# Status of Alternative Optical Package R&D

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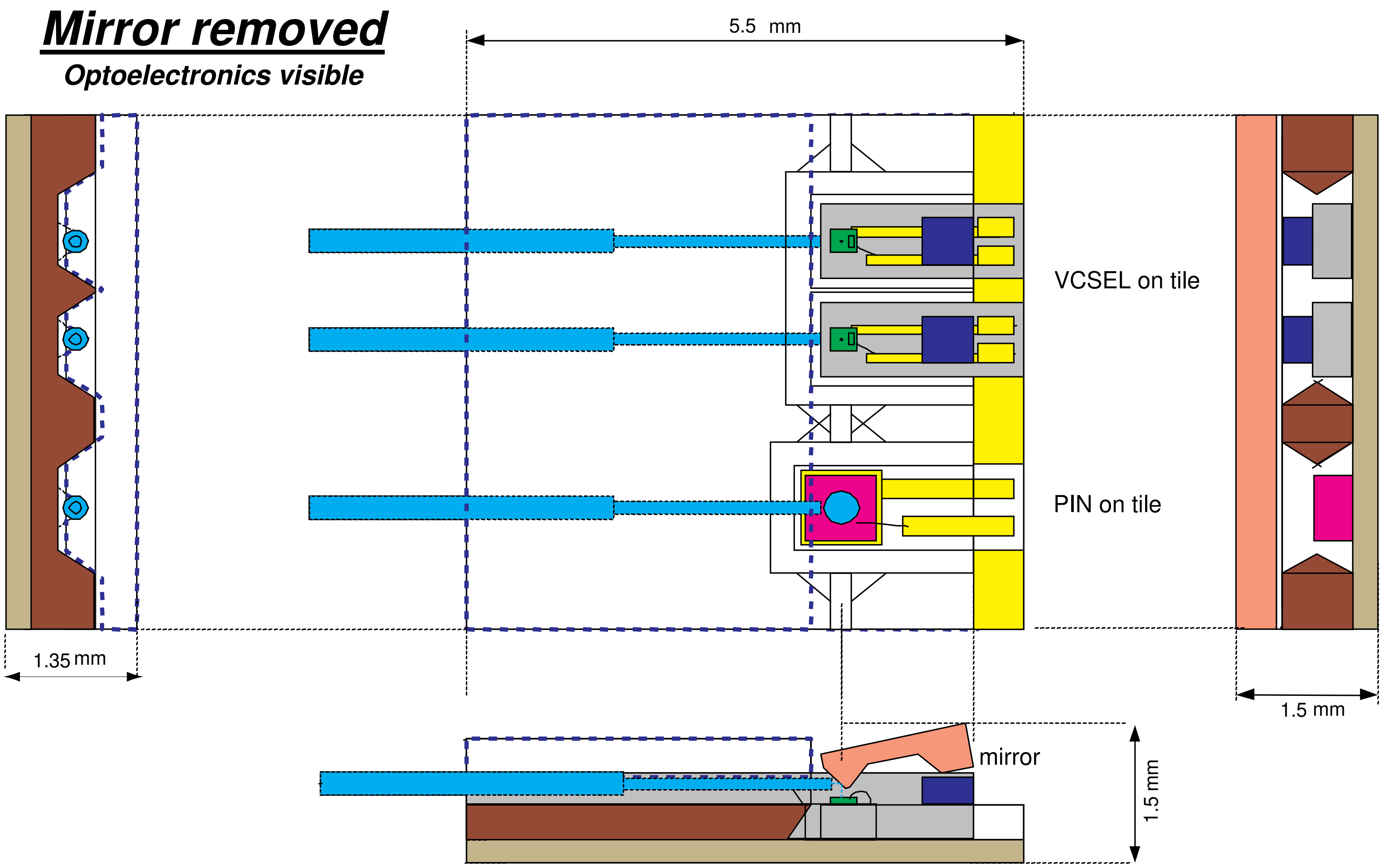
Outline of Talk

