Estimating Farm Machinery Repair Costs

by
William F. Lazarus, Extension Economist, University of Minnesota
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A custom operator recently asked whether the repair component of my extension machinery cost estimates, accurately reflects the occasional large repair bills that are incurred when something like an engine or transmission breaks[1]. The short answer is "yes", the estimates are ***intended*** to cover total repair and maintenance expenses including what you can expect to pay ***on average*** for major breakdowns. Of course, not every machine will blow an engine, so for any particular machine the actual repair cost might be greater or less than the estimates. There is a bit more to the story, however…

Accurate estimates of farm machinery ownership and operating costs are important for pricing custom work, calculating crop breakeven prices, and other management decisions. The economic engineering approach that extension economists use to estimate farm machinery operating costs is sometimes called the DIRTI-5 approach which stands for the main cost components of Depreciation, Interest, Repairs, Taxes, and Insurance.

Repairs are probably the most difficult of these costs to estimate. The purpose of this note is to discuss how most farm management economists go about estimating repairs and to suggest a new tool that producers can use to arrive at accurate repair cost estimates for their own situation. Repair costs in the DIRTI-5 approach are normally estimated using equations that are regularly reviewed and maintained by a machinery management committee of the American Society of Agricultural and Biological Engineers (ASABE). The equations are published in a technical library of standards for agricultural engineers to use (1).

The empirical data that these repair equations are based on is quite old, however (as far as I have been able to determine). In 1966, agricultural engineers Bowers and Hunt surveyed around 1,800 farmers in Illinois and Indiana and used that data to develop equations (2). The equations were revised by Rotz and Bowers in 1991 based on expert opinion, but they did not do another survey (3). Obviously, machinery has changed a lot since the 1966 survey. The equations estimate repair costs as a percentage of the machine purchase price, so the equations should remain valid as long as the machine purchase price goes up at the same rate as the cost of repairs. But, we do not know that for sure. Funding has just not been available to do much research in this area.

One reason repair costs have been somewhat neglected by engineers and economists may be a feeling that repair costs are a small percentage of total machinery costs compared to some other items like depreciation and more recently, fuel. So, inaccuracies in repair costs may not affect

[1] He was referring to my "Machinery Cost Estimates" extension publication, downloadable at: http://www.apec.umn.edu/faculty/wlazarus/documents/mf2008.pdf, and the associated spreadsheet MACHDATA.XLS.

total costs that much. But, repairs are still expensive for custom operators and larger farms, so we should look at it more closely.

Most producers and custom operators have some sense of the total amount they spend annually on repairs and maintenance, because it is a deductible expense on income tax schedule F. The difficult question, then, is how that total annual farm cost breaks down to a per-acre or per-hour cost for a particular machine used on a particular crop. If you are interested in estimating these costs for your machinery inventory, you can do that using an Excel spreadsheet downloadable from my website. The spreadsheet uses the ASABE equations to estimate the costs and then adjusts the costs so that they are consistent with your actual schedule F totals.

To analyze your repair costs, download the REPAIRCOST.XLS spreadsheet from http://www.apec.umn.edu/faculty/wlazarus/interests-farmmachinery.html. The spreadsheet requires you to enter three numbers for each of your tractors and self-propelled forage harvesters or combines – its age, how many hours you use it in a typical year, and an estimated list price for a similar new machine. For implements, you enter acres per year rather than hours, and how many acres you cover per hour. The final item of information needed is to choose from a list the closest ASABE equipment category for each machine. The spreadsheet calculates the repair cost per year and per hour or per acre for each machine and the total for the farm.

How close are the estimated repair costs to what your schedule F totals? I would be interested in any feedback you would like to provide. Please feel free to email me at wlazarus@umn.edu, or call 612-625-8150 and let me know what you find.

Reference List

1. American Society of Agricultural and Biological Engineers. *ASAE Standards, Engineering Practices and Data Adopted by the American Society of Agricultural Engineers*. 2950 Niles Road, St. Joseph, MI 49085: 2006.

2. Bowers, W. and D.R. Hunt. "Application of Mathematical Formulas to Repair Cost Data." *Transactions of the ASAE* (1970):806-809.

3. Rotz, C. Alan and Bowers, Wendell. Repair and Maintenance Cost Data for Agricultural Equipment, Paper 911531. 1991 International Winter Meeting Sponsored by the American Society of Agricultural Engineers.