



EFCE



European Forum
for Circular Economy

June **23** & **24** 2021 - Lyon, France

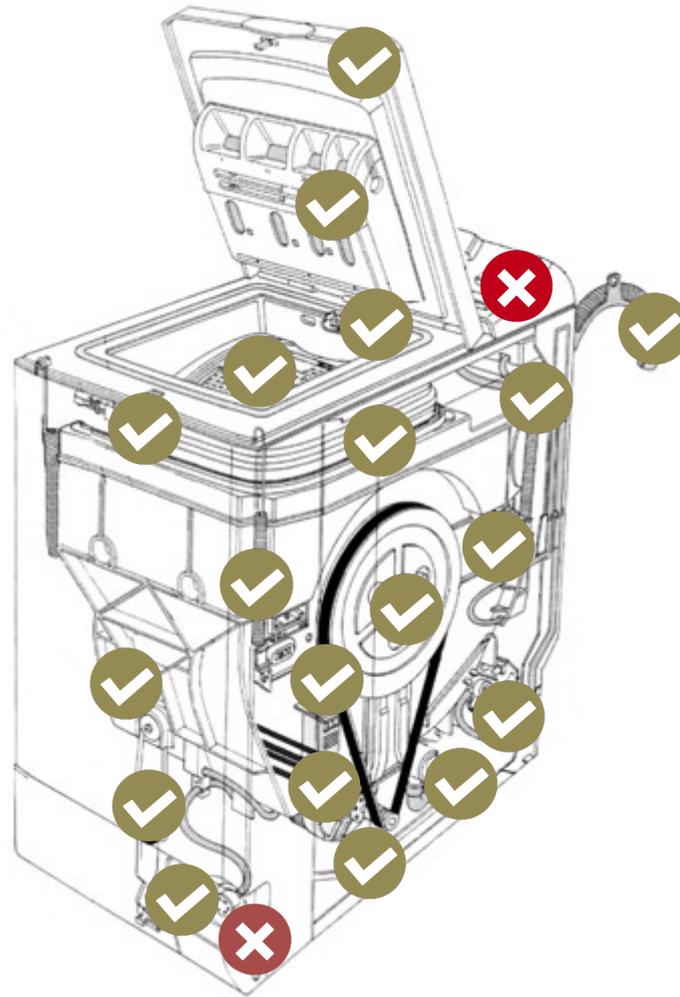
Remanufacturing and related activities to extend product life span

