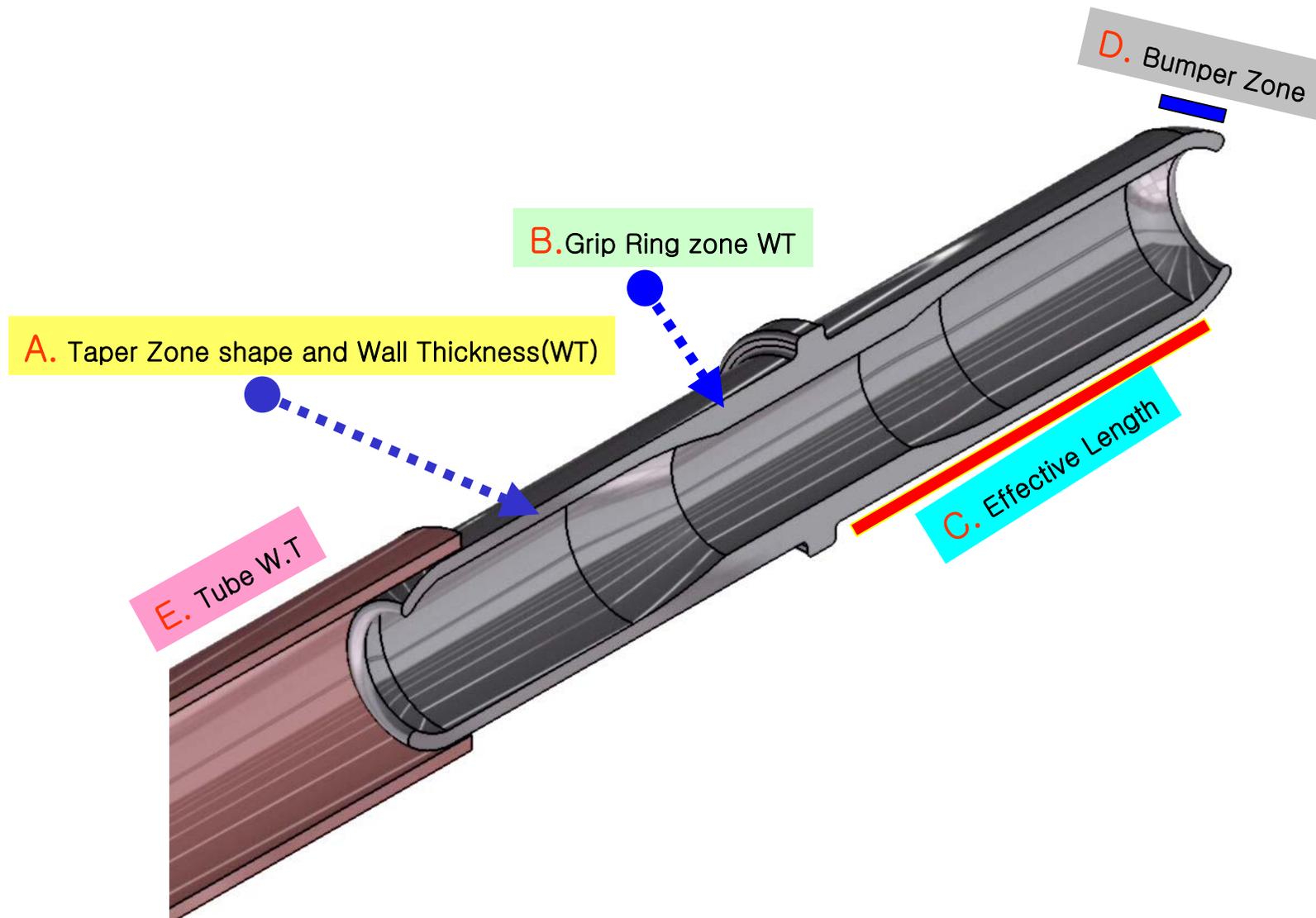




# Advanced Floating Connector And Tube Analysis

July 22, 2005

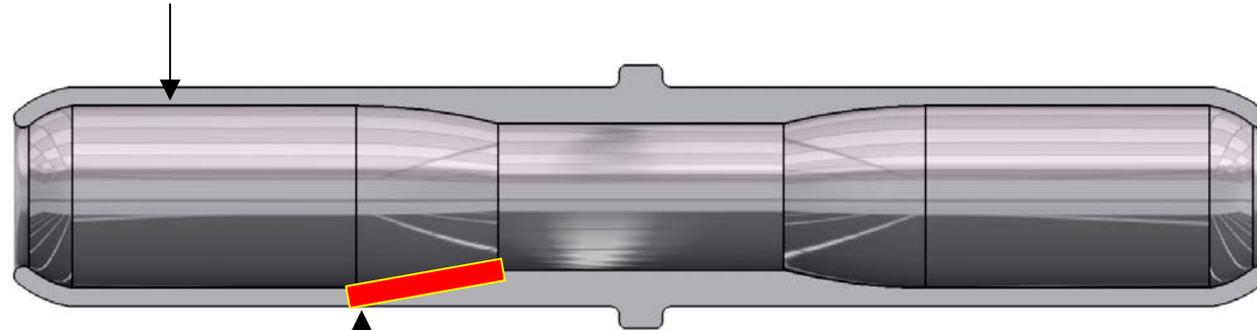
# Features to be analyzed for improving FC/tube performance





# A. Taper Zone shape and WT

Variable 1 – WT ( from 0.4mm to 0.75mm in ~ 0.05–0.1mm Increments)



Variable 2 – taper length and angle  
(from 5mm to 19mm in ~2–5mm increments)  
*the longer the length, the slighter the angle*

preparation



Test Result

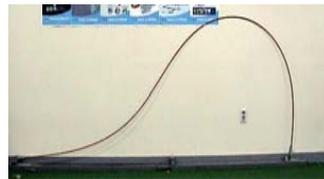
- 1. Longer Transition Length
- 2. Slighter taper angle
- 3. ~0.5–0.55mm WT

*Results in*

