Submission for the Engineering Run

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- **Beetle engineering run submission:**
  - **Beetle 1.3 / 1.4: Thu, 13. May 2004**
  - **Beetle 1.5:   Mon, 17. May 2004**

- **Beetle chip size: 5.4mm x 6.1mm**

- **Reticle layout/size: 3 x 2 chips / 16.6mm x 12.5mm (with gap between chips)**
  - **684 chips / wafer   OR**
  - **228 chips / wafer / chip version**

- **In total: for 2 wafers (guaranteed)   for 6 wafers (max.)**

  456 chips / version   1368 chips / version

Beetle 1.3 / 1.4

- **Beetle 1.3:**
  - **no modifications, same gdsll-file (data-file) as for last MPW run**

- **Beetle 1.4:**

  Modification as discussed and decided in Beetle Production Readiness Meeting (20.04.04):
  - **Fix parity bit of Pipeline Column Number (PCN)**
  - **Fix the even/odd crosstalk in pipeline**
  - **New modified comparator**
  - **New Beetle Id. number**
  - **Alignment markers**

Beetle 1.5

- **Beetle 1.5:**

  Based on Beetle 1.4, additional modifications were done on this version:

  - **disconnection of analog Frontend and Comparator power,
    therefore pad ProbeIDAC has to be exchanged to a new power pad**
  - **new pipeline cell (n-FET over n-well structure)**
  - **new MUX timing to reduce the header crosstalk into the first readout channel**
  - **Pipeamp:**
    - improved routing
    - new line driver structure (less spread in switch-timing over all 128 channels)
    - pipeamp is now split into 4 parts with 32 channel each (smaller baseline variation)

    simulation shows a flatter baseline and a slight reduction between consecutive and non-consecutive readout
  - **improved power routing for MUX, Pipeamp and TopPads**
  - **new test structure**
  - **new Beetle Id. number**
  - **minor modifications in different cells**