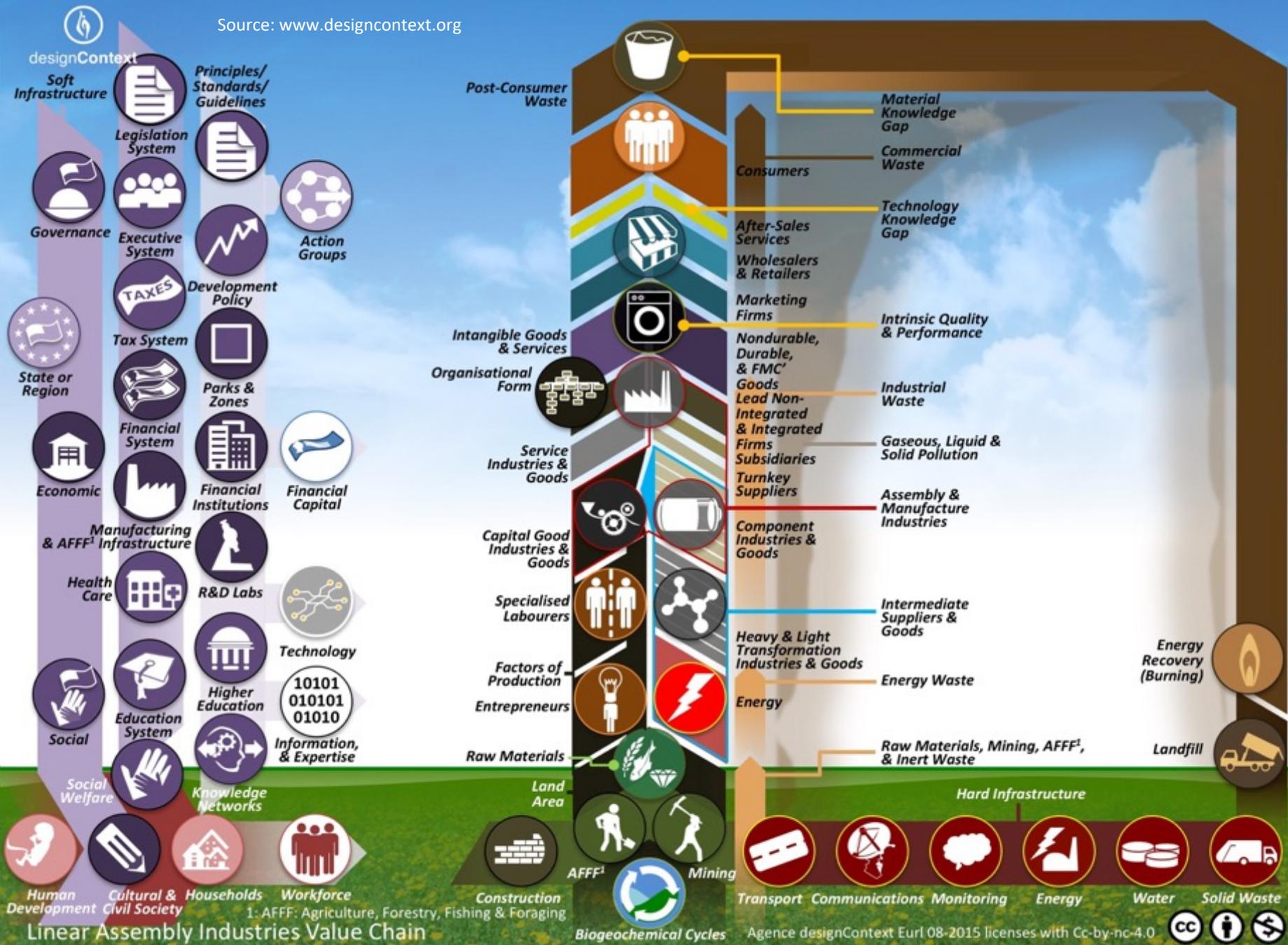
Régis DANDO - RevalueSystems



revalueSystems
INNOVATION & ENVIRONNEMENT







Linear Assembly Industries Value Chain

1: AFF¹: Agriculture, Forestry, Fishing & Foraging

Agence designContext Eurl 08-2015 licenses with Cc-by-nc-4.0

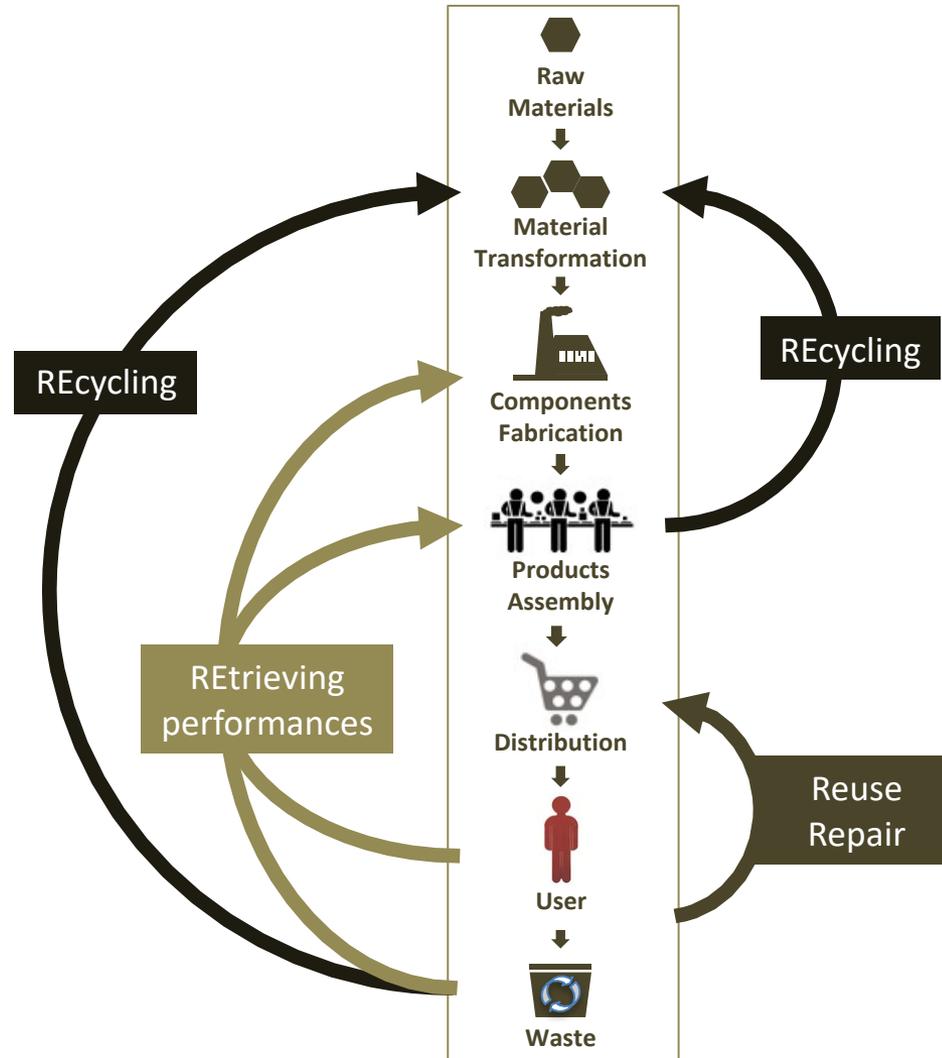


The Value Chain: Embedded value in a product



Picture credit: free – Pictograms: under the courtesy of: www.designcontext.org

Technical loops of the Circular Economy to extend the product life span



The technical loops of the Circular Economy which make it possible to extend the lifespan of...

materials



Recycling

Extracting the individual materials from a product and reprocessing them, to be used as raw materials for the same (type of) product, or any other product, or used as a source of energy.

products



Reuse

Simply reusing the product without any modification, basic cleaning for example.



Repair

Fixing a mechanical or electronic failure for example, but without guaranteeing the performances and proper functioning on the entire product.



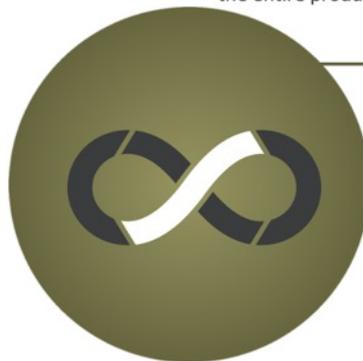
Renovate

Fixing a failure, cleaning the product to look like new, and replacing some semi-worn-out parts for example.



Recondition

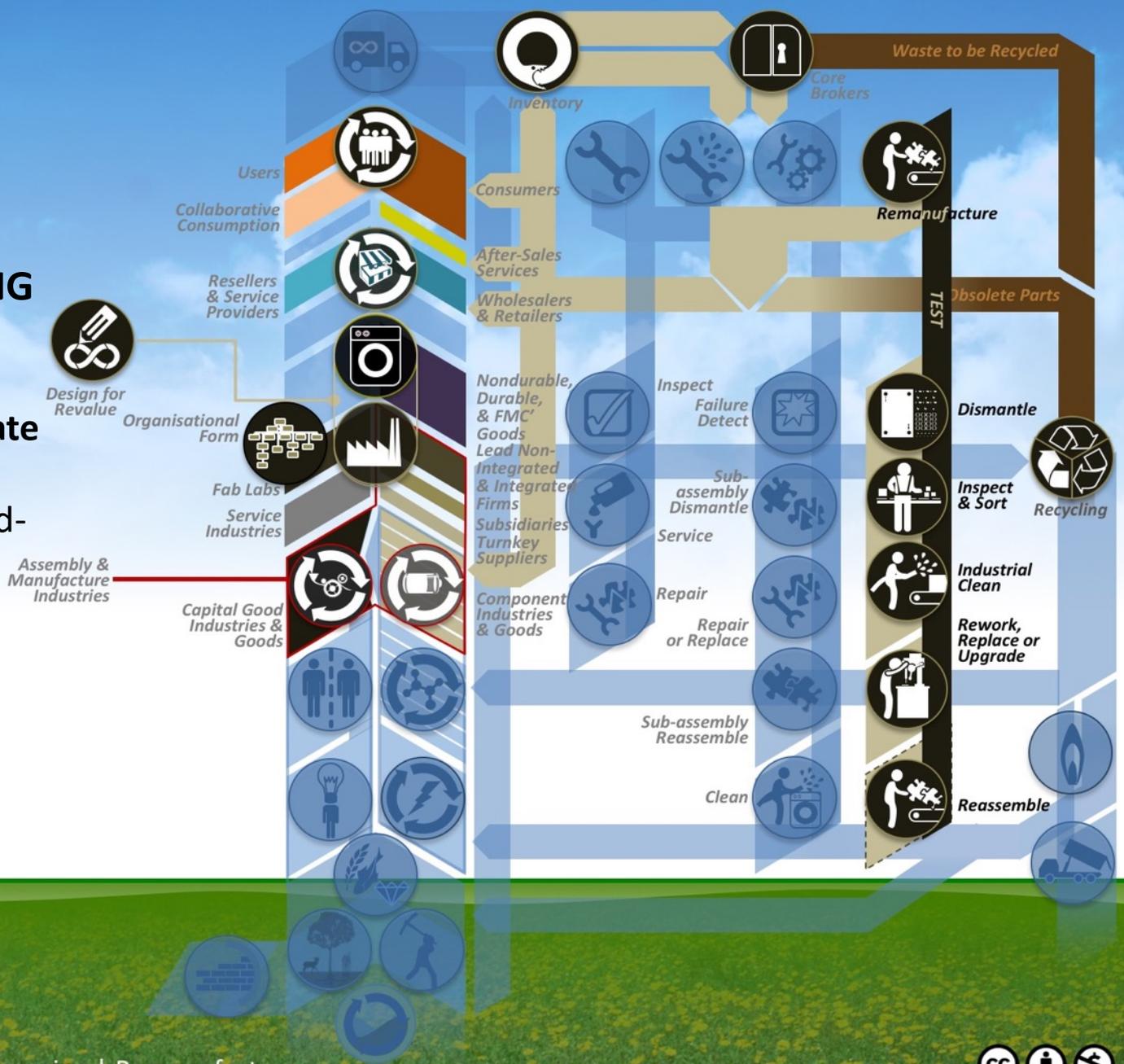
Fixing failures, preventing future failures, cleaning the product to look like new product, changing aesthetical parts, and functional upgrades, although without guaranteeing the initial performances.



