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Assessment of beam-intercepting device robustness for intensity increase in CERN's North Area

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CERN's North Area comprises several target and experimental systems and is a zone of interest for future development. Provision of beam to this area relies upon several beam-intercepting devices located in various branched transfer lines from the Super Proton Synchrotron. In several lines, these include a primary production target system of beryllium plates followed by a combined collimation, attenuation and dump device made from a set of aluminum, copper and iron blocks and known as a 'TAX' (Target Attenuator [for] eXperimental areas). These may operate in a range of configurations depending on experimental needs. Future operational regimes with higher beam intensities (increased from a current specification of 1.5×10ˆ13 to 4.0×10ˆ13 p+/pulse), shorter pulse times (4.8 s reduced to 1.2 s), greater repetition rates (14.4 s cycle time reduced to 7.2 s) and ten times the annual intensity place more stringent thermo-structural demands on these existing devices, beyond their original specification. This contribution outlines the engineering analysis, including beam-matter interaction studies and thermo-structural simulations, carried out to assess their robustness under such conditions.

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Footnotes

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Yes

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