The Christmas Lectures - CAS 2005

FIA 2006

FIA 2005
Commercial Awareness Seminars

FLOOD DAMAGE
-
Does it really affect optical fibre?

Flooding?

What is “flooding”?

- water/contaminants at the optical fibre surface
- water/contaminants at the cable surface

What is “water”?

- de-ionized/distilled?
- “tap”?
- contaminated with pathway materials?
  - concrete/steel etc.
- contaminated with other chemicals?

Damage?

Cable sheath

- cable sheath/construction
  - protection of optical fibre during installation
  - protection of optical fibre during operation
- water/contaminants at the cable surface
  - risk to operational lifetime of the optical fibre

Optical fibre

- weakening
  - reduction of tensile strength
- impact on “handleability”
  - stripping/splicing/termination

Source Data

COST 246: 1998

- *European* Co-Operation *in the field of* Science and Technical *Research*
  - *1998: Reliability of Optical Fibres and Components*

Key Issues

- Presence of water
  - reduces the strength of optical fibre
  - impact on “handleability” not proven
  - distilled/de-ionized water has little impact
  - contaminated water presents greater threat
- Presence of hydrogen ions at the optical fibre surface
  - created within metal sheathed cables
  - increases in attenuation
  - “breathing” cables relatively unaffected
- All affects are time dependent
- All effects are temperature dependent

Conclusions - I

- no definition of minimum strength required for "handleability"
- 2GPa was "proposed"
  - COST 246 work showed much lower strengths survived
  - optical fibre contains weak spots anyway
- too many variables to provide guaranteed answers

Conclusions - II

- cable sheath damage
  - water/contaminant/time/temperature cocktail
    - to be specified
    - compared with manufacturers material specification
- optical fibre damage due to cable flooding
  - wicking length/time to be determined
    - compared with manufacturers material specification
  - water/contaminant/temperature cocktail
    - to be specified
    - compared with manufacturers material specification
  - entrapment/reaction mechanism to be considered
    - development of hydrogen ions
    - increase in attenuation