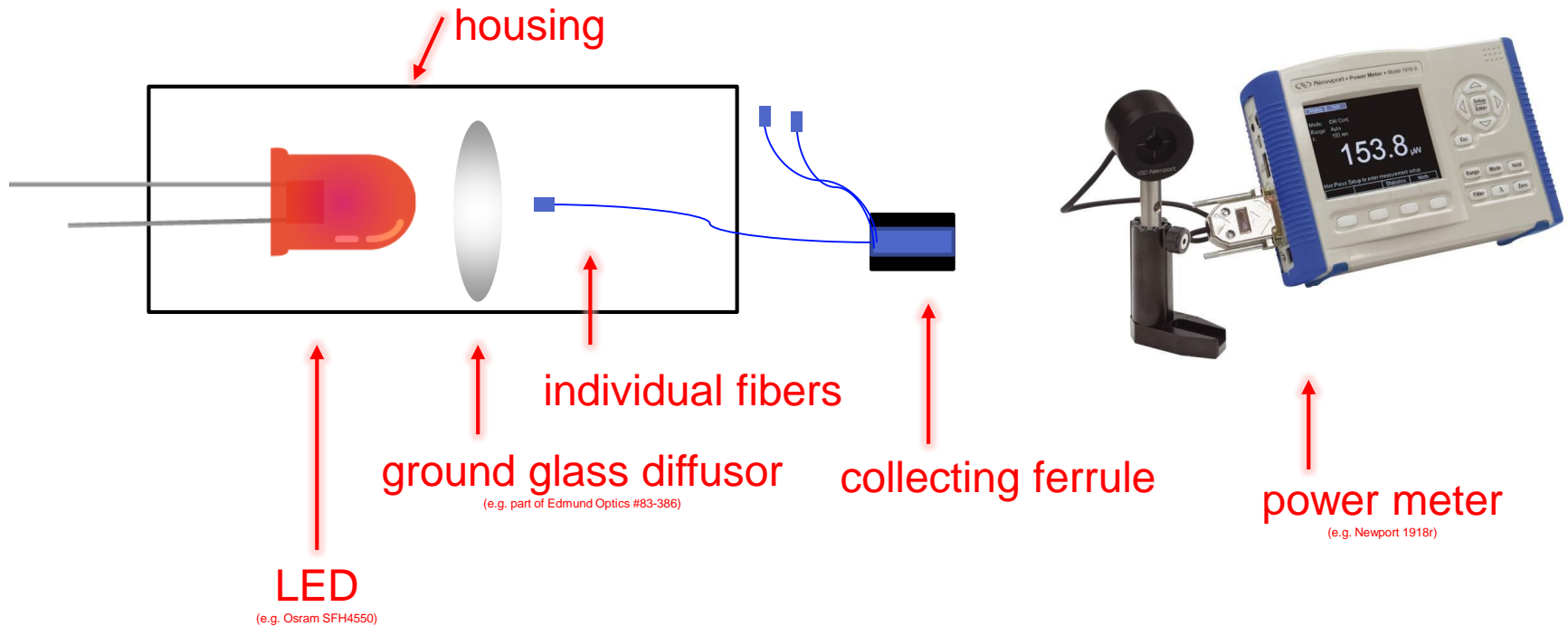


collecting ferrule



2.5 mm stainless steel ferrule with 1 mm bore containing 32 polished fibers

Fiber Bundle Test



procedure

- measure a reference fiber (e.g. Reichelt LWL 4XST62-2)
- couple the LED's light into the individual ferrules
- measure the optical output power at the collecting ferrule for all 30 fibers
- repeat the measurement of the reference fiber to ensure that there was no relevant change in between

requirements

- the fiber with the highest damping should have a minimum optical power of at least 85% when compared to the fiber with the lowest damping
- the fiber with the highest damping should have a minimum optical power of 70% when compared to the reference fiber