- SCT optical package
- Alternative optical package
- Status
- Plans

# SCT Optical Package Design

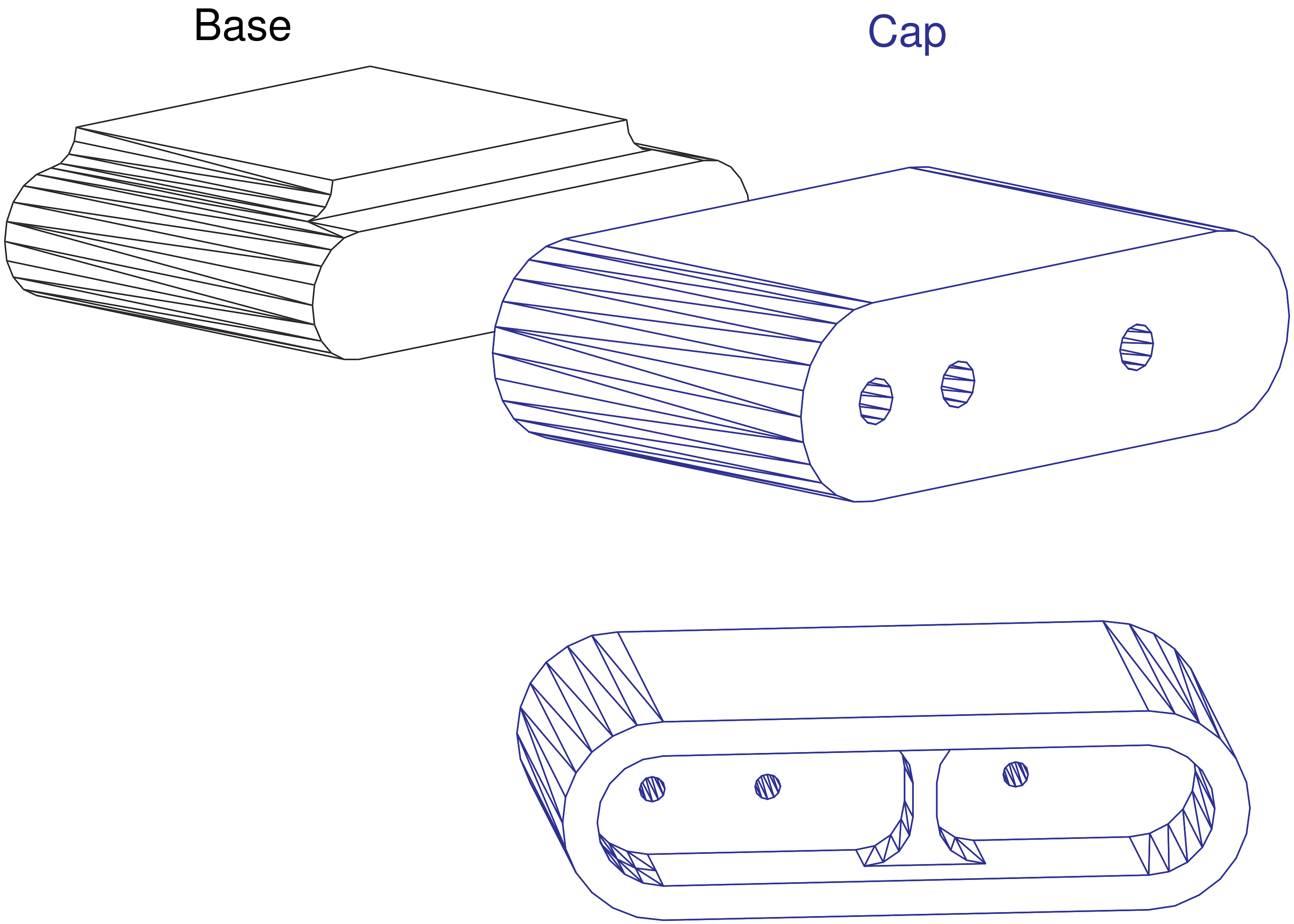
- **3 fibres + 2 VCSEL + 1 PIN**
- **Coupled VCSEL power: 300-1000 $\mu$W**
- **Material: silicon baseplate/alumina tiles**
- **Developed by GEC-Marconi**
- **Estimated Cost: 300CHF (without fibre placement)**
- **Quantity: 5,000+2000+spares**
- **Phase I:**
  - ◇ need active alignment
  - ◇ no power without active alignment
- **Phase II:**
  - ◇ v-grooves for fibre alignment
  - ◇ aluminizied silicon mirrors for light reflection
  - ◇ passive alignment features


