

# A new bunker construction technique: comparison of maintenance costs

A. De Luca\*, M. Mocioni\*\*, E. Portigliatti\*\*\*, A. Battistella\*\*\*\*

\* - Federazione Italiana Golf, Viale Tiziano 74, Roma

\*\* - AntNet Srl, Via Livorno 60, Torino

\*\*\* - Mapei Spa, Via Cafiero 22, Milano

\*\*\*\* - Battistella Golf, Via V.Veneto 48, Chions (PN)



## INTRODUCTION

Bunkers represent a small portion of the total golf course, but they are an essential part of the golf course and the proper construction and maintenance are really important. The maintenance requires a lot of manpower and materials and it includes periodical raking, water removing, edge restructuring, ace rebuilding, sand addition, drainage and weed control.

In the last years a lot of different construction methods were studied and tested in order to save operational time, provide a good drainage and maintain the sand clean.



## MATERIALS AND METHODS

At Golf della Montecchia a new construction method was tested, developed by Mapei in collaboration with Battistella Golf. The system, called Mapei Technology, consists of the installation of a specific draining porous bonded layer, in order to separate the soil from sand.

The purpose was to increase the drainage capacity, allowing to increase water removal, reduce face erosion, avoid drainage work, maintain the sand clean and limit the growth of weeds.

In order to reduce the edge maintenance, the bunker perimeters were plugged with 40 cm wide *Zoysia matrella* sods.

All data of maintenance operations have been collected throughout two years, in order to compare them with the previous data collected on the same bunker before changes.



## CONCLUSIONS

The Mapei Technology allows to save more than 40% in operation time, with an average time

of 13 hours/year/bunker instead of 22 hours/year/bunker. The largest saving are in raking (20% less), edge and face cleaning (90%) and water removal.

The cleaning of the drainage system, annual in the golf course bunkers, should be less frequent in Mapei bunker as well as full sand replacement.

Considering only the labor, the saving should be more than 200 €/year/bunker and the construction costs will be amortized in 6 to 7 years.

Operation	Traditional bunker			Mapesoil technology		
	Number of operations/year	Time for each operation (min)	Total time (hours)	Number of operations/year	Time for each operation (min)	Total time (hours)
Raking	100	8	13,3	80	8	10,7
Face cleaning	20	15	5,0	2	15	0,5
Edge restructuring	2	10	0,3	2	10	0,3
Sand thickness check	6	5	0,5	6	5	0,5
Sand addition	2	30	1,0	2	30	1,0
Water removal	10	15	2,5	0	15	0,0
<b>TOTAL TIME</b>			<b>22,7</b>			<b>13,0</b>
Drainage cleaning	1	120	2,0	1 every 2 years*	60	1,0
Full sand replacement	1 every 5 years*	60	1,0	1 every 8 years*	45	0,8
<b>TOTAL ADDITIONAL TIME PER YEAR</b>			<b>3</b>			<b>1,8</b>

\* - considering the total time (6 hours) broken down by the number of years