Remanufacturing Opportunities: Successful Academic/Industry Collaborations & Projects

Scottish Institute for REMANUFACTURE

Scottish Institute for Remanufacturing

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Our Objectives

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1. Increase Innovation through stimulating and co-funding collaborative projects between industry and High Education Institutes
   - Increase productivity
   - Increase number of operations

2. Increase activity and engagement from the academic community to build capacity

3. Establish the Scottish Re-manufacturing community in Scotland

Our Approach

Build Awareness

- Remanufacturing
- Information Source
- Case-studies
- Research Portfolio

Knowledge Exchange

- Workshops
- Training
- Best Practice
- Industry needs
- Remanufacturing Portal

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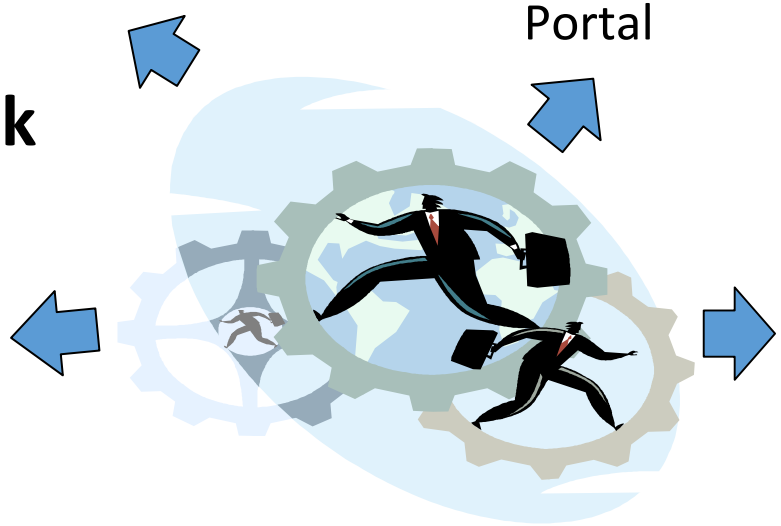
Create the Network

- Academics
- Remanufacturers
- Public Sector
- Trade Associations
- External partnerships, projects



Industry Driven Projects

- Collaborative projects
- Driven by business need
- Match-funding
- 2-12 month period
- £10K - £100K

SIR: Pan-Scotland Centre of Excellence for Remanufacturing

Ellen MacArthur Foundation Model for Circular Economy

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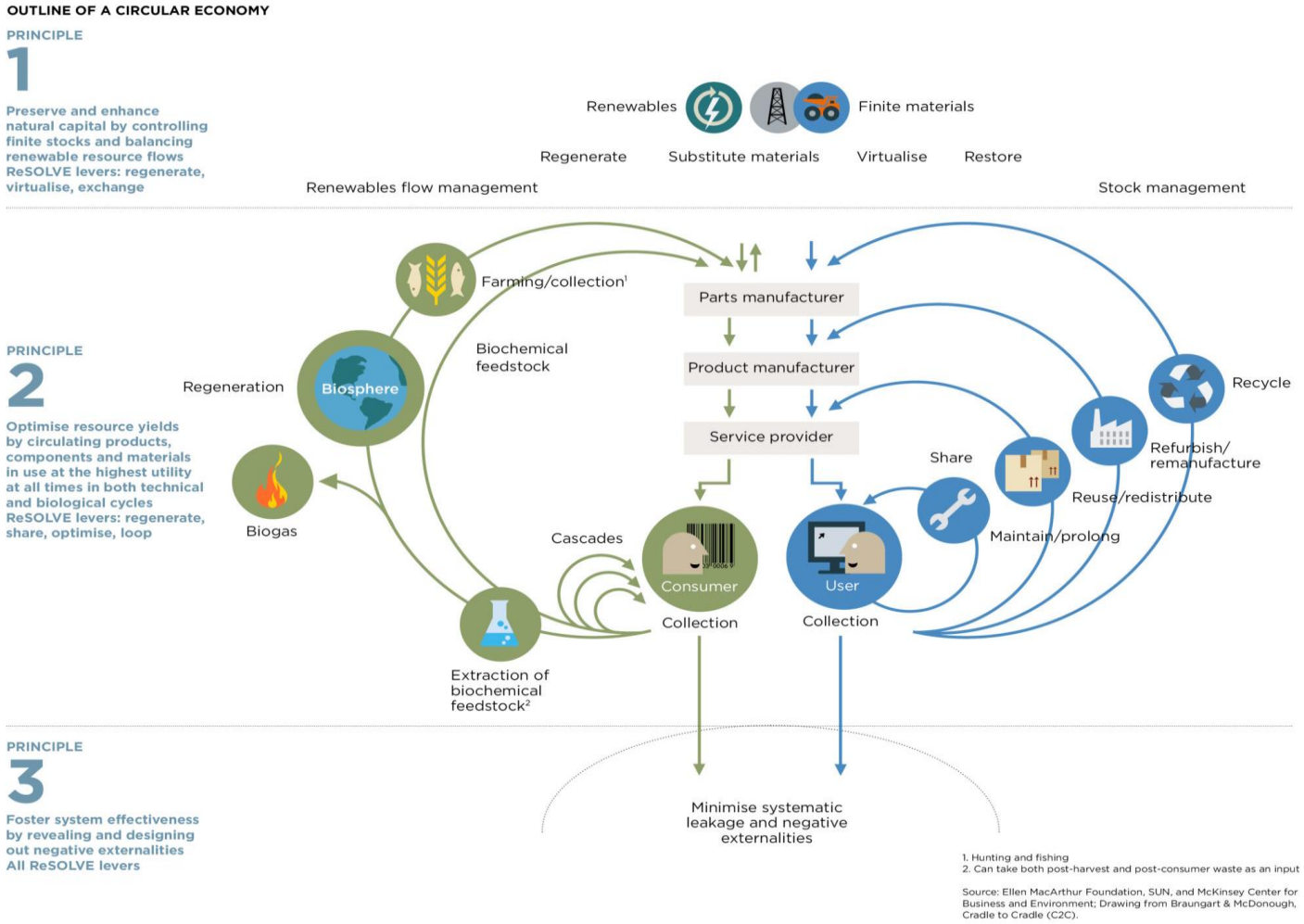

