**Test Superconducting Wire at CERN**

* Ic critical current
  + at 3T, 4.5 K and 1.9K
* RRR
* cross section, to look at filaments
* electrical insulation (breakdown voltage)

**Test Superconducting Cable at Uppsala & Scanditronix**

* measure diameter
  + 3x 0.36 mm = 1.08 to 1.09 mm diameter
* check bending,
  + measure approximate bending radius
  + does it come apart?
* make some photos
  + close-up look with microscope
* measure HV insulation between strands
  + ramp-up to breakdown voltage
  + (put in water bucket, then measure b/w strand and water)
  + strand to strand insulation

**Test Impregnation at Scanditronix**

**NOTE: Quality Control documentation**

**NOTE: Adapt lengths to available cable**

* dummy winding channels
  + 4 different pieces
    - 2x straight (1 without mold release, 1 with mold release)
    - 1x bend horizontal
    - 1x bend vertical
  + approximately 5 to 10 cm length, few channels next to each other, 0.3 mm barrier
    - 2x 1.12 x 5x 1.12 mm2 (width x height) -> 10 cables
      * cable diameter **1.08 mm**
      * add gap /tolerance about 120 microns
      * width 2.26 – 2.36 mm
    - on drawing: **channel width 2.31 x depth 5.58 mm**
    - ~~2.5\*6.25 mm2 (width x height) -> 10 cables inside channel~~
  + with cover, Kapton sheet, glass sheet (as in the real magnet)
  + grooves should be cleaned, sharp edges taken off
* measure channel width / depth after manufacturing
  + e.g. every 10th channel
* anodization approximate 50 micrometer, adapt to final channel diameter
  + up to 150 micron total thickness possible
  + tolerance 1-2 micron,
  + adapt to real width of the channel
    - note that ½ width grows into the channel, ½ outside
    - channel width reduces by 2 x ½ = 1 times the anodization thickness
* cable to stick out by few cm
  + measure HV insulation between strands
  + note that cable unwinds easily, should be restrained
  + not enough superconducting cable
    - use superconductor in one channel
    - use copper cable in other channels
* impregnation
  + resin options:
    - as standard used by Scanditronix (MY750)
    - ~~(paraffin wax)~~
  + without and with mold release
  + document the full procedure and types of resin/hardener etc used
    - put a thermo-coouple on the samples to monitor the temperature
  + keep some of the resin that comes out at the back
    - measure shear stress on this sample
* after impregnation
  + measure HV insulation between strands
  + thermal shock
    - 10x: dip in liquid nitrogen for a minute to cool down, warm-up to room temperature
  + measure HV insulation between strands
* destructive test
  + cut and polish
  + make photo of cross section
    - check positioning of the cables and strands
    - check for cracks in impregnation
  + other interesting measurements
    - tension, shear, bending measurement
    - SEM microscope at LNU can have samples up to 100 x 14 mm