LOAD SENSING HYDRAULIC SYSTEM ON EXCAVATORS

Project ID: EE./00546/85
Funded under: ENG-ENALT 2C

LOAD SENSING HYDRAULIC SYSTEM ON EXCAVATORS

From 1985-12-01 to 1986-12-31

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>EUR 171 496</th>
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<tbody>
<tr>
<td>EU contribution:</td>
<td>EUR 68 598</td>
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<tr>
<td>Coordinated in:</td>
<td>Italy</td>
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<th>Topic(s):</th>
<th>3.2 - INDUSTRY</th>
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<td>Funding scheme:</td>
<td>DEM - Demonstration contracts</td>
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Objective

Application on excavators of a load sensing hydraulic system for their working implements and transmission. This system is aimed at improving the energy efficiency of excavators in neutral, cut-off and partial charge conditions. It was expected to achieve a saving of 4000 liters gasoil/yr for an excavator of 73.5 kW nominal power compared with a current production excavator.

On the basis of the test results for:
- Trenching,
- Digging from bench and loading of trucks located on the same level of the excavator,
- Digging from bench and loading of trucks located on a lower level.

The performance figures of LS adapted excavator are higher than those of a current model either for the average productivity and the usage of the machine weight or the fuel efficiency. Based on the current model reference, one has:

<table>
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<th>Current model LS adapted excavator</th>
<th>Average productivity 100 116</th>
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<td>Production/weight 100 126,5</td>
<td>Production/fuel consumption 100 113,7</td>
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Taking into account a similar productivity, the energy saving resulting from these tests is 4200 liters gasoil/year excavator for 2000 hours/year.

The overcost of the innovative hydraulic system is expected to be negligible; in any case, the rate variation on the total cost of the excavator will not be significant.

Market prospects amount to 8000 units/year in the EEC.

The energy saving for the Formula 100 excavator using the L.S. system is 12.1% of the fuel consumption compared to the model FE18 excavator, which was taken as the standard.

An excavator has been equipped with a load sensor system (LS) which controls delivery of oil to the hydraulic system by the 2 pumps of the excavator.

With the LS system, both pumps can operate independently, so only the oil pressure requested by the operator is produced. The use of load sensors permits the optimization of the engine fuel oil consumption essentially for the following cases:

1) NEUTRAL CONDITION: engine is running but the machine neither works nor moves; both pumps are disconnected while in the conventional system they are still working.

2) CUT-OFF CONDITIONS: one or more implements cannot travel anymore or they meet an obstacle which they cannot remove; in this case, the cubic capacity of one pump is reduced at the lowest level, maintaining the hydraulic circuit under pressure. The cut-off function is also available for the conventional system but is not used because the 2 pumps are connected together.

3) PARTIAL CHARGE CONDITIONS: the pumps are controlled in order to provide only the requested oil flow while in the conventional system excess oil flow induces additional fuel consumption.

The excavator of 73.5 kW equipped with the LS system has been compared in real use with a conventional excavator in order to verify its effectiveness and the energy saving target.
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Last updated on 1999-10-21
Retrieved on 2019-06-11

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