Flow of technical and biological materials through the ‘value circle’

		PRIMARY METRIC
PRINCIPLE 1	Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows	Degradation-adjusted net value add (NVA)[1]
PRINCIPLE 2	Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles	GDP generated per unit of net virgin finite material input[2]
PRINCIPLE 3	Foster system effectiveness by revealing and designing out negative externalities	Total cost of externalities and opportunity cost

1 The System of Environmental-Economic Accounting, 2012.
2 Adapted based on the EU's Resource Efficiency Scoreboard (Eurostat, 2014). The adaptation is to dedu

The Value of Remanufacturing to the UK

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Estimated Remanufacturing value to the UK = £5.5 Billion
Scotland accounts for £1.1B, with 19,000 employees
14 categories of remanufacturing reviewed
9 identified as having High or Medium growth potential









Circular Economy Evidence Building Programme: Remanufacturing Study. Oakdene Hollins March 2015

Refurbishment of Subsea Tree

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Case Study:
Bonga Phase 2 Field development

Shell Nigeria Exploration & Production Company (SNEPCo) in 2013 embarked on a Tree Refurbishment initiative.

Drivers:

- Increased cost of subsea equipment due to market demand from deep water projects
- Global slump in oil prices
- Project schedule requiring subsea trees to deliver production within 14 months from field development approval

Opportunity:

- Subsea wells in Bonga field were being suspended, enabling access & retrieval of subsea trees
- Subsea trees produced to PSL 3 in API Spec. 6A, 20th edition, section J.2.3 of API 6A Annex J outlines repair & remanufacture guidelines

Refurbishment of Subsea Tree

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Approach:

1. Development of Discipline Controls & Assurance Framework
2. Development of dedicated inspection & test plan
3. Inspection & assessment
4. Functional testing
5. Deck Test
6. Spare procurement & rebuild
7. Progressive reviews of re-build
8. Deck Test for sign off

First Subsea Tree under program was installed on schedule in May 2015 on the Bonga-51 well

Impact:

- Every refurbished Subsea Tree = $6 million saving
- Delivered in 15 month lead time
- Up to 40% cost reduction was made, by accelerating hardware availability
- Newly manufactured components would hold 36 month lead time