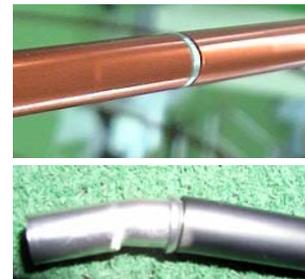
- 1. preventing permanent bending at taper
- 2. possibly less crazing
- 3. stress equalizing of ~3–5% under computer simulation



*Crazing monitoring*



*Flexion Test*



*Possibly less crazing  
(difficult to determine)*

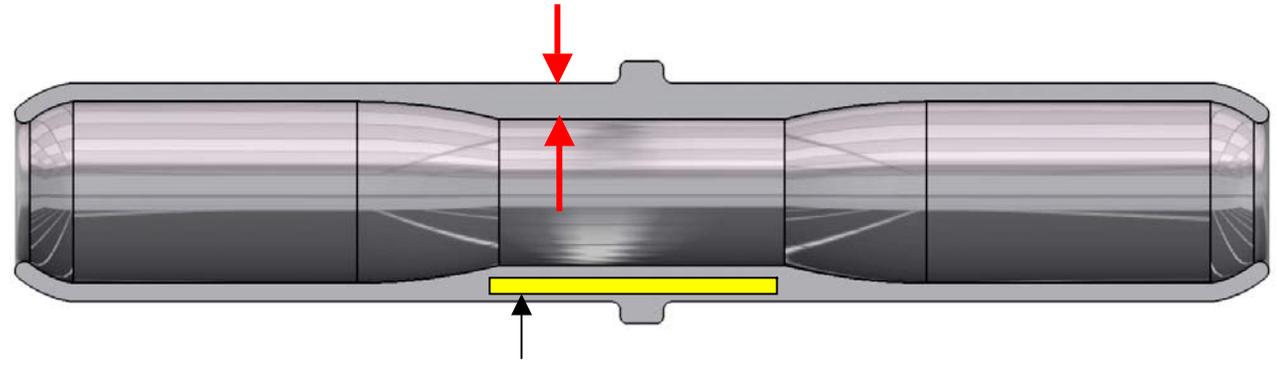
*Example of permanent bending  
At taper under severe Flexion test*



## B. Grip Ring zone WT

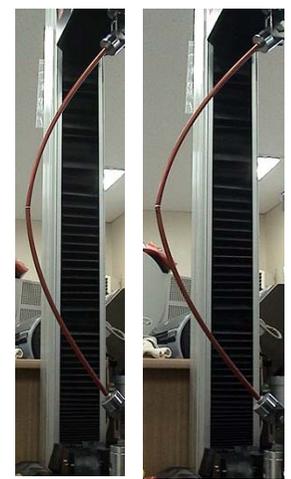
Variable 1 — Grip Ring zone WT  
(from 0.85 to 1.20mm in ~0.05–0.1mm increments)

preparation



Variable 2 — Grip Ring zone length  
(from 6mm to 13mm in 2mm increments)

