

FOR ANTENNA MAST FOUNDATIONS



Whenever masts or towers have to be constructed, professional foundations are required. Foundations made from concrete are generally the most popular choice. Until now... the company BFtec from Nentershausen in Hessen wants to revolutionise the market with its so-called SteelRoots®. Company founder, owner and developer Peter Kellner is convinced that his steel root foundations without concrete will replace conventional construction methods in the foreseeable future.

Kellner and his employees have worked on the SteelRoots® for more than six years: they have executed trials and series of tests accompanied by scientists and, now that all investigations have been concluded, they wish to position themselves on the market.

Flexible in application, inexpensive in production, easy to transport and assemble, and ecologically expedient as they are completely recyclable or reusable, and above all can be used immediately (no curing time for concrete) – the advantages of SteelRoots® are readily apparent. The root section, except for the uppermost segment, disappears into the ground. It is therefore expedient to have a look at their practical construction:

The efficacy of the SteelRoots® system is revealed during the erection of an antenna support mast suitable for directional radio in a location close to Büsum. In less than eight hours, the 20-metre-high mast was set up on its secure foundations. The North Sea resort of Büsum is above all renowned for the mudflats on its doorstep. But this feature so beloved by holiday-makers walking in the shallows generally puts frowns on building professional's faces: the subsoil features low load-bearing capacities on both sides of the dyke. In addition, the wind conditions typical for the North Sea prevail here. For this reason, good foundations are of great importance. "Every construction is only as sturdy as the foundations on which it stands", explains Peter Kellner.



In order to prepare the building site subsoil, a building team initially excavated a 4 x 4 m large and 2.20 m deep excavation pit using a chain excavator, and stored this excavation earth on the construction site. Then the employees laid out a geogrid, onto which they installed a compactable mineral mixture 60 centimetres in depth. During the installation, they compacted this material layer by layer using a compactor. A soil surveyor then inspected the compaction values using a drop plate: all reference values

were adhered to! In this way, the ground was prepared for the SteelRoots®.

The Assembly Team then assembled and bolted together the individual elements made from galvanised steel on-site. SteelRoots® products consist of struts and steel plates which can be configured exactly to fit the respective applications. BFtec has developed a modular system which is not only easy to assemble at the construction site, but which is also substantially easier to transport than preassembled building structures. The individual steel elements

are supplied to the construction site in bundles. Once assembled, the steel structures are reminiscent of tree roots, which is how the SteelRoots® got their name.

The completely assembled steel structure was then lifted in with a digger and placed on the fine levelling material provided for the purpose. Then the earth removed from the excavation pit was used to backfill it again. The ground was subsequently compacted using rammers and compactors until only the uppermost segment of the SteelRoots® projected out of the ground. The steel mast was then connected through friction-locking to this segment.

"We were able to construct the support mast in less than eight hours. The broadcasting site was put into operation the next day,



once the telecommunications technicians had mounted the antennae. This is an enormous time-saving in comparison to conventional concrete foundations", reports the ingenious entrepreneur. Naturally, he had to submit all statics, planning and safety verifications anchored in construction legislation for the erection of the mast.

Dipl.-Ing. Christian Kausch from the ehsah Ingenieurbüro für Telekommunikation und Bauwesen GbR (Engineering Office for Telecommunications and Construction) provided the structural planning for the antenna support mast. The Büsum project represented the first steel root foundations without concrete for the engineering office based in Barleben near Magdeburg, which employs, in addition to general partners Marko Jungnitsch, Michaela Palm and Christian Kausch, another 14 professional employees; which is one of the leading offices in the field of telecommunications structures and which calculates the structural integrity of approximately 150 radio and antenna support masts per year. "At first, we were indeed a little sceptical, in particular regarding the structural stability", reports the certified engineer. However, dialogues with Peter Kellner and the evaluation of other BFtec projects meant that their initial scepticism was resolved. Kausch now sees the diverse application possibilities of the SteelRoots®. In many areas, they represent a more economically viable alternative to concrete foundations.

The Büsum construction project has already made waves in professional circles. For Peter Kellner and his company BFtec, it is now merely a matter of time until the SteelRoots® also become comprehensively available on the market, as in addition to transmission masts, the SteelRoots® are also suitable as foundations for gantries, noise barriers, light and floodlight masts, wind power plants and much more. Even the first commercial halls have been successfully founded on SteelRoots® by BFtec.