Refurbishment of Gearbox

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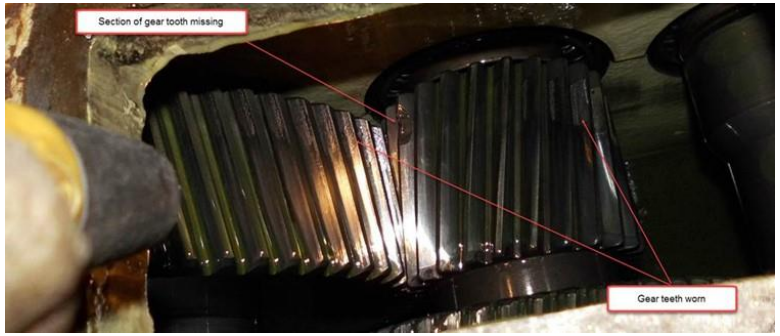
Case Study:
Elgin lean glycol pump gearbox

Drivers:
- Operational downtime not acceptable
- New product cost approximately between £140,000 to £165,000
- Lead-times of 34 week

Opportunity:
- Gearbox remanufacture found to be an acceptable practice in other sectors i.e. energy, transport, chemical plans
- Test programs establish to certify refurbished gearbox,
- Established supply chain

Impact:
- Lead-time reduced to 4 weeks from receipt of component
- Delivery with 40% cost reduction over new
- Refurbished units held as spares in inventory



Digital - DigiTool

- £1.2 Million IUK Project
- Over 3 Years
- Utilising a Hybrid Manufacturing Machine
  - Laser Metal Deposition (LMD)

DigiTool Partners

AFRC ADVANCED FORMING RESEARCH CENTRE UNIVERSITY OF STRATHCLYDE

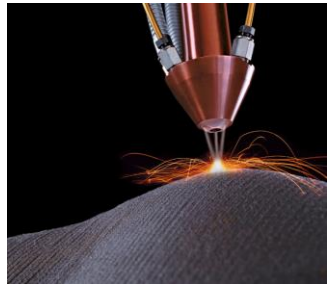
HYBRID MANUFACTURING TECHNOLOGIES

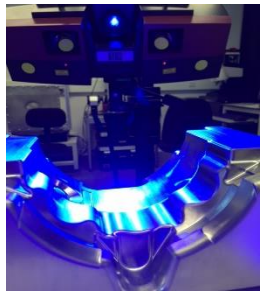
INSPHERE

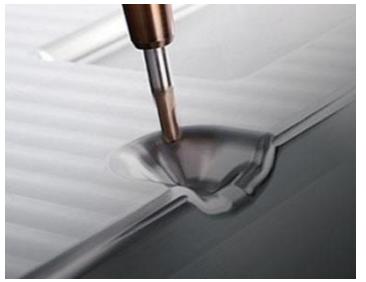
Innovate UK

KIMBERMILLS international

TTL







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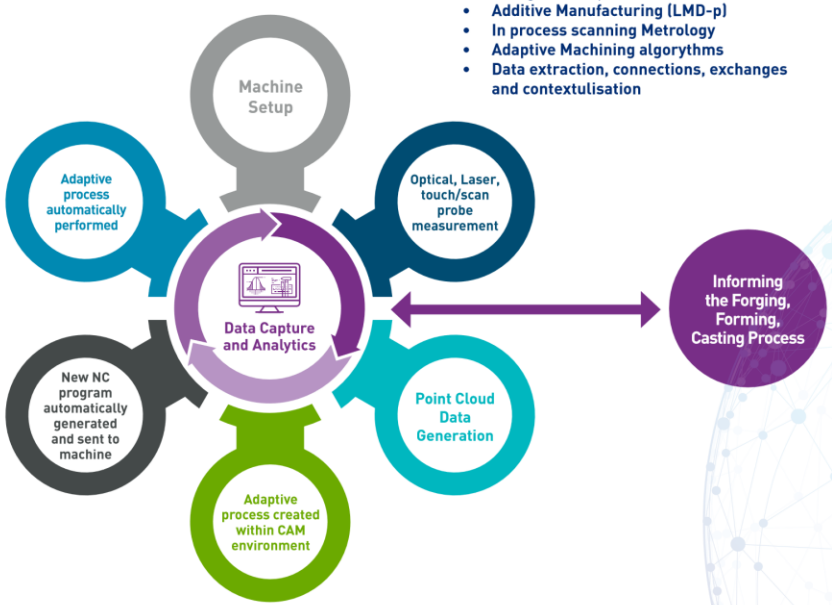
The Digital Transformation of the Tool and Die Sector

Funded by Innovate UK, the DigiTool project aims to help small and medium enterprises in tool and die industries to embrace industry 4.0.