Test Result



*Acceptable tube breakage*

*Unacceptable tube breakage  
(tube and FC split)*

Sufficient Grip Ring zone WT and length with steady taper leads to safer pole structure

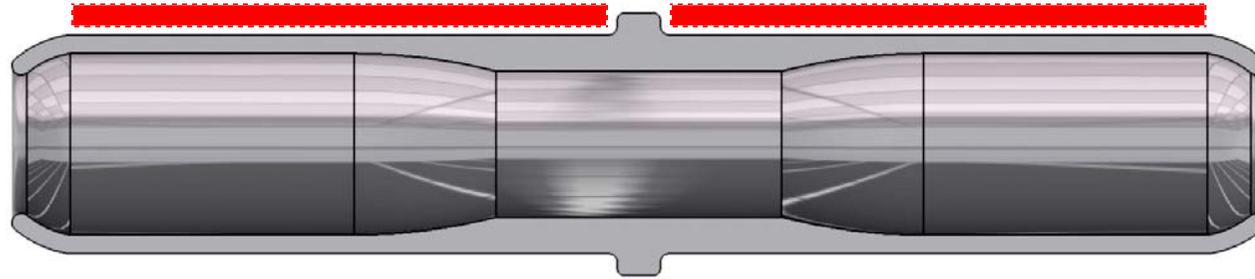
➡ Optimal Grip Ring zone WT and length determined by pressure test and simulation



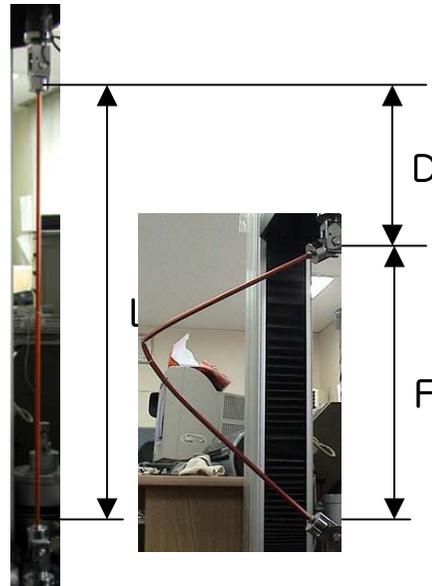
## C. Effective Length

Variable 1 – Effective length  
( from 19mm to 32mm )

preparation



Test Result



L = initial pole length  
D = arching length  
F = final pole length

*Increasing the effective length:*

- Case 1. — Increasing 26% results in ~7-8% more arching  
(“D”increases as “F”decreases)
- Case 2. — Increasing 27% results in 9% more arching  
(“D”increases as “F”decreases)

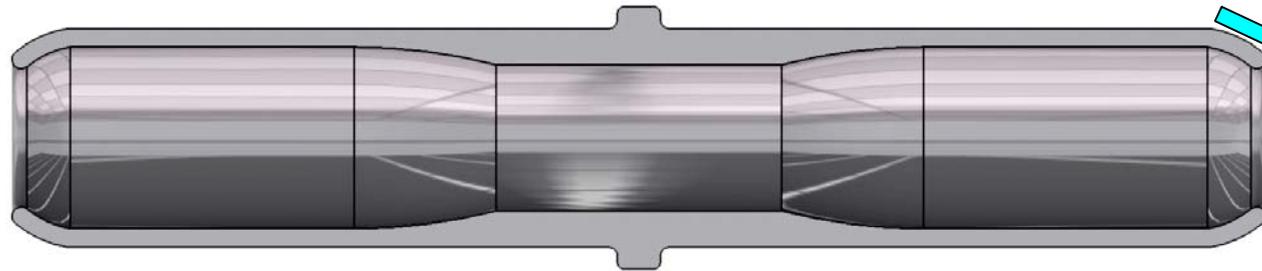
Longer effective length results in safer poles

