

Why testing saves time and money

Sharon Bruce and Sylvain Duval explain the role played by lab analysis in golf course construction and management.



Constructing a golf course is an expensive and technical affair. Important decisions are made from the outset, so it's imperative that the project is undertaken to a high standard from the beginning. There are many tools available in the sportsturf industry to aid in the process.

Lab analysis, in particular can be used to provide a valuable insight into the selection of the correct materials for golf course applications or constructions. Testing can have a good, positive impact on the profitability, playability and longevity of a golf course.

Currently there are only ten such laboratories in the world, mostly based in North America. European Turfgrass Laboratories, located in Stirling, Scotland was the first laboratory outside of North America to become accredited to the A2LA (American Association for Laboratory Accreditation) in the Geotechnical Field 'Putting Green Materials', in 1997.

A2LA-accredited laboratories have strict policies and procedures which must be

“Every two years an assessor visits each laboratory to check staff competency”

followed to ensure consistency, accuracy and reliability of the test results. Every two years, an assessor visits each laboratory to assess the competency of the staff to complete their testing techniques, the quality management system is reviewed and the laboratory's compliance to the international standard for testing and calibration laboratories, ISO/IEC 17025:2005. Laboratory equipment is calibrated on a regular basis and must be traceable to national standards. Reference standards are tested alongside samples to ensure that all equipment is functioning correctly.

Laboratories are used in obtaining results for selecting the appropriate materials for renovation and new construction projects – these analyses are used by the decision maker to provide assurance and act as a reliable back-up to the decisions taken.

Laboratory analysis can help provide data for:

- Sourcing suitable construction materials
- Ensuring the sand/gravel are compatible
- Ensuring the organic /inorganic amendment is suitable
- Determining the best mix ratio for the rootzone by preparing lab mixes
- Checking the selected lab mix against the bulk mix
- Establishing a good quality control program for use during the construction
- Selecting bunker sands and determining the appropriate depth of fairway capping sands
- Assessing suitability of irrigation water.

Testing prior to any construction could potentially save a golf project a significant amount of money should the wrong selection of materials be initially made which results in rootzone failure. All too often, ETL receive samples for testing after they have been placed in the golf green. The cost of having samples analysed is a mere fraction to the cost of replacing a failed green at a later stage.

Testing should not be seen as an unnecessary expense, but rather as an invaluable backup to help make golf course managers, architects and consultants make the right decision.

Remember to use an experienced, independent and unbiased laboratory for the production of the accurate test results as a tool for effective golf course management and construction.

The consultant works closely with the owners' representative, the golf course architect, the golf course contractor and of course, the testing laboratory.

The testing is key to firstly select adequate and suitable materials, to verify particles size distribution and physical properties, to define the optimum placement depth for capping material, to design the proper green mix, to check compatibility between sand and gravel and finally to verify the quality during the construction.

The consultant's role should start at the early stage to assist the golf course



Laboratory testing plays an important role in ensuring the success of golf construction

“Testing should not be an unnecessary cost, rather an invaluable backup”

architect and project manager preparing the construction specifications. The construction specifications should include guidelines to help the contractor sourcing different samples. Prior to any testing, the consultant will advise the client on the type of testing needed and will liaise with the laboratory to ensure specific testing is carried out according to the exact needs of the project. The consultant must ensure that all materials will perform to the desired standard to provide adequate growing medium to maintain sustainable healthy turfgrass for many years.

At Moraleja Algete, a new golf course outside Madrid, consulting agronomists working with Nicklaus Design have worked closely with the testing laboratory, during all phases of the construction.

A. During the pre-construction phase and the early stage of construction several stages of testing were needed:

- Green construction: Testing was done to select materials for the root zone of mix and to define the best mixing ratio between the sand and the organic amendment. This is a crucial step; not only to verify the particles size distribution of the sand but also to make sure the mix has enough total porosity with a good balance between the air and the water filled porosities. After selecting the sand, the organic amendment was sent to the laboratory that has prepared three samples by mixing the sand and the organic at different ratio. The gravel was also tested and the compatibility with the rootzone mix (bridging) confirmed before the final approval.
- The fairway capping sand: There are no standard guidelines for fairway plating materials and this is where the consulting agronomist and the laboratory have to work closely to identify the best possible material. The particle size distribution with the water release curve are the most common tests needed for fairway capping materials. The key is to identify the optimum depth that will provide sufficient aeration and water porosity (where the two curves intersect on the graph).

B. During the construction phase more testing was done to firstly, check that the initial approved material were being consistent during construction and secondly, to select the bunker sand.

- Quality control: Regular samples were being testing during the construction, following the tolerance range set up by the laboratory after the first bulk mix had been tested and approved.
- Bunker sand: Everybody involved in the project wanted to make sure that we would select the best possible sand for the golf courses to provide a pleasurable playing experience for golfers. From the turf manager point of view, we wanted the sand to stay in place in the high flashes after heavy rain. When evaluating bunker sand, several criteria must be considered:
 - Particle size & particle shape
 - Penetrometer (fried-egg lie) & crusting potential
 - pH
 - Percolation rate
 - Colour
 - Angle of repose.

The laboratory and its testing plays an integral part of a golf construction project. Establishing a good, fast and reliable quality control programme with the laboratory is essential for checking the materials as they are delivered to the site. Without these results, the consultant would not have reliable data to make informed decisions regarding the construction.

Sharon Bruce is laboratory manager/director of ETL. Sylvain Duval is a consulting agronomist for Nicklaus Design.



Photo: Chad Goetz, Nicklaus Design

Regular testing was key to the successful build of Nicklaus Design's Algete course at La Moraleja in Madrid