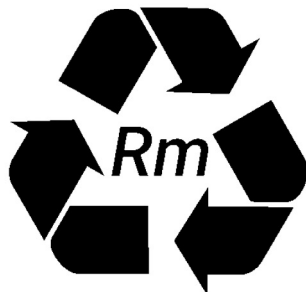




Implementing Remanufacturing Operations

Case Studies and Key Principles

What Is Remanufacturing?



Remanufacturing is a comprehensive and rigorous industrial process by which a previously sold, leased, used, worn, remanufactured, or non-functional product or part is returned to a like-new, same-as-when-new, or better-than-when-new condition from both a quality and performance perspective, through a controlled, reproducible, and sustainable process.

Source: ANSI/RIC001.2-2021: Specifications for the Process of Remanufacturing



Like-New Quality

Products restored to original or better-than-new specifications



Controlled Process

Reproducible, standardized industrial procedures



Sustainable Practice

Conserves materials, energy, and reduces waste

Executive Summary

Launching a remanufacturing program can be a complex undertaking. From establishing reverse logistics and core recovery systems to ensuring quality standards and customer trust, the barriers to entry can seem daunting—especially for organizations new to the practice.

Collaboration with experienced partners can significantly reduce these challenges and accelerate success. By working with established remanufacturers, forming joint ventures, or leveraging supplier relationships, companies can tap into existing expertise, infrastructure, and proven processes.

Benefits of Collaborative Approaches

- ✓ Lower initial investment and operational risk
- ✓ Faster scaling and improved quality assurance
- ✓ Access to broader markets and existing infrastructure
- ✓ Economic and environmental benefits of remanufacturing

Case Studies Featured

John Deere	Joint Venture with SRC
International Motors (Navistar)	Supplier Network Model
Caterpillar	Internal Division with Global Network

John Deere Reman

Joint Venture with SRC for OEM Remanufacturing

Background

In 1998, Deere & Company teamed up with Springfield ReManufacturing Corp. (SRC)—an experienced remanufacturer—to create a 50/50 joint venture called ReGen Technologies LLC.¹ This JV was established in Springfield, Missouri, a hub of remanufacturing expertise, with the mission to remanufacture John Deere engines and other components for agricultural and construction equipment.

By partnering with SRC, John Deere was able to fast-track the development of a remanufacturing business without starting from scratch, leveraging SRC's established processes, workforce, and know-how in rebuilding complex machinery parts.

Partnership Model

John Deere Provided	SRC Managed
• Product designs & quality requirements • Guaranteed market via equipment dealers • Customer base and brand reputation • Oversight of product performance	• Disassembly, cleaning, machining • Remanufacturing to like-new condition • Operational processes & workforce • Established reman expertise

The venture aligned both companies' incentives around Deere's product performance and customer satisfaction. From the outset, remanufactured John Deere parts coming out of ReGen were held to the same high standards as new parts, ensuring farmers and contractors could trust the quality.

Customers benefited from significantly lower costs and quicker availability of replacement parts, while John Deere gained a profitable new service offering and sustainability improvements.

John Deere Reman — Results

Results

The John Deere—SRC partnership proved very successful. By 2008—a decade after inception—John Deere elected to acquire full ownership of the JV, renaming it John Deere Reman.² This transition to a wholly owned division indicated that the reman operation had become strategically important to Deere, warranting tighter integration.

\$13.5M

Facility expansion
announced in 2025³

400K

Square feet of
remanufacturing space³

30%

Cost savings vs.
new parts⁴

Today, John Deere Reman remains headquartered in Springfield and has continued to expand. The central “Core Center” plant consolidation will bring satellite sites under one roof, further improving efficiency and delivering value through cost savings, local job creation, and a reliable supply of remanufactured engines, drivetrains, and electronic components worldwide.

Key Principles Demonstrated

Joint Venture Advantage

A JV can jump-start an OEM’s remanufacturing capability by sharing investment and expertise, achieving high quality and economic viability from day one.

Quality & IP Safeguards

Clear quality control processes and intellectual property safeguards are essential, as both firms’ reputations are intertwined.

Structural Flexibility

Over time, partners may negotiate structural changes—in this case, Deere’s buyout of SRC’s stake—to fully integrate the operation.

