

# A Repair Renaissance



A sensor light flashed on the dash and before Dave could react, the tractor shut down. It took him a minute to process what had just happened. He shook his head and grunted, he'd just been overridden by a bunch of little pieces of plastic and metal. Without warning, the on-board computer that ran his expensive new tractor stopped him cold.

Dave was out of his seat and under the hood in 60 seconds flat, but that's as far as he got. He knew what to do and how to fix the sensor, but he couldn't get past the software. So, he called his buddy Kyle, a master technician. Kyle came over and crawled all over the tractor, but he couldn't get past the software wall either. They stood on either side of the tractor at a loss.

This left Dave with no choice but to order a new sensor, schedule a company technician, wait five days for his appointment, throw away a part that could have been repaired and pay a hefty repair bill for a minor adjustment he could have made himself. That was going to be the price of getting back to work.

Like millions of other farmers, Dave and Kyle are hands-on, do-it-yourself guys. They grew up learning from their dads, granddads and brothers how farm equipment works. Until they tried to get through the brains of Dave's tractor, there was nothing they couldn't do, no piece of equipment they couldn't fix and fine-tune with their own hands until the afternoon they hit the wall of proprietary software.

When Dave bought "the beast" that spring, he envisioned having more,

not less, control over its settings. But he soon found its one-size-fits-all programming could not be modified. He thought he'd be able to adjust timing, collect data, troubleshoot error codes, but not with the this one. All he could do was change the fluids and filters.

What Dave and Kyle grew up doing, fixing equipment instead of throwing it away, has been the way of things for a long time. Today, communities dedicated to the world of repair are coming online in response to the external complications of modern farming. Minor repairs that could be made in the field have turned into costly delays and work stoppage issues. As farm equipment has become more complex, ownership and repair work has become restricted as manufacturers seek to protect their proprietary software through licensing agreements.



For the generations of operators who invested their brains and brawn in learning how to care for and modify equipment, this is a hard pill to swallow. All the Daves and Kyles out there know that self-repair costs a fraction of the time and money required for dealer repair, but the information they need to access the on-board computers of modern equipment is not available to them. The experience is souring a lot of farmers and ranchers on purchasing equipment with proprietary computerized systems. In a recent issue of Farm Journal, auctioneer Greg Peterson noted that the demand for newer tractors is dropping and the demand for older tractors is rising.

*“There’s an increasing number of farmers placing greater value on acquiring older simpler machines that don’t require a computer to fix.”*  
Machinery Pete

Dave describes the dilemma as one in which farmers are driving around on giant black boxes outfitted with harvesting blades. Kyle’s experience with his buddy’s tractor set him on a mission in which he discovered that farmers are pushing back in three ways:

- They’ve created a thriving grey-market for parts
- They’re dumping new equipment for old as fast as they can
- They’re going open source

Operators understand that manufacturers have the right to control access to their on-board computers, but they chafe at the extent of it. Licensing agreements make it illegal for buyers to work on their own equipment. The Digital Millennium Copyright Act of 1998 was written to prevent digital piracy and it classifies breaking a technological protection measure as a breach of copyright.

## The Meaning of Repair

For every 1,000 tons of electronics, landfills create one job, recycling creates 15 jobs and repair creates 200 jobs, or one job for every 10,000 pounds of equipment. The iFixit community sees repair as an opportunity to put back into use a quarter of the five million tons of out-of-use equipment piling up in America and create a quarter million jobs at the same time.

Repair work is one of the few industries that thrives no matter what the economy is doing as more and more people want to make the most out of the stuff they already own. Thousands of locally owned and operated repair shops have popped up in the last few years.

### iFixit

Dave’s buddy, Kyle Wiens wound up creating an online community, iFixit, for other tinkerers like himself who are committed to the ecology and economy of fixing their own (older) equipment. The success of his first online endeavor (600,000+ members and counting) lead to the founding of a company by the same name in 2003.

*iFixit is a wiki-based site that teaches people how to fix almost anything... Our site empowers individuals to share their technical knowledge with the rest of the world.*

All members adhere to the belief that being able to repair their own equipment connects them to it, saves them money and time and keeps equipment out of landfills. They believe that if you bought it, you own it and that ownership includes the right to adjust it to your particular needs rather than be limited to one setting. Today, iFixit provides 32,101 free manuals

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## Open Sourcing

A corollary of the self-repair movement is open-source manufacturing, which brings back a business model based on customers rather than stockholders. It’s built on the idea that farm technology can advance more rapidly than it does currently and that it can get cheaper every year.



It hasn’t happened in agriculture in a big way yet, but it’s happening in other industries. Computer hardware and cell phones are seeing dramatic price drops as the market expands. Farmers want the same for their market.

## Farm Hack

Dorn Cox grew up on the land and after a stint in high tech, he moved to a 250-acre farm in New Hampshire. There, he co-founded Farm Hack, an online community of farmers, designers, developers, and engineers dedicated to helping farmers be better inventors, develop tools that fit the scale and ethics of their operation.

The members of Farm Hack, while helping individuals one problem at a time are also building an open-source library of farm equipment knowledge. Their agricultural knowledge-base holds the solutions that have been found to work for their members but with wide applicability to all family and small-scale operators. Two of their creations are a farm bicycle designed for picking ground crops and a remote-controlled compost monitor. Farm Hack is built on a community can-do spirit.

*We are a worldwide community of farmers that build and modify our own tools. We share our hacks ... because we become better farmers when we work together.*

One equipment challenge at a time, they are adapting and taking ownership.

