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Integrating non-destructive methods for the prediction of remaining servicing life of airfield APRONs

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Airport apron relates to an airfield area dedicated to the parking, loading/unloading, refueling and boarding of aircrafts. The standard conventional pavement solution in apron areas is a concrete rigid pavement with jointed concrete slabs, which is due to two main reasons. First, use of concrete technology helps to prevent the potential viscous behaviour of the hot-mixed asphalt solution. This is caused by long-term and permanent loads, especially at high temperatures. Secondly, use of concrete blocks avoids the decay of the wearing course due to the contact with fuel.
The project of such rigid pavements is a complex process taking into account several factors, spanning from the critical aircrafts that is expected to park in the stand to the subgrade bearing strength. However, issues occurring during the construction phase or overloading of the pavement are likely to reduce the service life with respect to the design expectations.
This work presents outcomes from a still on-going non-destructive monitoring activity carried out from 2008 over three park stands located in APRON 800 in Fiumicino Airport of Rome, Italy. In particular, the three stands were subjected over the years to different loadings that produced various rate of damage of the concrete slabs. The area was surveyed, at different time intervals, by visual inspection of the cracking (i.e. calculation of the Pavement Condition Index), Heavy Weight Deflectometer (HWD) testing and Ground Penetrating Radar.
By comparing the outcomes from NDTs with the visual evolution of the damages over the area, it was possible to stress out the evolution pattern of the decays and to determine a reliable domain of service life by means of damaging versus time prediction curves.