



New algorithms provide a better harvest

Researchers have entered into a collaboration with one of the world's leading manufacturers of agricultural machinery. They are now well on the way with the first version of a fleet management system that can optimise a farmer's harvest.

Economies of scale and efficiency improvement are key words for the latest trends in the development of agriculture. Farmers who take care of the land get a better crop yield. An optimised execution of the harvest can provide both fuel and cost savings. And farmers can now get help in planning the whole process with computer intelligence.

In recent years, the university's leading experts in operations management and software engineering have been working intensively on developing computerised fleet management tools for agriculture. They have now completed the first early prototype of a system that can control all the machines involved in a harvest, giving them the best possible route in relation to each other.

"Computer intelligence can lift the logistical planning involved in agriculture to a completely new level. We've developed an algorithm that can select the mathematically optimal route for each of the machines involved in harvesting. This means that farmers can save time, fuel and money in their operations, and at the same time reduce soil loading," says Senior Scientist Claus Aage Grøn Sørensen.

No more harvesting using the same patterns

For the time being, the researchers have shown positive results in computer-simulated harvesting operations. With the new

algorithms, they can control the harvest in a defined area with route planning that takes into account not only the field and vehicle dimensions, but also the soil compaction.

"In principle, we're doing away with traditional harvest methods in the fields, where there is no overall control of harvesting machines and transport vehicles. Instead of this, we're getting the computer to work out how the machines should move around in relation to each other, taking into account the status of the soil. It means the driving patterns become more complex," says Senior Scientist Sørensen.

For major agricultural regions such as the USA and Eastern Europe in particular, the technology can have a significant impact on the efficiency of the harvest. It is not uncommon here for farmers to keep track of five combine harvesters and a corresponding number of transport units in one operation.

Fewer kilometres mean healthier soil

When the 2016 harvest begins, the researchers will try out the intelligent fleet management in Danish fields. In connection with the 2015 harvest they used a GPS logger to record the driving behaviour of the farmers in the same fields, and this will make it possible for them to very precisely assess the efficiency improvement potential of the technology.

Under certain conditions, computer simulations of other field operations have shown driving savings of up to 15 per cent.

"We hope we can reduce driving on the fields by 10 per cent in connection with harvesting. This may not sound like very much, but at an aggregate level, it would provide considerable global savings of both fuel and time. We would also be reducing the problem of soil compaction and thereby the amount of subsequent care the fields require," says Senior Scientist Sørensen.

One of the really great side-benefits of using computerised fleet management is that the soil is exposed to less loading by the heavy machines, and the fertility is thereby increased.