International Motors (Navistar)

Building a Circular Future — Navistar's Remanufacturing Supplier Network

Overview

Navistar scaled its remanufacturing operations by developing a robust network of specialized suppliers to support its ReNEWed® remanufactured parts program. This approach enabled the company to deliver high-quality, cost-effective alternatives to new components while advancing its circular economy goals.

How It Works

- 1 Core Collection**
Used components collected through 4 regional return centers
- 2 Distribution**
Cores distributed to ~50 remanufacturing suppliers⁵
- 3 Restoration**
Partners restore critical systems to OEM specifications
- 4 ReNEWed® Brand**
Parts sold under the ReNEWed® brand with full warranties

Core Advantage Program

Launched in 2016, this program streamlines core tracking and incentivizes returns through Navistar's proprietary Core Management System (CMS), ensuring efficient recovery and redistribution of used components across the network.⁶

Navistar — Results & Key Principles

Results

3,000+

Unique part types
remanufactured

20%

Target for parts revenue
from reman products⁵

2X

Double-digit growth
in parts revenue

The ReNEWed® and Fleetrite® parts businesses have contributed to double-digit growth in Navistar's parts revenue over a five-year period, underscoring the commercial viability of its remanufacturing strategy.

Key Principles Demonstrated



Strategic Collaboration

Leveraged supplier expertise to scale remanufacturing quickly and cost-effectively.



Circular Economy in Action

The program reduces waste, conserves raw materials, and supports sustainability goals.



Quality Through Specialization

Suppliers rebuild parts to OEM specifications, often incorporating design improvements.



Infrastructure-Driven Success

Core return logistics and IT systems (e.g., CMS) are critical to remanufacturing viability.



Flexibility and Resilience

The reman program helped Navistar navigate supply chain disruptions by expanding eligible reman parts.

Caterpillar

Internal Remanufacturing with a Global Value Network

Overview

Caterpillar Inc., the world's largest maker of heavy equipment, illustrates a third approach: building an internal remanufacturing division and connecting it with a broad external network of dealers. Caterpillar has been a pioneer in remanufacturing since the 1970s, choosing to invest in remanufacturing as a core business strategy.

The Exchange Program

Caterpillar runs an exchange program: when a customer's Cat engine or component wears out, they can go to any of the authorized Cat dealers worldwide and swap the used unit for a remanufactured one off the shelf. The dealer then sends the used "core" back to Caterpillar's remanufacturing facilities.

Caterpillar centrally remanufactures these cores, restoring them to original OEM quality and performance specifications through advanced industrial processes, and returns the newly remanufactured products to inventory. This closed-loop network relies on each node adding value – customers participate by returning cores, dealers manage the logistics and customer service, and Caterpillar's facilities perform the remanufacturing and testing.

Closed-Loop Value Network



Customers

Return used cores through authorized dealers



Dealers

Manage logistics and customer service



Cat Reman

Remanufacturing and testing to original Caterpillar specifications

Caterpillar — Outcomes

Outcomes

Caterpillar's integrated approach has achieved impressive economic and environmental results. Cat Reman parts are priced at 45-85% of their new equivalents, which makes equipment ownership more affordable for customers.

650M lbs

End-of-life material received by
Cat Reman in the past five years⁷

65-87%

Less process energy when compared
to manufacturing new parts^{7*}

Key Principles Demonstrated

Design for Circularity

Cat Reman engineers collaborate closely with new product development teams and leverage machine data and condition-monitoring insights to plan remanufacturing from the design stage.

Financial Incentives

Core deposit fees and credits create a self-sustaining return flow, ensuring end-of-life components cycle back efficiently into the remanufacturing pipeline.

Global Logistics Infrastructure

Significant investment in collection and redistribution infrastructure enables core recovery at global scale through Caterpillar's dealer network.

OEM Control with Independent Dealer Network

Full quality and IP control retained in-house while leveraging authorized dealers for distribution.

*Represents U.S. environmental impacts of gate-to-gate remanufacturing and remanufacturing processes for Cat engines and components, as defined in the 2018 United Nations Environment Programme report "Redefining Value – The Manufacturing Revolution." Does not include impacts elsewhere in the value chain.