Mirror removed
Optoelectronics visible
5.5 mm
VCSEL on tile
PIN on tile
1.35 mm
1.5 mm
mirror
1.5 mm

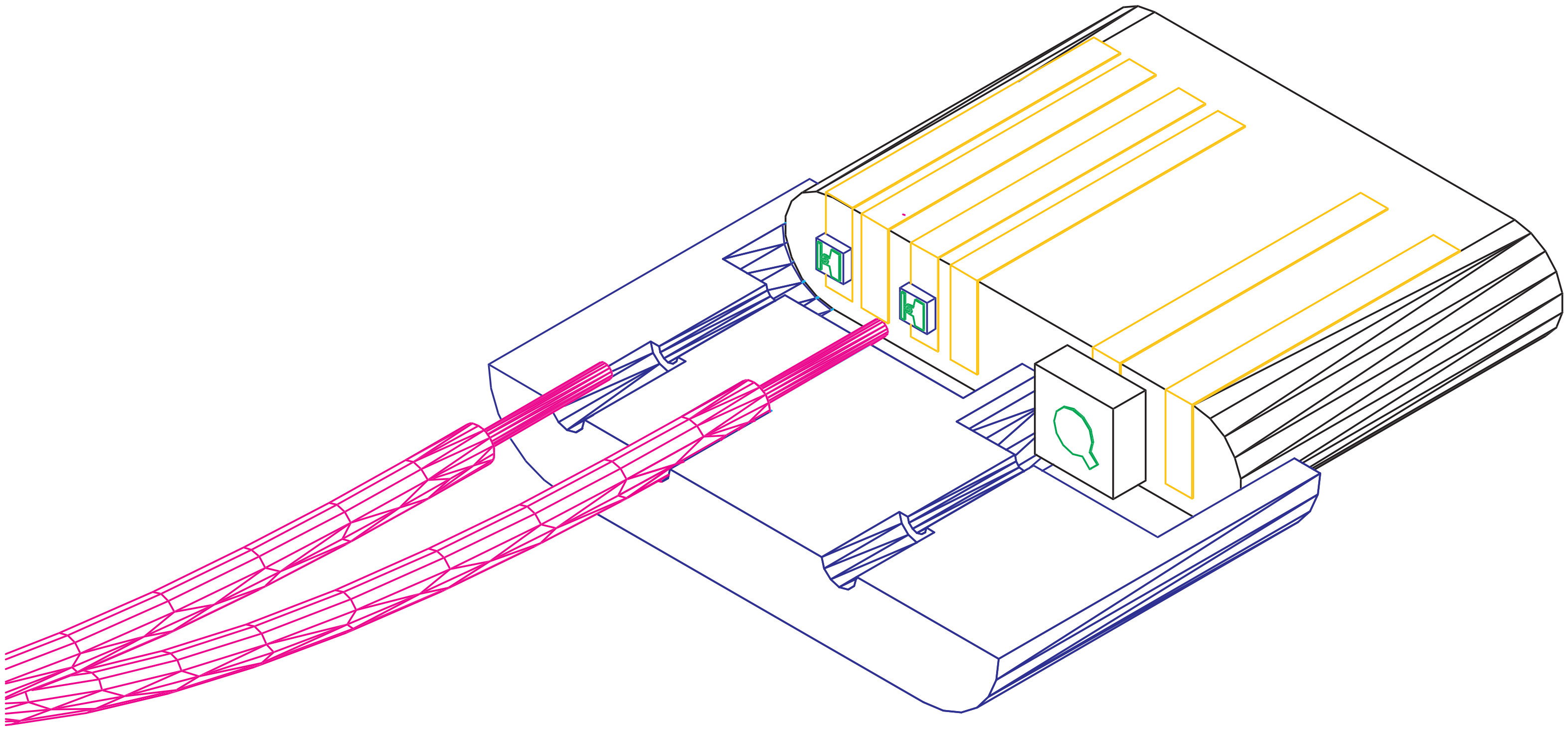
# Alternative Design

- **Tolerance from SCT Design**
  - 50 $\mu$m in $z$ (along fibre)
  - 25 $\mu$m in $x$ and $y$ (transverse to fibre)
- **Connector concept design**
  - use machinable ceramic, e.g. aluminum silicate, macor
  - use precisely machined plug and base for alignment
  - simple two-piece design for mass production and cost reduction
  - design based on experience in precision CLEO III Silicon hybrid micro-fabrication
- **Plug**
  - 3 holes for fibres
- **Base**
  - deposit gold traces for wire bonding, VCSEL and PIN placement

