

COMPASS-U tokamak

Toroidal field coils

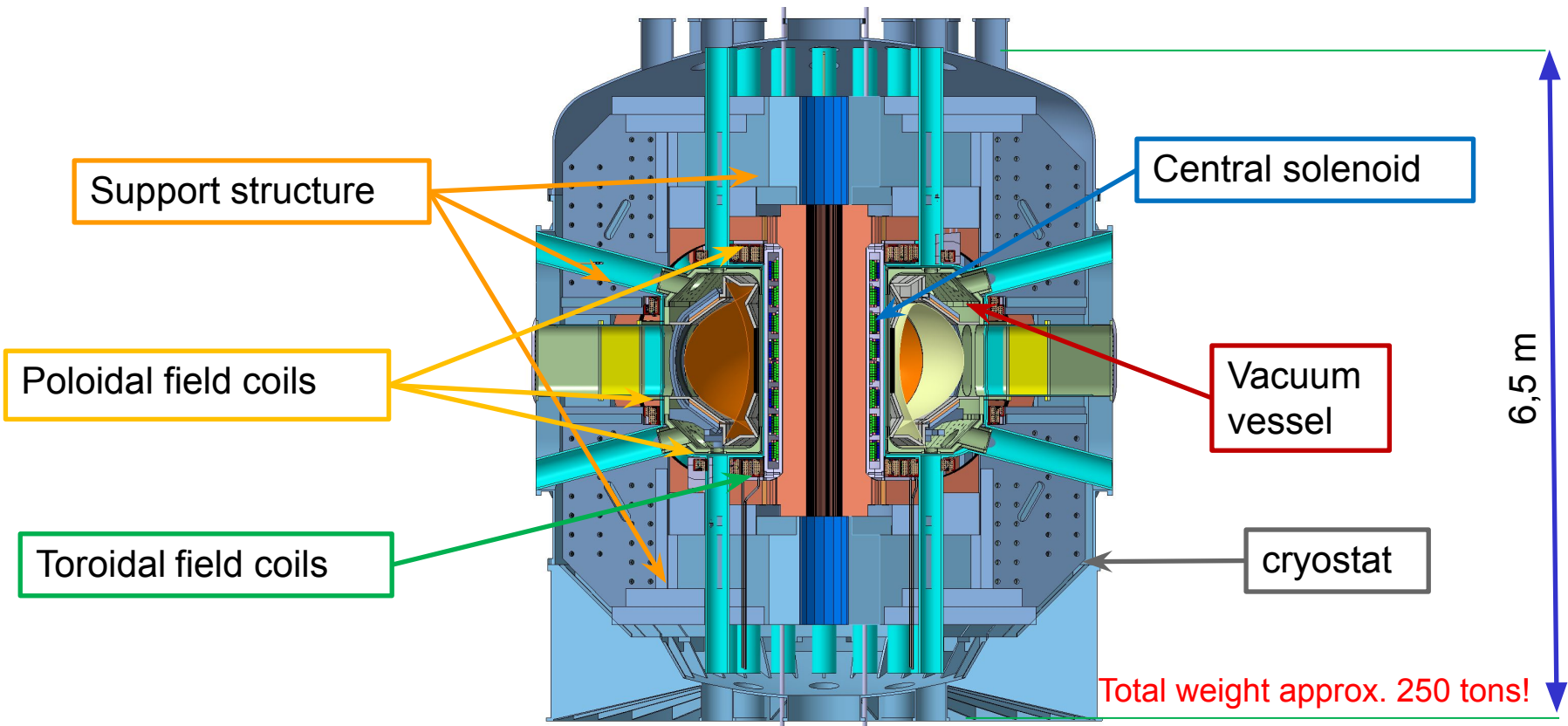
v1.1

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Key properties of COMPASS-U:

- High magnetic field to confine plasma (5 T)
- High plasma current (2 mil. Amperes)
- High currents in toroidal coils up to 200 kA
- High currents in poloidal coils up to 50 kA
- Both coils systems from copper alloy materials (discharge durations up to several seconds)
- tokamak operate at cryogenic temperature
- Operation with high temperature first wall – up to 500°C
- mid-size device

=> unique capabilities to address DEMO challenges



Key milestones:

Design of the components	2018 - 2020
Vessel, support structure manufacturing	2020 - 2021
PF and TF Coil manufacturing	2020 - 2021
Assembly and installation	2021 - 2022
Commissioning and start of operation	2022

First plasma: end of 2022

Time to a fully commissioned machine: 1.5 - 2 years

Presumed scope of work

- Prototype coil to confirm design and manufacture procedure
- Manufacture of 16 toroidal field coils from 20 mm thick plates from certain alloy of high conductivity oxygen free copper

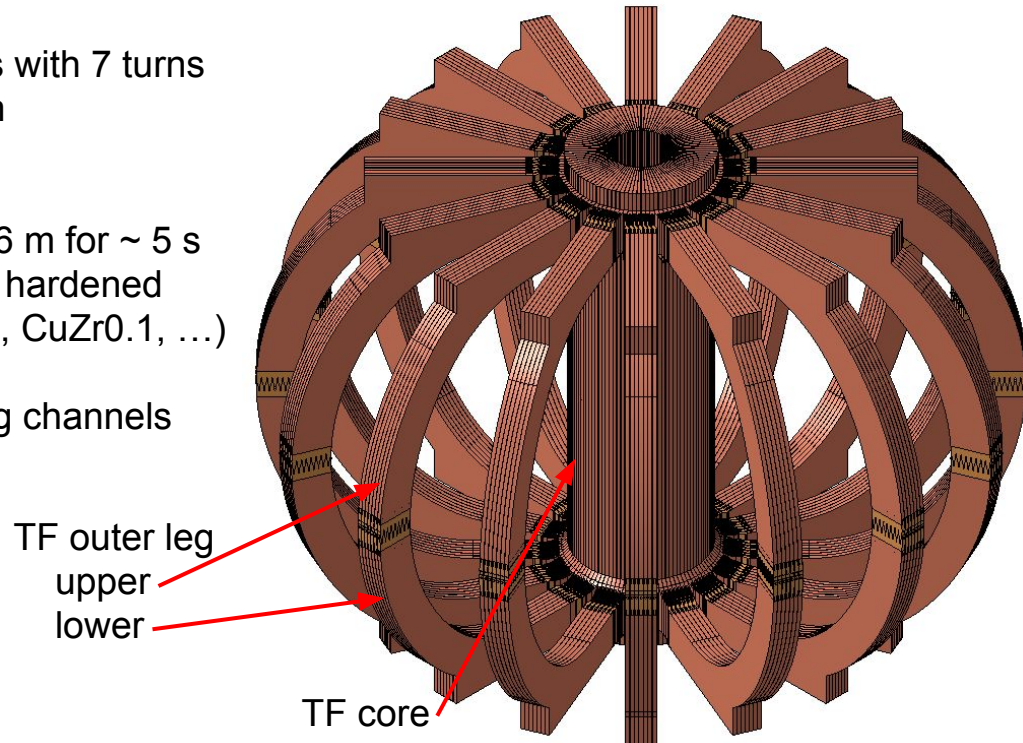
Presumed scope of work on the coil

- Machining of copper plates and connection of sliding/bolted joints
- Insulation
- (Vacuum) epoxy impregnation
- Electrical testing
- Transport to IPP

Note: coil models and coil parameters in this presentation are preliminary and **could change** during preliminary market consultations