Comparative Summary

Company	Value Network Structure	Operational Model	Benefits	Challenges
John Deere & SRC "ReGen" JV	Joint venture (50/50, later OEM-owned)	Dedicated remanufacturing JV producing exclusively for John Deere; combined OEM oversight and reman expertise	• Jump-started reman using SRC's proven capabilities • Cost savings for customers: 20–40% cheaper than new • New revenue & local jobs • Major facility expansion in 2025	• Tight alignment of quality standards and business cultures needed • Shared control and profits until buyout • Eventually needed integration (2008 acquisition) to fully unify operations
International Motors (formerly Navistar)	Outsourcing (supplier contracts)	Outsourced remanufacturing via ~50 supplier partners; Navistar oversees core returns, quality, and distribution through centralized systems and ReNEWed® brand	• Scalable model leveraging ~50 specialized suppliers • Lower capital investment compared to in-house remanufacturing • Flexibility to expand product line quickly • Efficient core recovery via centralized return centers • Streamlined tracking via Core Management System (CMS)	• Strong coordination needed across distributed supplier network • Dependence on external partners for quality and turnaround • Managing consistent quality across suppliers • Ensuring timely and complete core returns from dealers and fleets • Complexity in integrating design updates across multiple partners
Caterpillar (Cat Reman)	Internal network (OEM-owned with external collaborators)	Dedicated in-house remanufacturing (global Cat Reman facilities); independent dealers collect cores and run exchange program	• Full quality/IP control • Global scale ensures availability of Cat Reman parts in many countries • Environmental and economic benefits • Enhances brand loyalty and meets sustainability targets by operating a closed-loop system	• High upfront investment in facilities, technology, and core logistics network • Complex global coordination with many different dealers and return flows • Customer misconceptions about remanufactured products in some regions require ongoing education

Three approaches to remanufacturing value networks, with their structures, benefits, and challenges.

Key Takeaways for Best Practices



Leveraging Partnerships

Collaboration is crucial. OEMs can partner with specialized remanufacturers via JVs or contracts to jump-start capabilities, or work through dealer and supplier networks to facilitate core returns and distribution. Choosing the right partners and defining clear roles enables each party to contribute what they do best.



Quality and Standards Alignment

Maintaining “like new” quality is non-negotiable for remanufactured products. All network models invested in processes to ensure reman products meet original specs and warranty standards. Developing standardized quality criteria and certification can build trust across the value network.



Information Sharing and Integration

Effective reman networks require tight coordination—sharing technical data with reman partners, integrating IT systems for tracking cores and inventory, and frequent communication. Transparent communication frameworks and digital platforms can enable real-time collaboration.



Incentive Alignment

A value network functions best when all participants benefit. Incentive mechanisms like core exchange credits for customers/dealers and profit-sharing or growth targets in JV/partnership agreements help align goals. When designing a reman network, consider financial models that reward each stakeholder for maximizing recovery and re-use.

Key Takeaways (continued)



Risk and IP Management

Outsourcing and partnerships introduce the need for robust risk management. Contracts should define quality requirements, volumes, confidentiality of designs, and contingency plans if volumes fluctuate or if either party exits. Establish clear agreements and possibly exclusive arrangements for critical components to mitigate these risks.



Scaling and Adaptability

Start with a manageable scope and scale up. Many successful programs began with a specific component line or region and expanded. A modular network design allows adding new partners or facilities as demand grows. Be prepared to adjust the structure—a JV might evolve into a fully owned unit, or a supplier relationship might be supplemented by in-house efforts over time. Flexibility is key to sustain the network as markets and technologies change.



Supporting Ecosystem

Broader ecosystem support—workforce training, industry standards, and government policy—can greatly enhance a remanufacturing network's success. Regional remanufacturing clusters with educational programs and community support have helped remanufacturers and their OEM partners thrive. Collaboration with industry councils and regulators helps harmonize standards and acceptance for remanufactured products.



Conclusion

Developing a remanufacturing value network is a multifaceted endeavor that involves strategic cooperation across companies and sectors. Whether through joint ventures, outsourced arrangements, long-term supplier partnerships, or internally managed networks with external collaborators, the goal is to capture product value through multiple lifecycles.

The cases of John Deere, Navistar, and Caterpillar each demonstrate viable paths to that goal, all aligning with the principles of circularity and resource efficiency.

A well-organized value network—with clearly defined relationships, shared standards, and aligned incentives—is fundamental to making remanufacturing a scalable and sustainable business practice across industries.¹²

By learning from such examples, organizations can better design their own remanufacturing networks and contribute to a more circular economy.

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