Some in the community are searching for the answer of who owns high tech equipment, the buyer or the manufacturer? In conjunction with United State Code and the Electronic Frontier Foundation, Farm Hack members asked for an exemption for farmers who want to modify and repair the equipment they’ve bought

and paid for. They'll get their answer from the Copyright Office.

## Open Source Ecology

In the same year that Kyle Wiens founded iFixit, Marcin Jakubowski, PhD, founded Open Source Ecology, a collaborative of operators who are open sourcing the 50 most important machines required for modern life.

In Nebraska, farmers Kevin Kenney and John Kluthe have been pushing for right-to-repair legislation in their state and farmers in seven other states are considering similar actions. In 2015, they got their wish, sort of. The Copyright Office carved out an exception for land vehicles such as tractors, to enable owners to fix their own equipment, but it didn't restrict manufacturer agreements. So, operators could work on their equipment if the manufacturers would let them.

As operators explored the right-to-repair movement, other operators got busy on another experiment: an open source tractor.

## The Oggún Tractor

In 2016, the CleBer company brought the Oggún Tractor to the market. Completely open sourced except for its drive train, the 12,500-dollar tractor is built of common, off-the-shelf parts, many of which are used in other pieces of farm equipment and machinery. It's simply designed and locally sourced to make modifications and repair easy and accessible. The driving philosophy behind the Oggún tractor is a renaissance in smaller scale farming.

Like CleBer, Open Source Ecology and Farm Hack are working in support of family farming. The central challenge to their venture is how to capitalize their designs without imposing ownership over the intellectual property. One solution is

coming through a couple of mission-oriented investment groups that want to revive small-scale farming in the US. The Oggún tractor is still new. The fact that it's gotten this far as a commercial enterprise is remarkable and its potential, if taken to the next level, would give many farmers access to a new world of possibility.

on the traditional market could be purchased for a tenth or a fifth of that sum through the open-source market.

Two of the driving forces behind the open source movement are reducing waste and using true cost economics. According to the Earth Intelligence Network engineering and

*"Knowledge wants to be free." Dorn Cox*

## Open Source Engineering

The farm equipment repair movement has joined others in moving small businesses toward an affordable, inter-operable, scalable solution available to more people. Because it's data- and design- driven for owners, it translates into purchase prices in the 10 to 20 percentile range of the current proprietary model. This means a farmer who wants a tractor that would cost 250,000 dollars

manufacturing efficiency averages 50 percent across industry (agriculture, energy, health, housing, water and so forth). Open source engineering solves problems in community, rather than isolation and raises efficiency as dramatically as it lowers purchase prices.

True-cost economics factors all aspects of making a product into its

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Open sourcing is a return to one-for-all and all-for-one civilization building. It fosters achieving more with less and extending the benefits of engineering to many more people.



## From Here

Instead of fighting the system, more and more operators and agencies that represent them are investigating open source and putting their support behind them. Several major agricultural associations have joined the right to repair movement and more are expected to come on-board:

- the American Farm Bureau Federation
- the National Farmers Union
- the National Corn Growers
- the Iowa State Farm Bureau

- the Massachusetts State Farm Bureau
- the Michigan State Farm Bureau
- the Nebraska State Farm Bureau
- the Texas State Farm Bureau
- the National Grange

In addition, right to repair legislation has been introduced in Nebraska, Minnesota, New York, Massachusetts and Kansas and a bill specifically for tractor repair has been introduced in Wyoming.

Manufacturers are protecting their investment and business model by sending letters of opposition with each new piece of legislation. Their objections hold that allowing anyone

other than certified technicians to repair their equipment could result in safety issues, disruption of equipment performance, emissions problems, the voiding of warranties, questionable resale disclosures, uncertain liabilities and sub-optimal customer experiences.

Joining the manufacturers is the Association of Equipment Manufacturers who wants farmers prohibited from working on their tractors despite the USCO exemption that took effect in 2016.

## Six Keys to Prevent Breakdown

Whatever the outcome of the repair renaissance and the open-sourcing movement, the following comes from repair pros and will stand you in good stead in protecting your equipment investments, large and small.

*“Our goal is to provide an affordable foundation that allows the people closest to the problem to innovate unique solutions that work for them... It’s not just a tractor, it’s a way of thinking.”*

### Use Quality Fuel

“When oil prices went high, we started seeing lots of equipment come in that had used cheap, poor quality fuel with a high moisture content,” said Conrad Amstutz at Sterling Farm Equipment. Cheap fuel can cause algae buildup and black slime in the tank, which means plugged tanks and freezing issues in winter weather.

### Invest in Quality Parts

The market is flooded with cheap, after-market parts and often those cheap parts will wind up costing you more in the long run.

### Keep Radiator Clean

Ron Susalla, with Shearer Equipment says one of their most common calls is overheated radiators. Nine times out of ten, blowing it out with an air hose solves the problem of a dirty radiator.

### Capacity Rating

Trying to do more than the equipment is rated for is another common reason for breakage and break down. Lots of good equipment is permanently damaged by operators pushing the envelope.

### Shelter

Any experienced repairman will tell you that weather extremes are

harder on equipment than most usage. Precipitation gets down in-between moving parts creating rust or mold. Very cold and very hot temperatures accelerate wear and tear. Keeping equipment covered or in a shelter when not in use will extend its working life and reduce maintenance needs.

### Regular Maintenance

Keeping up with the regular maintenance (fluid checks and changes, lubrication) is crucial to smooth operation. “There is a reason they put those recommendations in the owner’s manual,” said Amstutz. It’s not rocket science, but it’ll keep you running.



- J.E. Holloway

### Sources

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Extreme Tech  
Farm and Dairy  
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