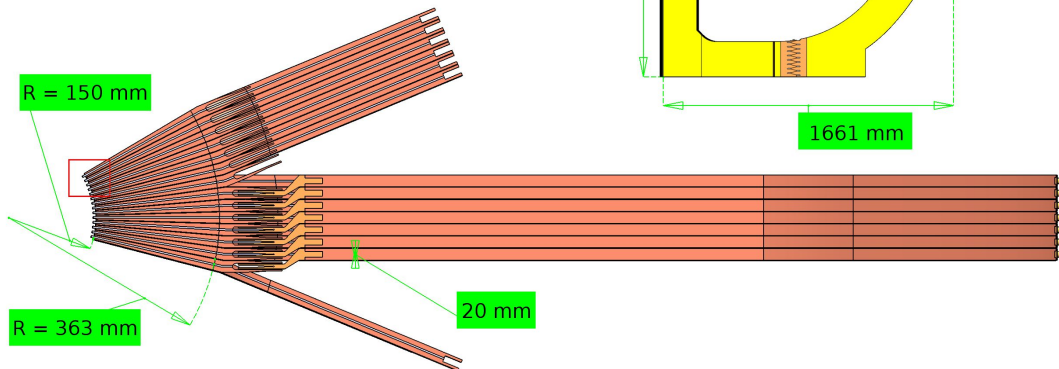
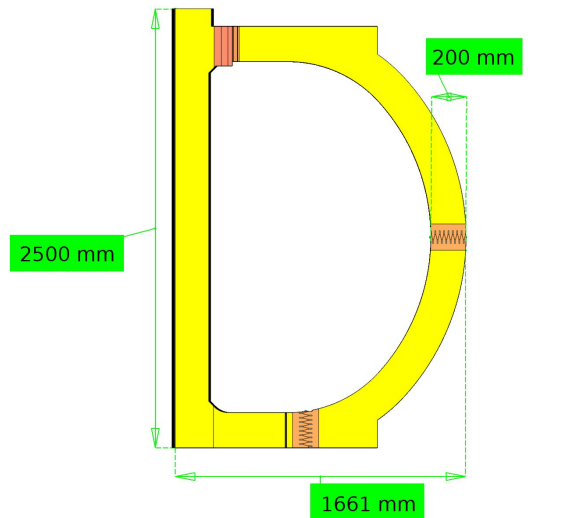
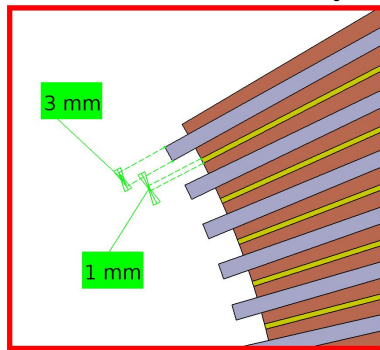
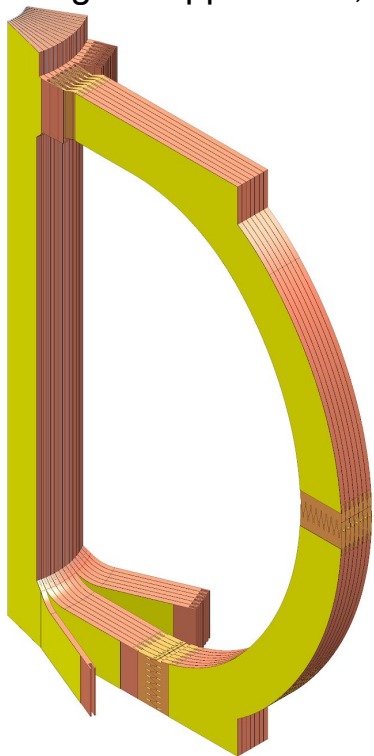
Preliminary parameters

- 112 D-shaped turns grouped to 16 bundles with 7 turns
- Outer dimensions of one turn $\sim 2.6 \times 1.7$ m
- Each turn composed of 3 parts with joints
- Turns insulated by G10 plates
- Current 199.5 kA providing 5T @ $R = 0.896$ m for ~ 5 s
- Turn cross section 20×200 mm made from hardened OFHC copper or similar material (CuAg0.1, CuZr0.1, ...)
- Total mass ~ 25 tons
- Cryogenically cooled to $T > 50$ K by cooling channels in each turn



