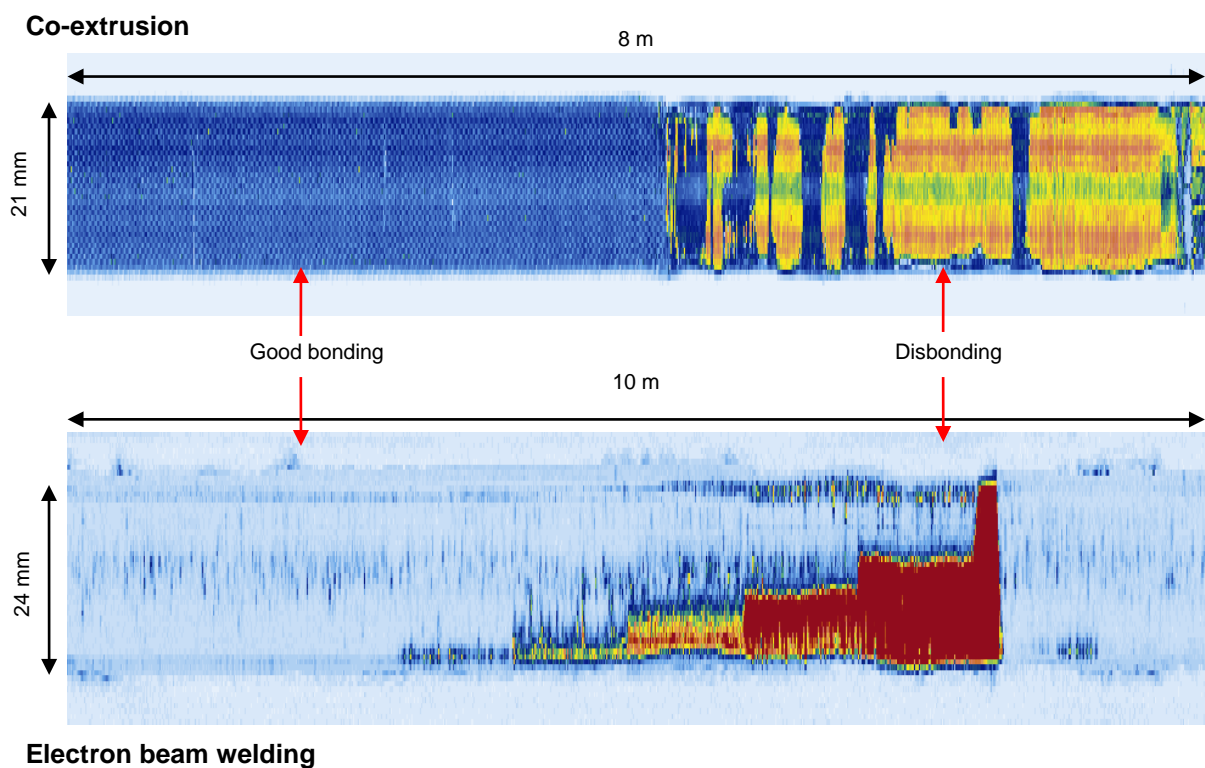


Ultrasonic quality control of Cern superconductors

For Cern's large scale LHC detectors, ATLAS and CMS, a total length of 140 km of aluminium-stabilized Rutherford type superconductors had to be manufactured. The superconducting flat cable is electrically and thermally stabilized by the addition of a high-purity aluminium sheath in a continuous co-extrusion process. In order to withstand the very high electro-mechanical forces, a further reinforcement of the CMS conductor is necessary. This is achieved by attaching two high-strength aluminium alloy strips to the extruded conductor in a subsequent continuous electron beam welding process. For optimum performance of the conductor, a void-free bonding between the different constituents must be guaranteed.

It could be demonstrated that ultrasonic imaging is capable of detecting and localizing incomplete bonding in these superconductor cables. In collaboration with the High Energy Physics Laboratory of ETH Zürich and industrial partners, Empa has developed dedicated ultrasonic phased-array systems and used them for the continuous bond quality control during the manufacture of the superconductors in Switzerland, Belgium and France.



References

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