Leading firms from the advanced manufacturing space are using their expertise to develop an additive manufacturing digital framework.



The framework is designed for easy integration with existing legacy machine tools to provide a simple and affordable solution with cross sector applicability in all re/ manufacturing applications.

The framework will incorporate three automated closed loop systems:

1. **Adaptive removal of worn areas**
2. **Adaptive additive manufacturing**
3. **Adaptive blending and finishing**

Technologies Incorporated will include:

- **Additive Manufacturing (LMD-p)**
- **In process scanning Metrology**
- **Adaptive Machining algorythms**
- **Data extraction, connections, exchanges and contextulisation**

Benefits of DigiTool

- **Gain on material utilisation**
- **Saving on machine time**
- **Saving on consumable costs**
- **Lead time reduction**
- **Reduced energy consumption**
- **Improved performance**
- **Rapid tool and die re/manufacture (hybrid single platform)**
- **Circular economy approach**

Supporting the emphasis on reducing costs, improving die life and enhancing material utilisation and functional performance across the tool and die sector (forging, forming, stamping and composite processes.)

Key Trends:

- High costs associated with die replacement and repair
- Large proportion of UK's high value tooling is manufactured in China

Drivers:

- Overcoming supply chain, capacity and lead time challenges in the UK
- Stimulating investment and technological expertise required for adoption of new methods
- Enhancing competition across the industry through uptake of innovation and new technology

Juice – Light as a Service

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Business Costs:

- Lighting can be 40% of electricity costs

Juice:

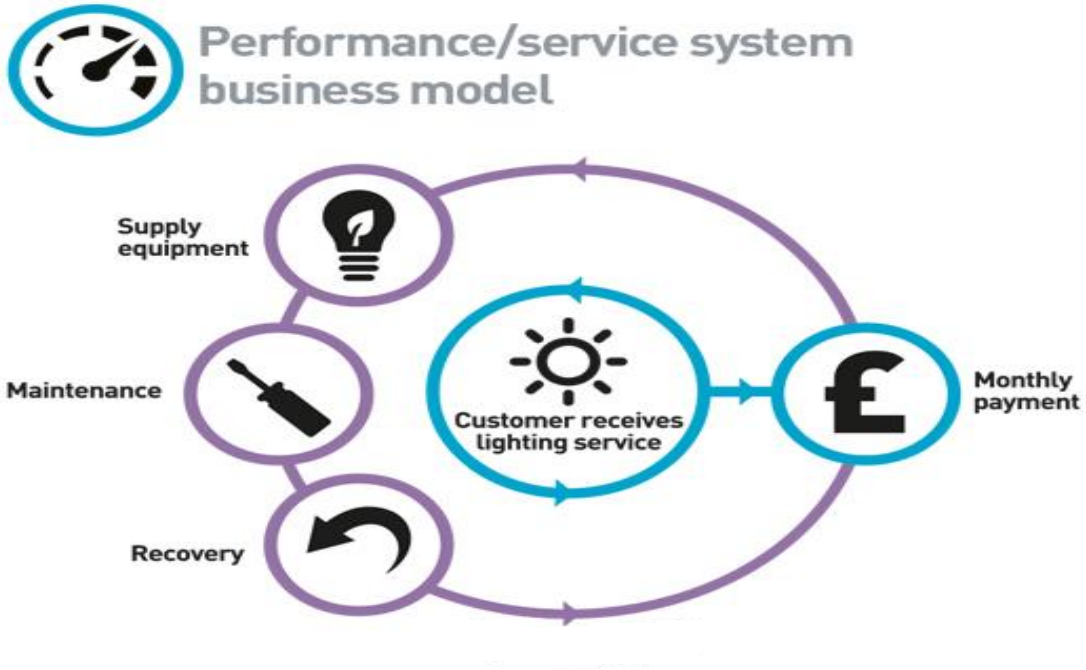
- Upgrade business to LED lighting
- Reducing electricity costs and environmental impact

New Circular Economy Model

- ‘Pay for Lux Service’
- Installation and maintenance

Benefits:

- Customer: Eliminates issues
- Manufacture: Enables recovery and remanufacturing
- Juice: Different income stream and a new service



THANK YOU

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BEFORE AFTER

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