

Leica Geosystems **TruStory** Machine control aids archaeology



The excavating project in Rynkeby has been going on for more than 10 years, and a grass field is currently being excavated before being laid out for construction. Traces of the settlement have been preserved, and the remains of houses seem to date back to the end of the Nordic Iron Age or early Viking Age (i.e. 700-800 A.D.). Findings show that the formation of villages on Funen may have occurred even earlier than archaeologists originally thought.

At first there were perhaps two or three farms, but in 1100-1200 A.D. the place developed into a small village with several houses, before it later became smaller again.

Intact village hidden under a grass field

Jakob Bonde, curator at Odense City Museums and leader of the excavation at the Rynkeby site, finds the intact imprint of the development of this little village

over the course of time fascinating and explains: "We can only guess what has happened here, however we do know that in some areas the plague killed 90% of the population in villages just like this one."

First time use of machine control

An archaeological excavation is commenced by the digging of search trenches to get a sideways (layered) view of the deposits. This establishes if there are archaeological objects or material in the area and places them in a chronological order.

If archaeological finds are discovered onsite after the initial examination, an excavator will meticulously remove the top soil. In the case of Rynkeby, the remains of several houses, wells and pits were found as well as several artifacts, such as a riding spur and a woman's belt buckle with a Viking valkyrie.

"It is the first time we used machine control for the excavation, and we



■ **Company**

Odense City Museums and their large team of archaeologists were given the task of researching, excavating and preserving the prehistory of Funen in Denmark.

<http://museum.odense.dk/en>

■ **Challenge**

Use machine control for performing and documenting the removal of topsoil on the archaeological site in Rynkeby, Denmark.

■ **Location**

RYNKEBY, DENMARK.



■ **Solutions used:**

- Leica iCON iXE3 - 3D System
- Leica iCON gps82
- Leica MSS400 bucket and tilt sensor
- Leica CS15 controller using SmartWorx Viva field SW
- Leica GS12 GNSS antenna

■ **Benefits**

- Fast and precise excavation of search tracks on an archaeological site.
- Fast and accurate removal of the top soil.
- Precision mapping of archaeological findings with Leica CS15 controller and GS12 GNSS sensor.



Finding of a barrel well from the Middle Ages.



Findings of pole holes, pits and wells.

certainly see the potential," says Jakob.

In this case, the machine control iXE3 Dual GNSS solution with new MSS400 sensors, helped guide the driver, and all the movements of the excavator were logged and registered. The excavator, with the help of machine control, carefully removed the top soil. If something was found, a Leica CS15 controller using the highly precise Leica GS12 GNSS antenna, recorded the exact location of the find. After, wooden pegs were placed in the soil so that archaeologists could later look for traces of houses, pits and wells in the designated areas.

Finding of a barrel well

The day we visited the site, archaeologists had just excavated a barrel well, typical for the period of 1300-1500 A.D. A soil column was taken out from the well area. This work had to be completed fast because the date of the well is determined based on the pollen and carbon results found in this soil.

Jakob was very pleased with the finding of the well. "I feel like I am walking in the footsteps of the man who built this well," he says.

The archaeologist's extended arm and finger

The data position of every find is collected using a Leica Viva GS12 together with a CS15 controller.

"If the machine control system on the excavator can be described as the archaeologist's powerful yet sophisticated extended arm, then the Leica Viva GNSS solution can best be described as the archaeologist's extended finger. The Leica Viva GNSS solution, together with machine control, enabled automatic, precise and fast mapping of the findings on the site. Both systems save us time, cost and a lot of steps," concludes Jakob.

Potential for the future

The archaeologists at Odense City Museums are carefully observing the development of GNSS and machine control solutions on excavators and can see the potential for future

archaeological excavating tasks.

Until now, archaeologists set up sites using strings and stakes, but with machine control, a DXF-file can be loaded directly into the machine control system, and the excavator operator can then simply follow the map, dig the search trenches and set out the site boundaries accordingly. Thanks to the Leica Geosystems machine control solutions this job can be done with utmost accuracy. These technically advanced solutions can help administer larger data than ever before possible and will ensure highly precise documentations on future excavations.



Jakob with the soil column, which determines the age of the well.

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