Remanufacturing

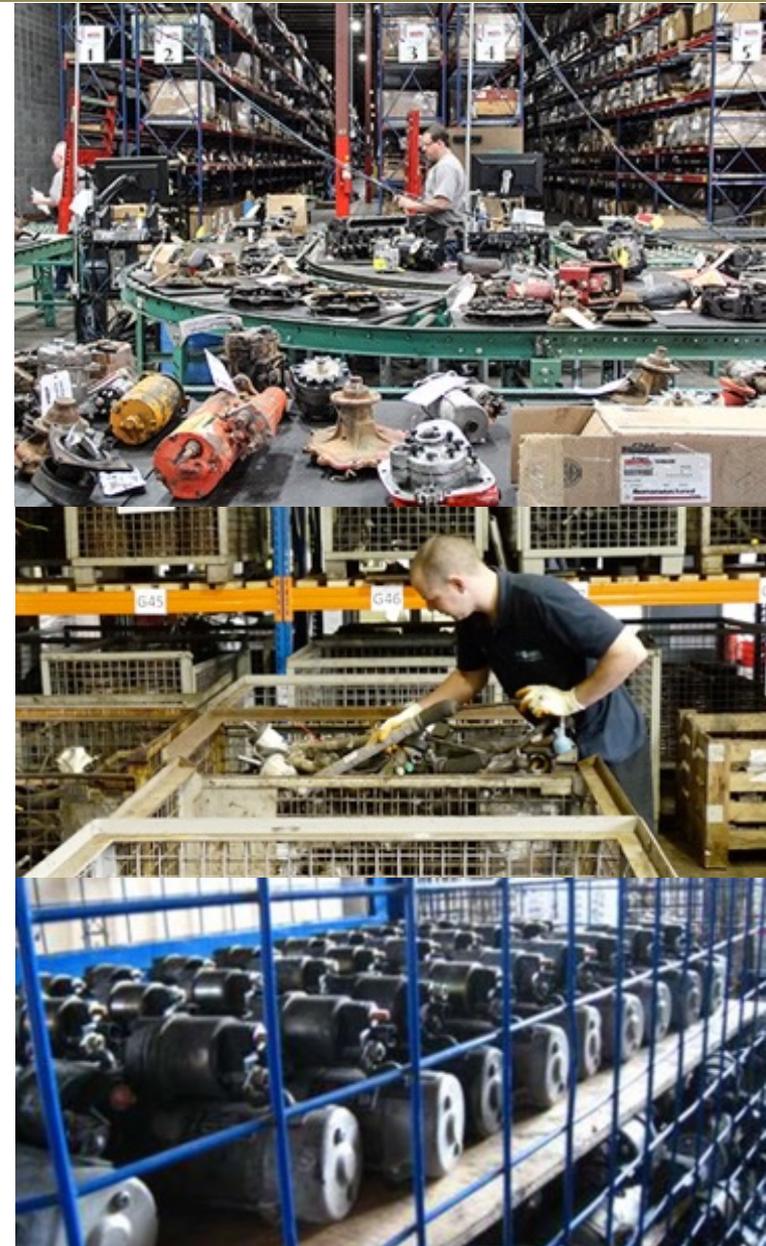
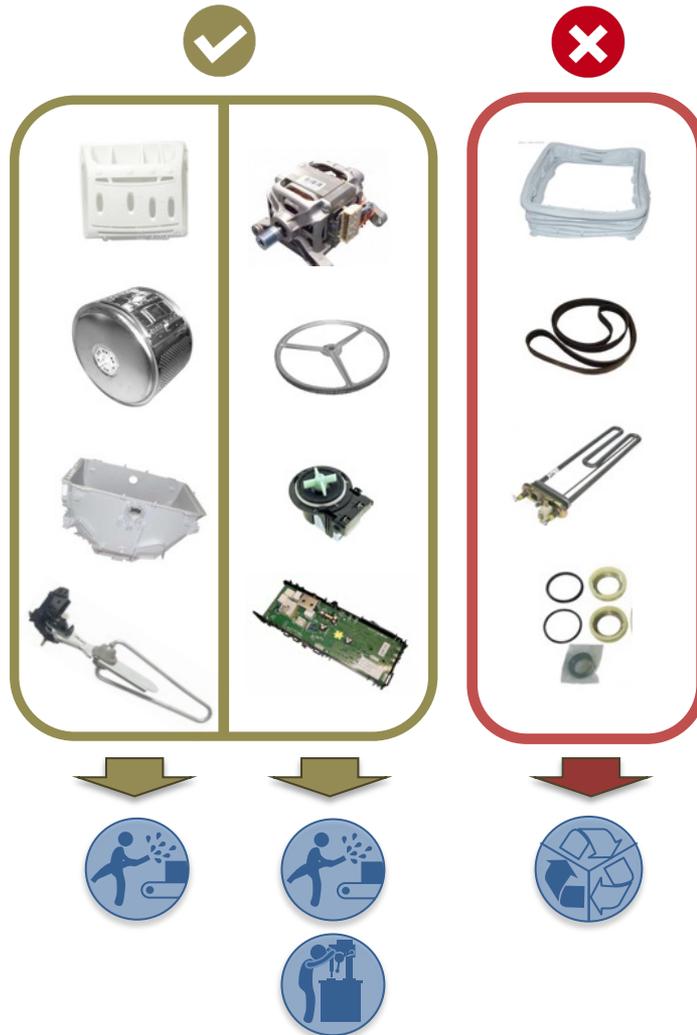
An industrial process that **regenerates the intrinsic value of components** (formed & machined materials, energy and knowledge) **from end-of-life products**; these components are then used **to make products with equal or higher performances** as they were originally.