# *Alternative Design*



# Alternative Design



# Status

√ **Produced bases**

- ◇ two different designs tried

√ **Produced caps**

- ◇ two different designs tried

√ **Modified fibre cleaver (6 mm) to cut 1.2 mm bare fibre**

- ◇ two different designs tried
- ◇ produce clean cut

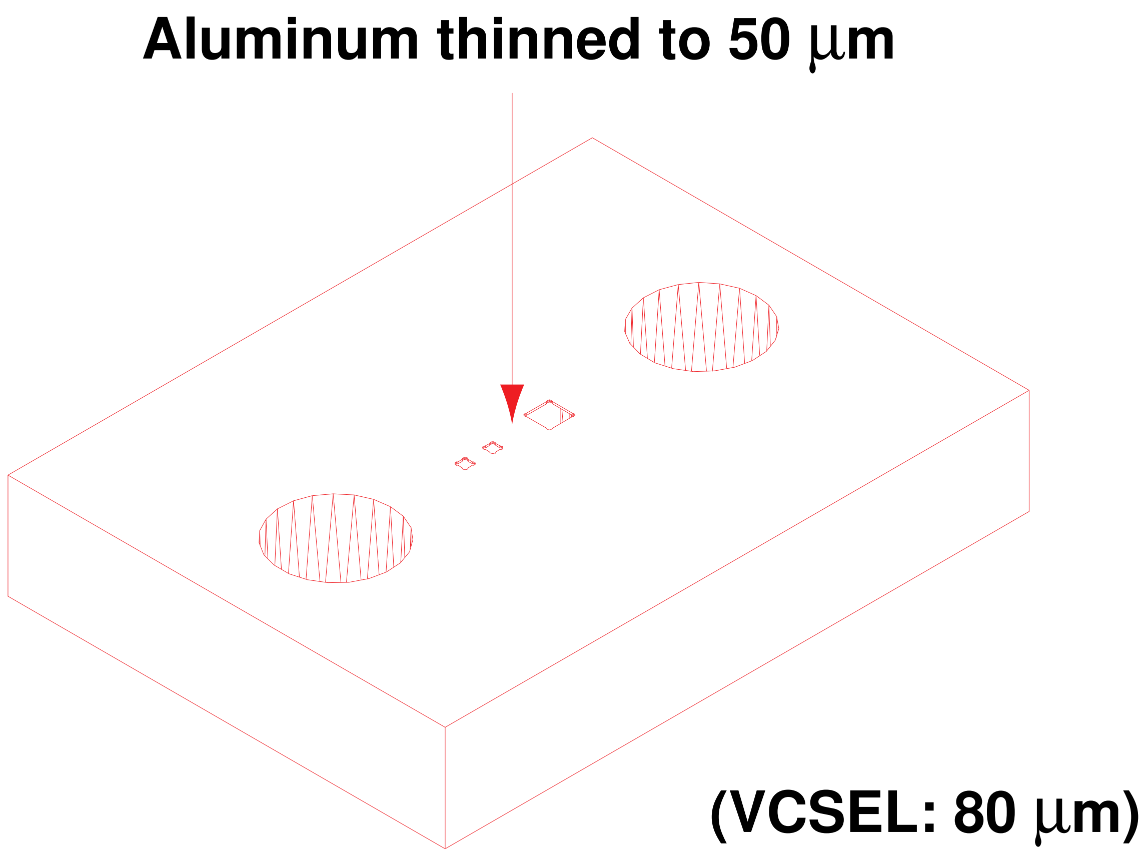
√ **Produced VCSEL/PIN mounting jig**

- ◇ three different designs tried

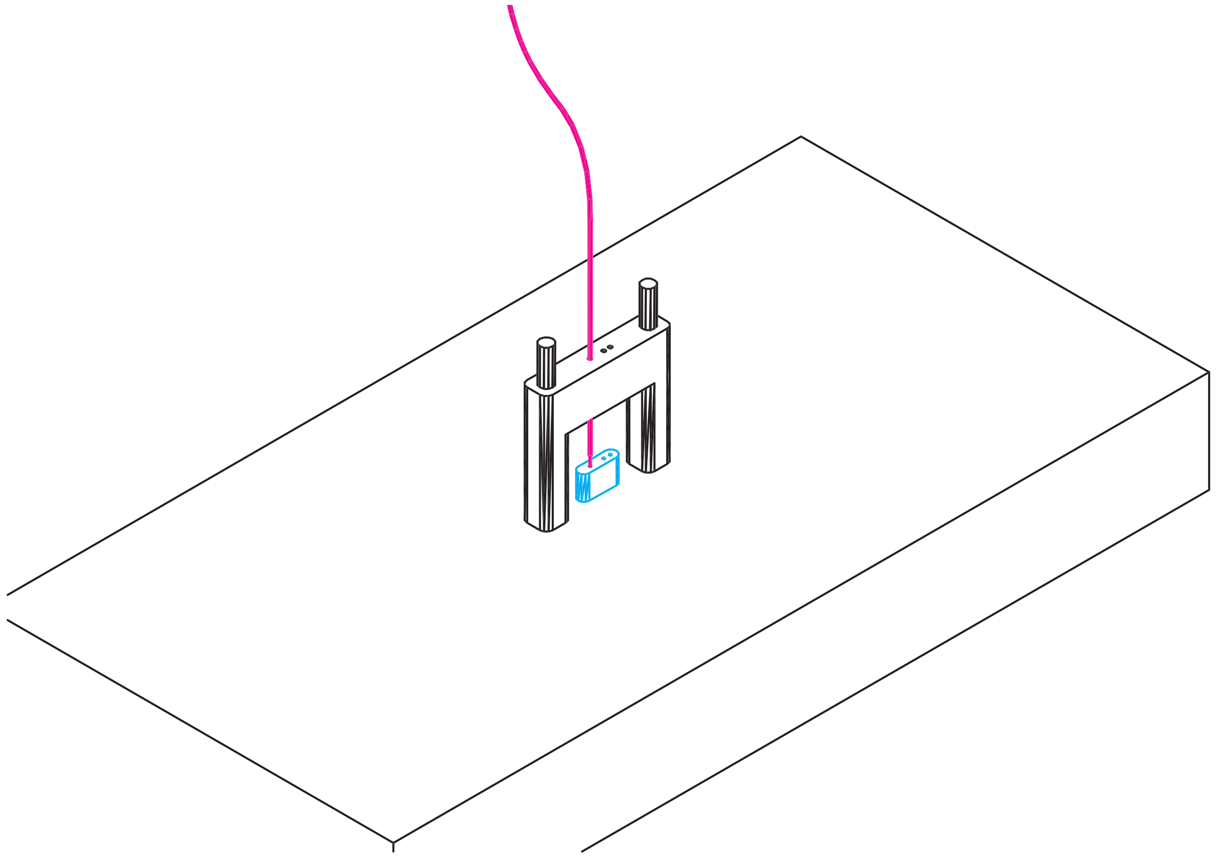
√ **Produced fibre gluing jig**

- ◇ no damage to fibres

# VCSEL/PIN Mounting Jig



# Fibre Gluing Jig



# *Status*

√ **Produced VCSEL pick-up tool**

- ◇ five different designs tried
- ◇ 250 $\mu$m x 250 $\mu$m x 80 $\mu$m
- ◇ 0.007 mg

- **Produced 3D mask**
  - ◇ three different designs tried
  - ◇ able to deposit 3D Au/Cr traces (1 $\mu$m) by evaporation
  - ◇ inconsistent bond pull strength: 1-10 gm
  - $\rightarrow$ HybridTek to screen on gold traces (10 $\mu$m)

- **VCSEL soldiering with surface mount technology**
  - ◇ evaporated gold traces (1 $\mu$m) can't smooth out rough macor surface (10 $\mu$m)
  - $\rightarrow$ VCSEL does not sticks to macor without glue
  - ◇ VCSEL sticks to BeO with gold screened on by HybridTek
  - $\rightarrow$ expect VCSEL to stick to macor with gold screened on by HybridTek

## *Plan*

- Produced prototypes using aluminum silicate
  - proved principle of design
  - weak coupled power due to loose cap
- Produce prototypes using macor
  - greatly simplified design
  - tight cap fit
  - need to produce several optically functional packages