D. Bumper Zone

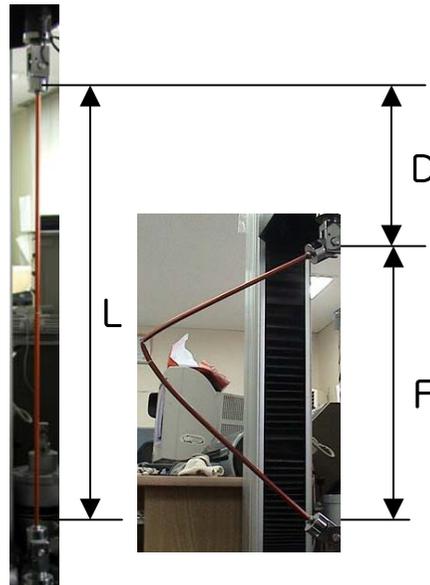


Variable 1 – Bumper Zone length  
( from 0mm to 2mm )

preparation



Test Result



L = initial pole length  
D = arching length  
F = final pole length

*Results of changing Bumper Zone length*

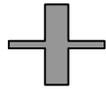
From 2mm to 1mm

1. Difference in crazing difficult to determine visually
2. In pressure test at left , no discernible difference between 2mm and 1mm lengths as “D” amount increases
3. Wear to Shokcord due to Bumper Zone reduced under visual inspection



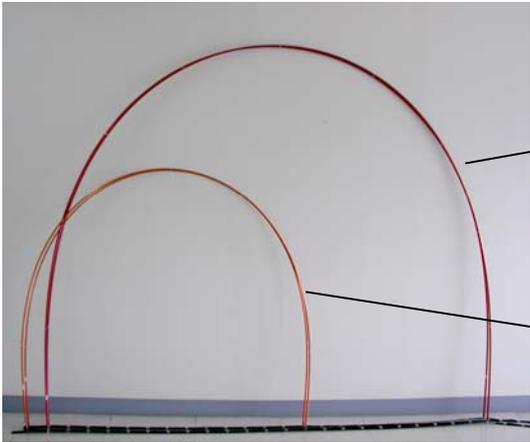
E. Tube WT

Advanced FC  
(Optimal construction)



Current Specification

Material	Current O.D	W.T
Scandium	8.88mm,	.60mm
Scandium	9.76mm,	.61mm
Scandium	10.76mm,	.62mm
A7001T6	8.91mm,	.62mm
A7001T6	9.80mm,	.63mm
A7001T6	10.80mm,	.64mm



Smoother arching and safer pole structure During Flexion test



Current\_FC



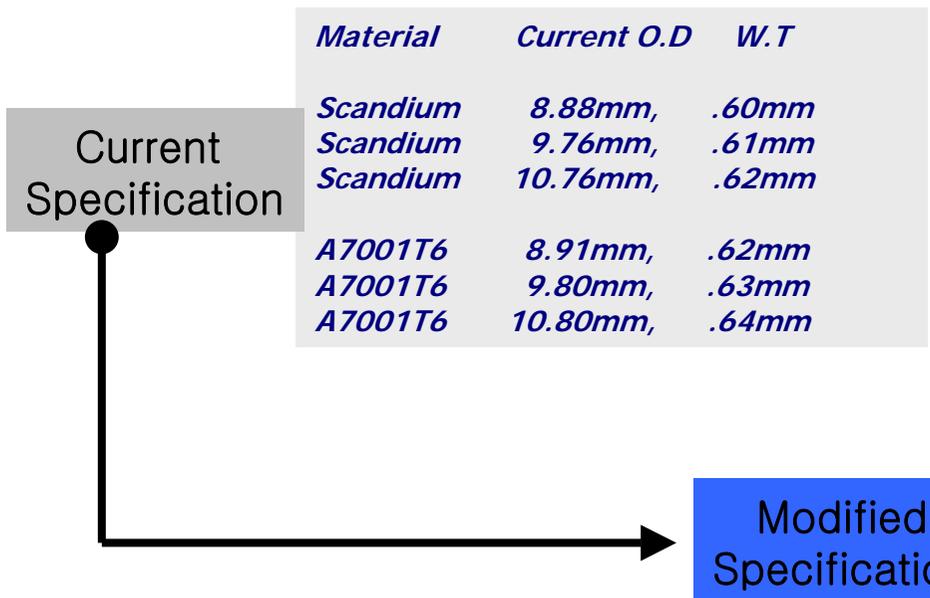
Advanced\_FC

Advanced\_FC

Current\_FC

Ensures less crazing and a more secure pole structure

E. Tube WT modified to create a safer pole system

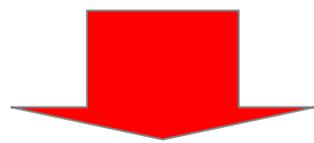


Material	Modified O.D	W.T
Scandium	8.90mm,	.61mm
Scandium	9.78mm,	.62mm
Scandium	10.78mm,	.63mm
A7001T6	8.93mm,	.63mm
A7001T6	9.82mm,	.64mm
A7001T6	10.82mm,	.65mm