REMANUFACTURING
 “A structured and rigorous industrial process that regenerate the intrinsic value of components from end-of-use products with equal or higher performances to its original state.”





Inspecting & Sorting



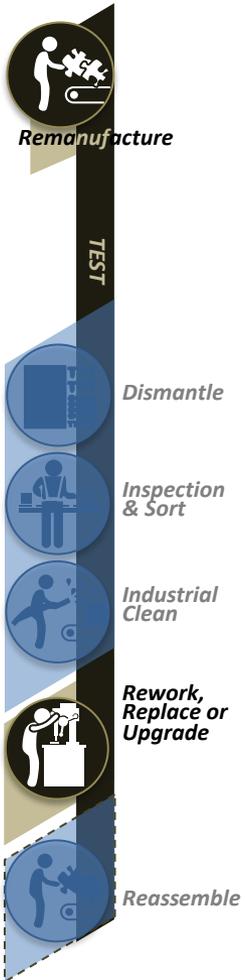


Industrial cleaning technologies

- Blowing / brushing
 - Spray
 - High pressure
 - Vapour degreasing
 - Immersion (solvents, detergents...)
 - Electro-cleaning
 - Tumbling / vibratory
 - Ultrasonic
 - Shot glass bead
 - Sanding / grinding
 - Lasers
 - Ultraviolet
 - ...
- (Often combined)

Performance = Time + Mechanical action
+ Chemical action + Temperature





Recovering original performances

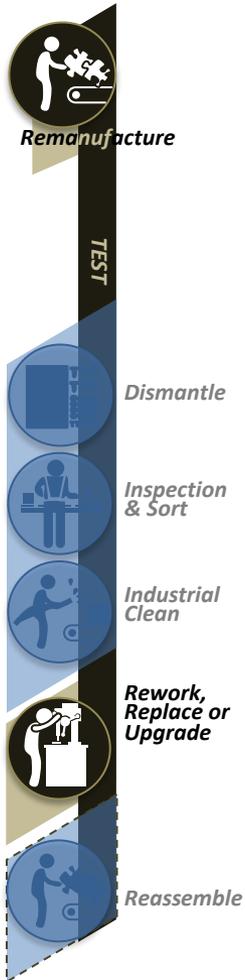
- Replacement of components
- Reinforcement of parts (identified as weak)
- Adapting to the state of the art (technological upgrade)

Rework technologies

- Machining and adapting
- Surface treatment
- Photo-polymerisation
- Additive technologies (plasma, powder fusion..)
- 3D printing
- New software (suitable to new regulations...)

