



The gunite method compacts the sand in place. The plywood board keeps sand within the bunker.

Installing Sand in Bunkers— A Better Way

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BUNKERS ON GOLF courses as hazards are necessary. How many and how large the bunkers should be depends upon a number of factors, especially on how the golf course architect envisions the specific requirements of the site. Some golfers love bunkers, many others fear them, but one thing is certain — bunkers are expensive to maintain.

Because they are costly to maintain, superintendents continually search for

more effective time-saving methods for maintaining the sand and the surrounding areas. The mechanical sand rake was a welcome advancement; it reduced the need for hand raking, and freed workers for other maintenance work. Now one worker operating a mechanical sand rake can do much of the work and touch-up himself, if bunker sand facings are not severe. If facings are severe, then extra help is required to smooth the sand where the mechanical rake cannot operate. Even

though the mechanical sand rake has been a major advancement in bunker care, other improvements are needed. There is a need for a better trimming mower to maintain the turf along the edge of the bunker that is not easily accessible with conventional mowers, a better method of edging to define the bunker limits, and a better method of installing sand in bunkers; the conventional method of trucking and shoveling sand into bunkers is too costly and is very time-consuming.

The specific problems involved are:

1. Hauling large quantities of sand is very difficult on the regular maintenance trucks. Broken axles and broken hydraulic lines are common in hauling heavy loads of sand. It also means that these vehicles are tied up for a long time, and, therefore, not available for other work.
2. A large part of the work force is unavailable for routine maintenance when they are hauling sand. Morale is affected when the course isn't well-groomed.
3. Interference with golfers is drawn out over a long period. Golfers' patience and nerves are strained.
4. Dump trucks cannot move in and out of bunkers to place the sand where it is needed. This forces excess shoveling by workers.
5. Moving sand in large quantity with shovels produces a soft sand that causes the ball to bury. Much time and water (irrigation or rainfall) is required to firm the sand. This takes several months.
6. Moving sand in quantity requires many trips to the sand pile, new road-

ways and ruts are made and the edges of bunkers are damaged.

There had to be a better way, and after a lot of thought, I believe I have a solution:

FOR THE LAST THREE seasons, we have successfully used a gunite machine to place new sand in our bunkers. This machine is the same one used in the construction of swimming pools. It will accept bulk sand and force it through the hose under high pressure. The force is such that it compacts the sand while spreading it in place. One man easily guides a 2-inch (inside diameter) hose to place the sand where it is needed. It is capable of delivering up to 10 yards of sand per hour, using the following procedure. Two truck drivers are required. Each loads his own truck with sand. A helper shovels the sand into the mixing hopper and another helps move the hose. The gunite contractor provided the machine operator and a man to handle the hose in bunkers. The machinery is placed in the rough approximately 200 feet from the green. Only the hose is taken to the

bunker site. The sand is delivered to the site through the hose.

The time study (Figure 1) provides a comparison of costs between the old conventional method of placing sand in bunkers and the gunite method. Costs for the gunite method were approximately 50 percent of the old conventional method. The first test run was accomplished in 1978. We liked the technique and used it again on our second course and improved upon our efficiency by placing approximately 450 yards of sand into bunkers in 52 hours in 1979.

It was, in our opinion, a totally successful operation. I feel that with modification, this machine, or one that works like it, has endless possibilities. For example, I can imagine dressing bunkers with a thin layer of sand for an important golf tournament, or top-dressing a green in a matter of seconds, applying limestone, hydrated lime or fertilizer without stepping on the putting surface. It is our responsibility as turfgrass managers to continue to search for new ideas. You too may at least find it to be a solution to an old and difficult problem.

Time Study — Sand Installation in Bunkers

	Old Method		New Method	
Front loader cost per hour	\$10.00/hr		\$10.00/hr	
Two dump trucks cost per hour	\$16.00/hr	+ =	\$26.00/hr	
Manpower cost per hour	\$ 3.00/hr		\$ 3.00/hr	
Manpower needed per hour	5	× =	\$15.00/hr	
Sand used per bunker	4½ yards		4½ yards	
Number of bunkers	65	× =	296 yards	
Average size of bunkers	3200 sq. ft.		3200 sq. ft.	
Time to install 4½ yards of sand	2.25 hrs		½ hr	
Time to level sand & repair edges	1 hr	+ =	3.25 hrs	
Total installation time	65 traps × 3.25 hrs	=	211.25 hrs	
Contractor equipment & manpower cost	N.A.		× ½ hr = 32.5 hrs	\$50.00/hr

Equipment plus manhour cost times total time
 $\$26.00 + \$15.00 = \$41.00/\text{hr} \times 211.25 \text{ hrs} = \$ 8,661.25$
 Total sand used times hypothetical price:
 296 yards times \$7.00 yard = \$ 2,072.00
TOTAL: \$10,733.25

Equipment plus manpower cost times total time:
 $\$26.00 + \$12.00 = \$38.00/\text{hr} \times 32.5 \text{ hrs} = \$1,235.00$
 Total sand used times hypothetical price:
 296 yards times \$7.00 yard = 2,072.00
 Contract hourly price times total time:
 $\$50.00 \text{ hour times } 42 \text{ hours} = 2,100.00$
TOTAL: \$5,407.00