Increase tube outer diameter by 0.02mm

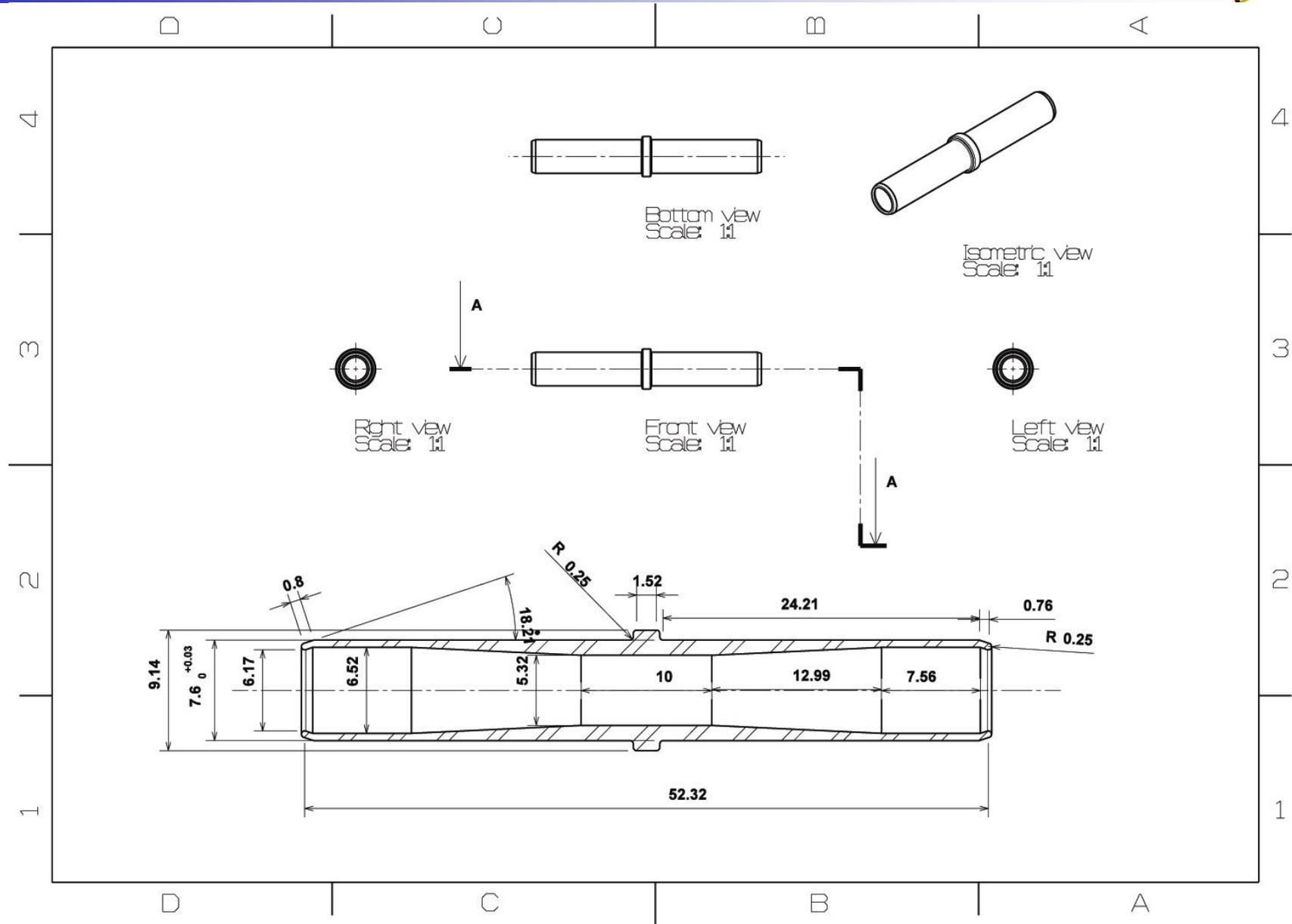
Decision based on following considerations :