Performance = same or higher
to the original product





Recovering original performances

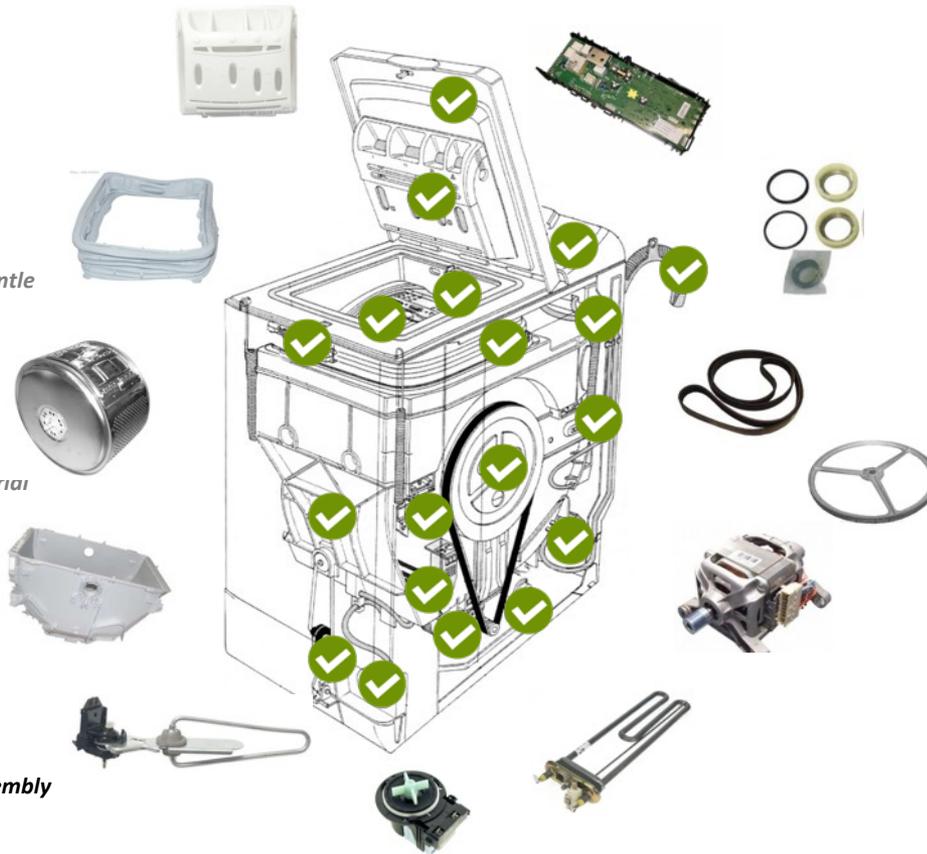
- Replacement of components

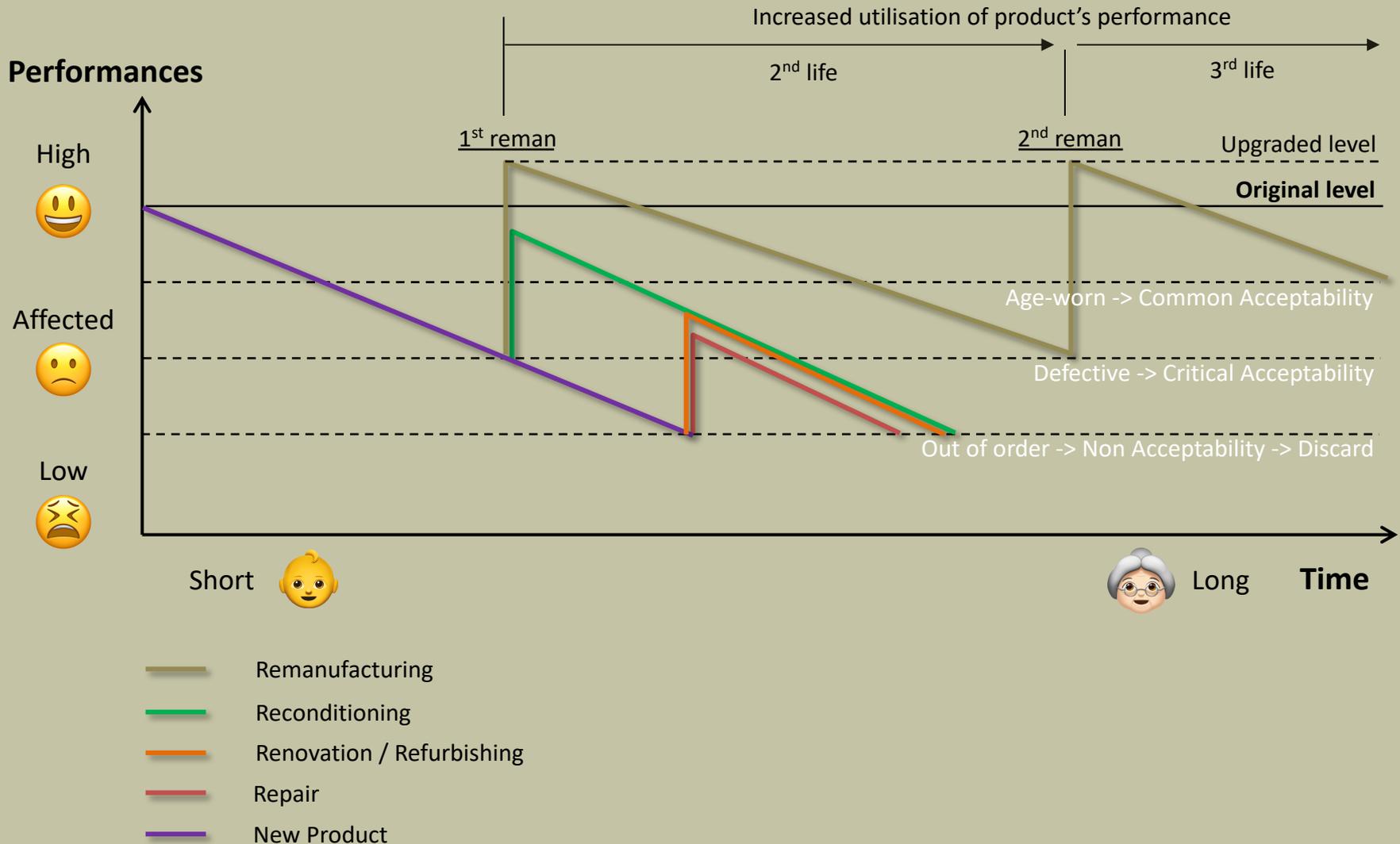
Performance = same or higher
to the original product

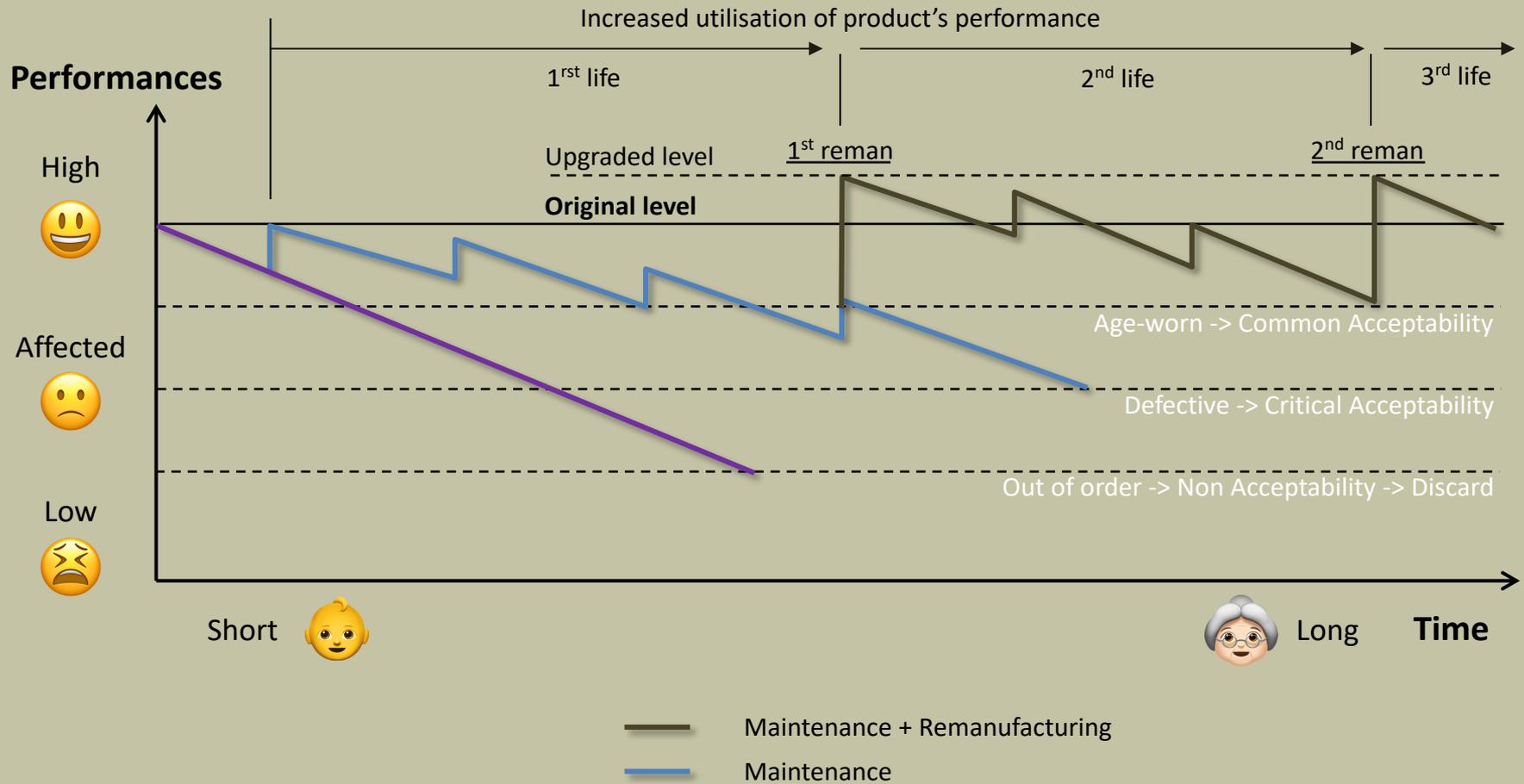




Reassembly









Economic

Remanufacturing gives opportunities for competitive advantages

- Value capture and new sources of profits
- Redesign the stakeholders' ecosystem (i.e. suppliers or retailers)
- Raise barriers against new entrant and protect local markets
- Develop products and services with higher value
- Explore untapped markets and attract new consumers...