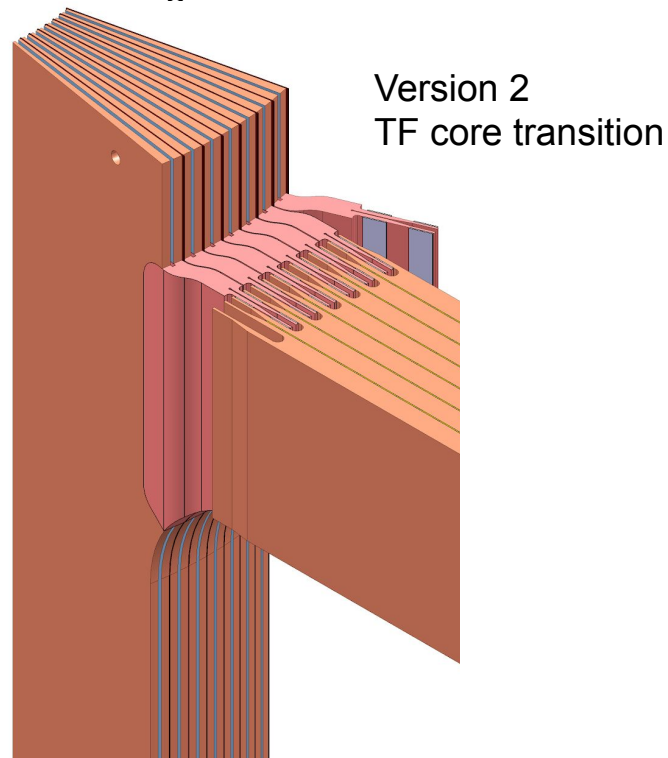
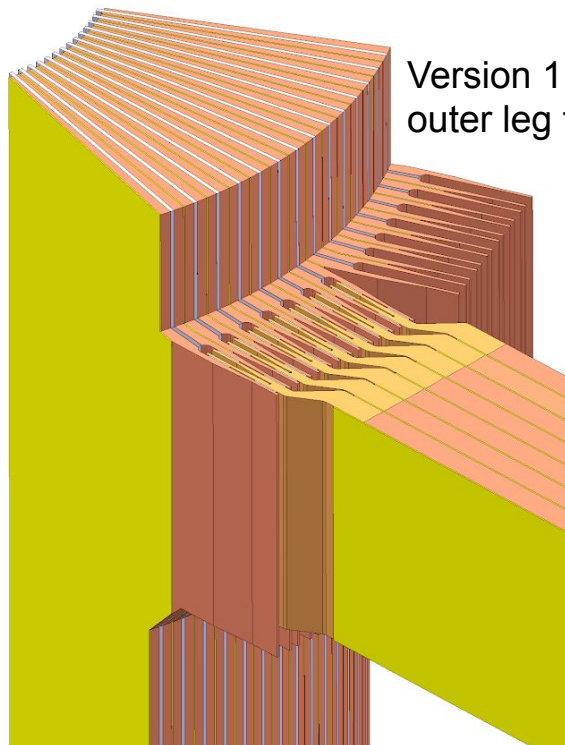
Detailed view (conceptual design)

- orange - copper turns, gray - stainless steel reinforcement, yellow - insulation



Sliding joint (conceptual design)

- suppress transfer of mechanical loads between TF core and outer legs



More informations about preliminary market consultation can be found at:

http://www.ipp.cas.cz/o-ufp/Verejne_zakazky/doc.html

At website tenders electronic daily

Notification Number at Tender electronic daily: 2019/S 113-276584

(Číslo oznámení TED: 2019/S 113-276584)

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