Problem
Engineers are continually faced with maintaining and developing pavement infrastructure with limited financial resources. Traditional pavement design and construction practices require high quality materials for fulfilment of construction standards. In many areas of the world, quality materials are unavailable or in short supply. Due to these constraints, engineers are often forced to seek alternative designs using substandard materials, commercial construction aids, and innovative design practices.

In 2008, at IVATO Airport in Madagascar, Maccaferri SA was invited to recommend a cost effective solution without compromising on the structural requirements for sections of the Taxiway and Parking Areas that were to be rehabilitated.

Solution
The inclusion of geosynthetic materials has proven to be successful in the pavement layers. Geogrids and geotextiles used within a pavement system perform two functions: separation and reinforcement, which resulted in a 17% cost saving.

The separation function was achieved by placing a woven geotextile Mactex® W1 4S (40/40 kN/m) providing additional reinforcement and separation medium to control the contamination of the base course by fines migrating from the subgrade and sub base. This resulted in a 30% reduction in the required thickness of the unbound base and sub-base layers for the same design life as demonstrated by Giroud and Noiray and Sellmeijer.

The reinforcement of the asphalt was enhanced using a geogrid made of glass fibre with very high mechanical properties: tensile strength 100x100 kN/m and elongation at rupture <4%. The design of reinforced pavements is an empirical mechanistic process and is based on the research commissioned by the UK highways agency, which resulted in a design software for reinforced overlays (OLCRACK) and is currently used by Maccaferri’s professional team. The results of the crack reflection analysis of the reinforced overlay using the OLCRACK program show the equivalence in terms of design life between the original unreinforced asphalt layer (100 mm thickness) and the reinforced one (80 mm thickness with Macgrid® AR 10.7).
As part of the ISO 9001 Management Systems, guided research and development programmes, information contained herein is continuously updated. Please confirm with Maccaferri SA (Pty) Ltd the latest version of the Product’s Specification available.

The reinforced pavement with reduced thickness

MACGRID® AR 10.7

MACTEX® W1 4S

8 cm

25 cm

60 cm

BETON BITUMINEUX

GCNT 0/40

DECAISSEMENT ZONE P2

SUBGRADE

Placement of the Mactex® W1 4S

Placement of the crushed rock on top of the Mactex® W1 4S
As part of the ISO 9001 Management Systems, guided research and development programmes, information contained herein is continuously updated. Please confirm with Maccaferri SA (Pty) Ltd the latest version of the Product’s Specification available.

Placing of the asphalt onto the Macgrid® AR 10.7

Completed section

Final result