Social

Remanufacturing enhance social values

- Redistribute categories of jobs and skills in the company
- Develop partnerships with social organisations
- Create skilled jobs...



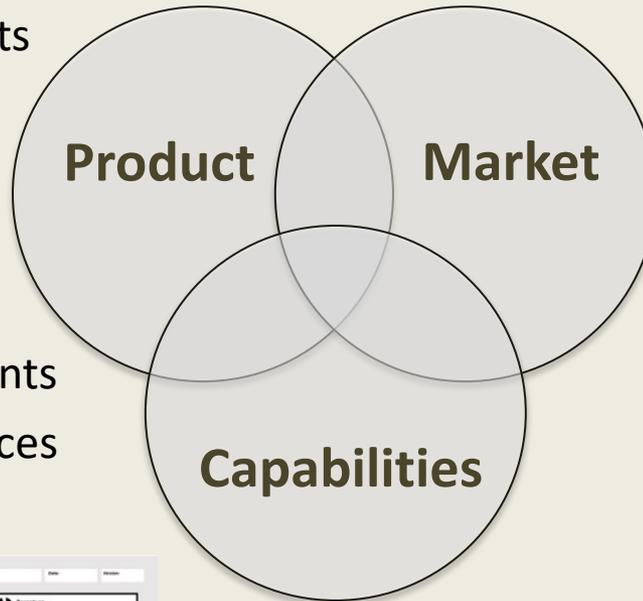
Environmental

Remanufacturing participate to draw our future

- Reduce drastically waste from the transformation process
- Reduce the extraction of virgin raw materials, energy and capital inputs
- Reduce greenhouse gases and other pollution...

Product value

- Number of components
- Complexity
- Product life cycle
- Techno life cycle
- Design for Re-x
- Recoverable components
- Transferability to services



Market (recoverable value)

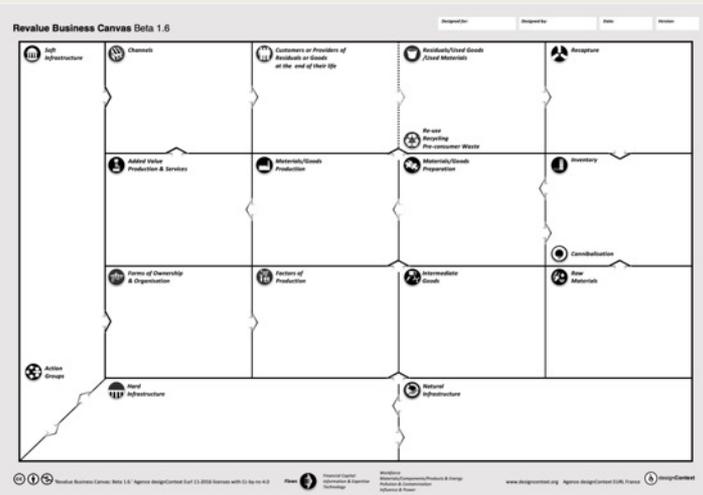
- Quantities, volumes
- Quality and variability
- Variation & recovery rate
- Competition

Market (opportunities)

- New markets
- Innovation
- New business models

Internal & external capabilities

- Current Business Model & service opportunities
- Resources & workforce skills
- Stakeholders and Partnerships
- Subcontracting, turnkey partners...
- Vertical / horizontal integration





- **Aeronautics & Marine** (jets, landing gear, avionics, engines...)
- **Automotive** (alternators, starters, gearboxes, injectors, tyres, motors...)
- **Electrical & Electronics Equipment's** (vending machines, air conditioning units, computers, phones, servers, printers & cartridges, cash machines...)
- **Office furniture** (tables, chairs, cabinets...)
- **Infrastructure Equipment's – Heavy Duty & Off Road** (heavy rail, military and agricultural machineries, power generators, wind turbines...)
- **Industrial Equipment's** (robots, pumps, tooling machines, compressors, power transformers, industrial ovens, coolers & heaters, cylinders...)
- **Medical Equipment** (devices and medical imagery...)



DINGUE DE LUNETTES

(eyeglasses)

D I N G U E
— de —
LUNETTES

RICOH

(Copiers)

RICOH
imagine. change.

FARAL

(Automotive parts)

FARAL
AUTOMOTIVE

- **2007** Dan is graduated from École Fresnel & Faculté d’Orsay
- **2007-2010** He fixes eyeglass frames for his relatives
- **2011** Dan launches a workshop to remanufacture eyeglass frames in Montreuil, then a store in Canal St Martin - Paris
- **2019** He launches a 2nd store in Bordeaux



“Why mass producing eyeglasses frame abroad, while **it is possible to restore-as-new exceptional frames locally?**”

“**Remanufacture** is remarkably relevant for this type of product, because vintage eyeglass frames are **better designed & manufactured, more robust, and more durable than the one made today!**”

“Thanks to our knowledge and expertise, we offer a second-life to eyeglasses.”



<http://www.dinguedelunettes.fr/fr/accueil-2/#atelier>

All steps takes around 45 min for each eyeglass frame



1- Collection, Selection & Disassembly

Eyeglass frames come from all over Europe, and are selected through their qualitative structure and materials composition; their design; and their original brand.

Eyeglass frames are totally dismantled



2- Cleaning

Each part is then cleaned, and carefully rub down.

Eyeglass frames are mainly in metal or acetate, and some are in wood, horn and tortoise shell.



3- Retrieving original condition & controls

Components are polished to remove micro-scratches, to retrieve materials brightness, and to revive colours. Nose pads, sleeves, screws and hinges are replaced if needed.



4- Reassembly

Components are reassembled. Eyeglass frame is hence **same as new** and ready to host new glasses.