1. Material (Scandium and A7001T6)
2. Maintaining stress balance between FC and tubes limits amount of tube OD increase
3. Advanced FC's longer effective length already results in stringer poles
4. Nominal weight increase maintains lightness of poles

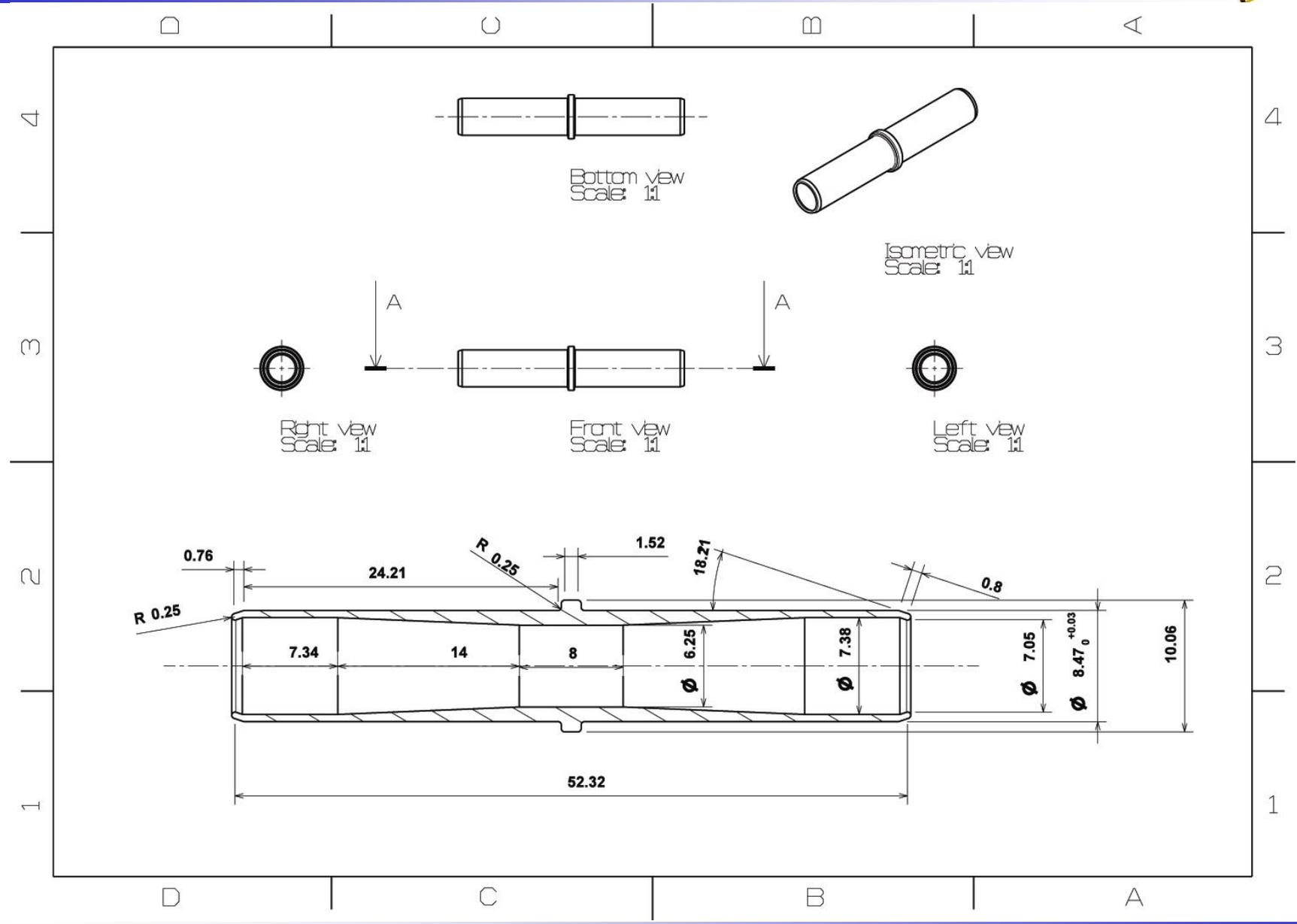


**Less Crazing  
safer pole system**

# 8.9mm/8.93mm FC\_AD Drawing



# 9.78mm/9.82mm FC\_AD Drawing



# 10.78mm/10.82mm FC\_AD Drawing