Ensure a high-quality work: a meticulous inspection at each stage of the process is performed to guarantee an exceptional qualitative eyeglass frame.

Ricoh GreenLine™ Program

The reuse of machines through the Ricoh GreenLine™ program established in 2012 is a tangible example of how the Ricoh Group reduce its total environmental impact. The Ricoh GreenLine™ assets are **going through a comprehensive Ricoh factory production process, independently audited and compliant with the BS8887:220 standard requirements for the process of remanufacture**. Every machine undergoes the same quality assurance process as a newly manufactured device.



GreenLine™
sustainable
printing systems

Committed to helping you further
reduce your environmental impact
with our GreenLine™ devices

The reuse of pre-owned machines through our GreenLine™ product range is a tangible example of how the Ricoh Group contributes to the development of a sustainable society based on the Comet Circle™ concept established in 1994.

All GreenLine™ devices are going through a comprehensive Ricoh Factory production process, independently audited and compliant with the BS 8887:220 standard requirements for the process of remanufacture.



23.689

GreenLine™ units have been produced by Ricoh Industrie France since 2012

For more information: https://www.youtube.com/watch?v=BG_1KtzqEGc

Ricoh GreenLine™ Program

<https://solarimpulse.com/efficient-solutions/greenline-printing-solution>

Solar Impulse Label awards efficient, clean and profitable solutions with a positive impact on environment and quality of life



Key features

- Same functionalities and performance than the original new product
- All firmwares update to their latest available version
- Over 80 % of existing parts and components by weight of the original product are reused
- Over 94 % of existing parts and components by weight of the original product are reused or recycled

Profitability

- From 29 to 52% cheaper than equivalent new equipment
- Same level of service and same warranty with a remanufactured GreenLine MFP device that provides with new equipment

Ricoh GreenLine™ Program

www.youtube.com/watch?v=Nn6Z-vLjR0A

GREENLINE

*Remise à neuf
d'appareils d'impression
multifonctions*

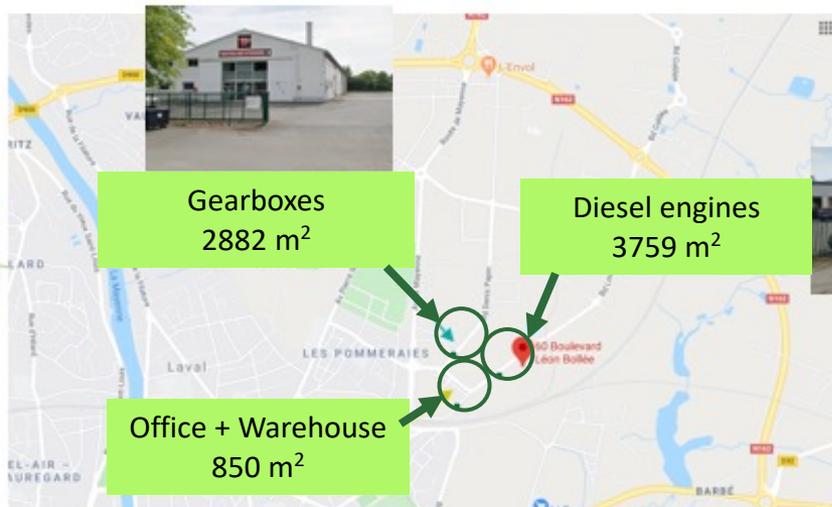


FARAL

AUTOMOTIVE



Location



History



Creation of an automotive workshop

1932



1958

FARAL starts to remanufacture **gasoline** engines



1965

Expansion of the activities to aircraft engines (maintenance)

1989

Launching the remanufacture of cylinder heads



2002

Launching the remanufacture of **diesel** engines



2005

Patenting cylinder head renovation process

Launching the remanufacture of gearboxes



2006

Transfer of the Turbos activities



2015

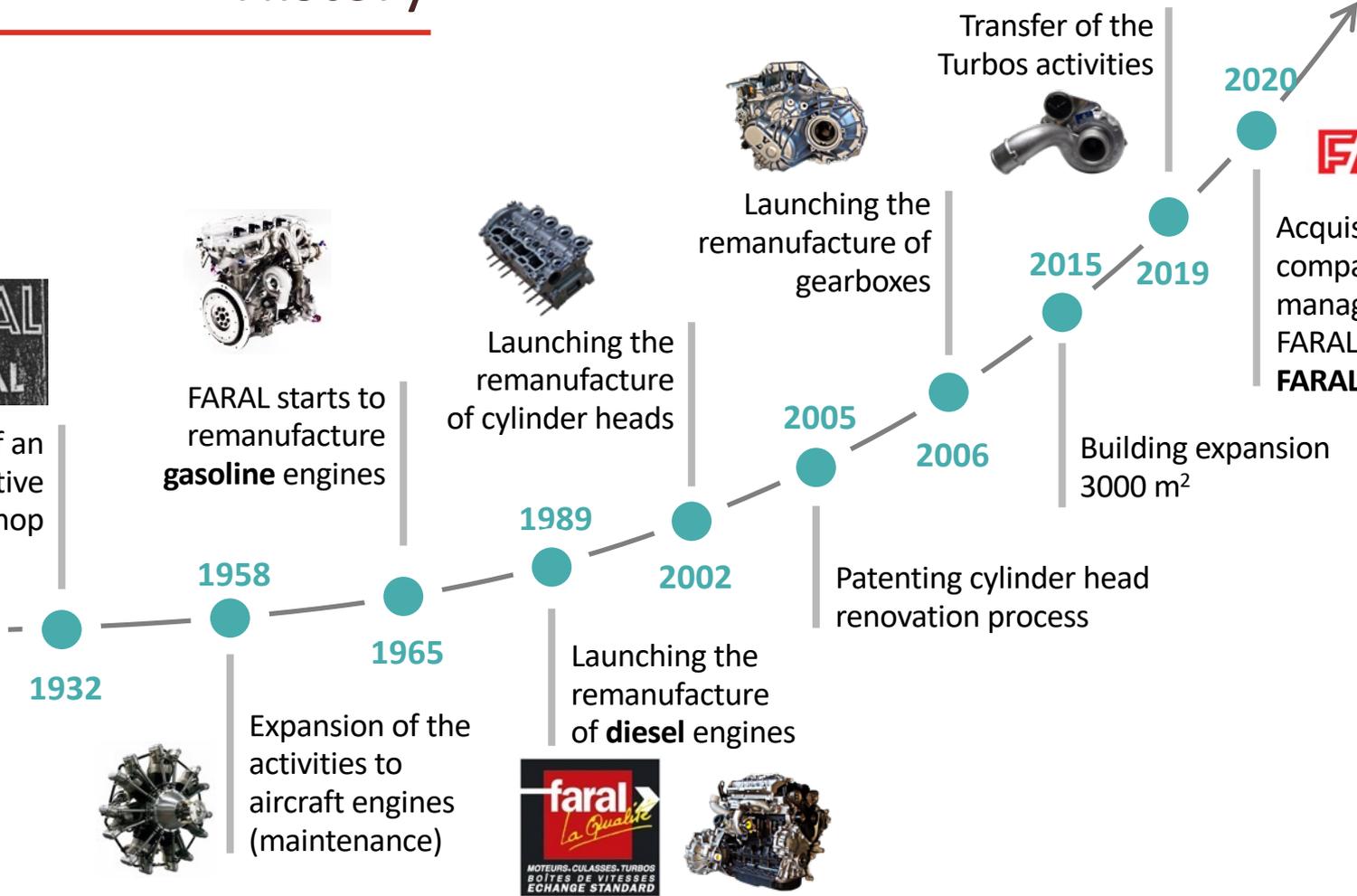
Building expansion 3000 m²

2019

Acquisition of the company by a new managing team FARAL becomes **FARAL Automotive**



2020



Products



DIESEL ENGINES

- **300 references**
- Main brands: PSA (30%) & RENAULT (30%)
- Overseas brands: MERCEDES, VAG, VOLVO, SOFIM, NISSAN, IVECO....
- Expansion of our ranges to produce FORD, FIAT, OPEL et VW engines
- Nearly all the engines are in diesel version
- A gasoline engine is on process to be added to our ranges.



GEARBOXES

- **250 references**
- Main brands: PSA (40%) et RENAULT (40%)
- We started an IVECO gearbox in 2019 and soon a FIAT gearbox
- A RENAULT assisted change speed transmission in in process.

Industrial process



1

Disassembly, inspection, referencing and sorting in our workshop



2

Spray cleaning + rust removal + ultrasonic descaling



3

Microbead and shot blasting to remove the last dirt's



4

Surface grinding of crankpins and hitch pins + glass tiling of crankshafts and camshafts + gears



5

Drilling cylinders and fine sanding cylinder blocks



Mechanical planarization of the gasket surface of the cylinder blocks



Brushing and boring cylinder blocks. Then spray painting



Rectifying crankshafts

Industrial process



6

Brushed cylinder heads, bored, tested and controlled by endoscopy. Welding if needed.



Machining gasket surfaces and re-machining valve housing. Waterproofing.



Reassembly and cylinder head control



7

Inspection and renovating cranks, valves, push rods ...



8

Engine reassembly with new rod bearing shells and pistons – and **80% reused parts**



9

Last control of the engine on the bench-test before expedition

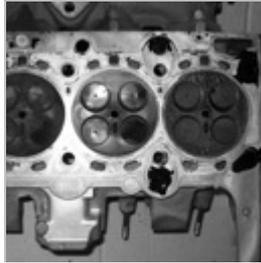


Patented Industrial Process



1-Disassembly & cleaning

Referencing, inspection, cleaning and preparing

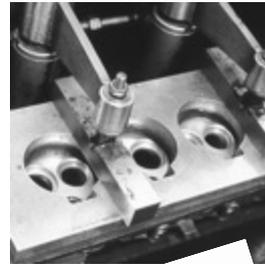


2-The “water bath test”

Evaluates the water tightness. An endoscopy is made with a micro-camera, to inspect the water circuit and identify any defects on the internal walls.

3-Reworking

Machining the corroded section, and using additive technology aluminium alloy under a high-tech self developed process. Surfacing and machining.

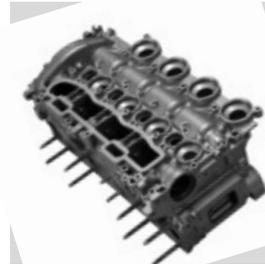


4-Leak test

High pressure test, to inspect the welding quality.

5-Upgrading

Applying a Faral patented process in reinforcing the water tightness (a cutting-edge technology using impregnation of resin by polymerisation).



6-Inspection, polishing, assembly, adjustments & final tests

Valves & springs testing and fitting, fitting of the camshaft and adjustment of the valves (electronic checks).

Environmental leader and stimulator

FARAL developed a label to **foster green practices** in revaluing automotive components



FARAL participates to the regional label **promoting local expertise's**.



FARAL develops **partnerships with startups** to **reduce engines CO₂ emissions**.



www.faral.fr

contact@faral.fr



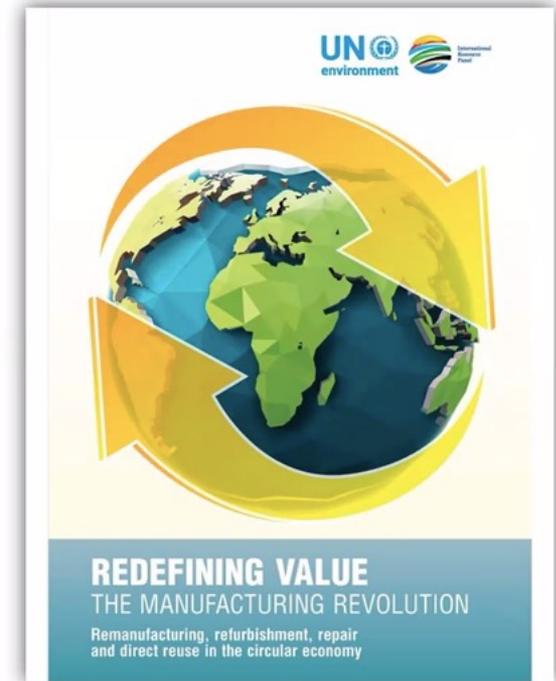
Remanufacturing : an efficient value retention process



The first study of this kind to :

- Initiate a comprehensive assessment of the resource efficiency aspects of **value retention processes**, including RE-x activities,
- Quantified the potential impacts (positive/negative) of engaging in circular processes.

Re-defining Value – The Manufacturing Revolution.
Remanufacturing, Refurbishment, Repair and Direct Reuse in the Circular Economy.



2018



www.remanufacturing.fr

Comprendre et démarrer
son activité de Remanufacture.



Eco-Engineering

Want to **explore** or **act**
to update your Value
Chain towards
circularity ?

Looking for **circular
opportunities** ?

Get in touch with me !!



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Eco-Ingénierie

Partant pour **explorer** ou
agir pour faire évoluer
votre Chaine de Valeur
vers la circularité ?

A l'affut de nouvelles
opportunités circulaires ?

Contactez-moi !!