



**Asia-Pacific
Economic Cooperation**



USAID
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Remanufacturing

Resource Guide

September 2013

Acknowledgements

The resource guide was prepared for the Asia-Pacific Economic Cooperation (APEC) organization as part of the APEC Technical Assistance and Training Facility (TATF) program. APEC TATF is managed by USAID, with funding and strategic direction provided by the U.S. State Department Bureau of East Asian and Pacific Affairs, Office of Economic Policy. For further information, please contact Ms. Victoria Waite, Chief of Party, vwaite@nathaninc.com.

This is a living document designed to provide APEC member economies with information resources to enrich their understanding of remanufacturing issues, industries, research, and economic and environmental considerations.

This publication was produced by Nathan Associates Inc. for review by the United States Agency for International Development. Its contents are the sole responsibility of the author or authors and do not necessarily reflect the views of USAID or the United States government.

EXECUTIVE SUMMARY

Remanufacturing is growing in the Asia-Pacific region and has been discussed in APEC since 2006. Remanufacturing is an industrial operation that uses existing products recovered from commercial use as inputs. It occurs in industries such as earth-moving and agricultural equipment, truck and automotive parts, medical equipment, office equipment, information and communications technology products, precision instruments, and machinery. Promoting trade in remanufactured products contributes to APEC green growth goals because less energy, materials, and water are used in their production. Remanufacturing also creates skilled, productive jobs at home and benefits businesses and consumers by offering "like-new" quality products at lower costs.

The following document is designed to provide APEC economies with information resources to enrich their understanding of remanufacturing issues, industries, research, and economic and environmental considerations.

Specifically, this document is designed to inform and increase APEC economies' awareness of the wide reach of remanufactured goods and remanufacturing facilities in the APEC region and their beneficial impact. It contains resources in the following areas:

- Global resources supplying information on remanufacturing, trade in remanufactured goods, and the treatment of remanufactured goods as new goods;
- Research institutions in APEC that conduct research or support remanufactured goods technology;
- Remanufacturing industry associations in the APEC region;
- Major remanufacturers in the APEC region;
- Resources detailing economic and environmental benefits of remanufacturing; and
- Other publications on remanufacturing and its applications.

It also contains an annex listing many of the individual remanufacturing facilities in APEC economies.

This is a working document that will require inputs and updates as new developments in remanufacturing technologies and remanufacturing activities in the APEC economies emerge. We encourage members to review the following resource and contribute any inputs and developments in their respective documents to make this resource a living, relevant document for the benefit of the entire region.

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I. GLOBAL REMANUFACTURING INFORMATION RESOURCES

ADVANCED REMANUFACTURING & TECHNOLOGY CENTRE OF SINGAPORE (ARTC)

At the Advanced Remanufacturing & Technology Centre of Singapore, collaborative, cross-sector technological innovation leads to the evolution of cutting-edge, high value technology, consequently leading the drive for a more efficient, environmental and productive industrial future.

Located: Singapore

artc.simtech.a-star.edu.sg

THE CENTRE FOR REMANUFACTURING AND REUSE (CRR)

The Centre for Remanufacturing and Reuse specialises in advice and promotion on remanufacturing, reuse and reconditioning. The CRR works with businesses and governments on a range of different projects from market studies to carbon footprint analysis.

Located: The United Kingdom

www.remanufacturing.org.uk

THE CENTRE FOR SUSTAINABLE DESIGN (CfSD)

The Centre for Sustainable Design is a resource for sustainable innovation and product sustainability. The Centre researches, develops and disseminates understanding of present and future sustainability impacts and solutions related to innovation, products, technologies, services and systems through projects, training, events, networks and information.

Located: The United Kingdom

cfsd.org.uk

THE JOURNAL OF REMANUFACTURING

The Journal of Remanufacturing aims to establish an effective channel of communication between academic and research institutions, industry and persons concerned with the challenges and significance of remanufacturing. The international dimension is emphasized in order to overcome cultural and national barriers and to meet the needs of global sustainability given the significant adverse ecological impacts of accelerating global industrialization.

Located: Germany

www.journalofremanufacturing.com

OAKDENE HOLLINS, LTD. (OHL)

Oakdene Hollins is a resource for the understanding of remanufacturing issues. OHL offers operational support to initiatives that have a direct impact on remanufacturing practices.

Located: The United Kingdom

oakdenehollins.co.uk

THE REMANUFACTURING INSTITUTE (TRI)

The Remanufacturing Institute is a global non-profit organization providing support for the marketing efforts of the aftermarket remanufactured products community.

Located: The United States

www.reman.org

THE REMAN TOOLBOX

A resource for businesses seeking remanufactured products.

Located: The United States

www.remantoolbox.com

REMANUFACTURING OPPORTUNITY TOOL (ReOpT)

The Remanufacturing Opportunity Tool, referred to as the ReOpT, is a software tool based on a set of core issues affecting the decision-making process such as the nature of the product, customers, markets, customer support, environment and resources. Not only does ReOpT boast an interactive feedback mechanism dealing with each core issue, the software provides users with a final report for each product.

Located: The United Kingdom

www.remanufacturing.org.uk/remanufacturing-decision-tool.lasso

ReMaTeC NEWS

ReMaTec News is a resource for global remanufacturing intelligence.

Located: The Netherlands

www.rematecnews.com

II. RESEARCH INSTITUTIONS

BOSTON UNIVERSITY DEPARTMENT OF MECHANICAL ENGINEERING: REMANUFACTURING STUDIES

Led by Professor Robert Lund and Professor William Hauser, Boston University's Remanufacturing Studies department is housed in the Department of Mechanical Engineering.

Located: United States

<http://www.bu.edu/reman/>

CHAIR OF MANUFACTURING AND REMANUFACTURING TECHNOLOGY, UNIVERSITY OF BAYREUTH

The Chair of Manufacturing and Remanufacturing Technology, part of the Fraunhofer Process Innovation project group since 2006, combines knowledge about products, production and remanufacturing for innovative research with a focus on interdisciplinary and international studies.

Located: Germany

www.lup.uni-bayreuth.de/en/index.html (English and German)

THE INSTITUTE OF ENVIRONMENT AND RESOURCES

The Institute provides technical and policy analysis that supports the formulation of policies with long-term implications for sustainable environmental, social and economic development in Chinese Taipei, an essential role of Chinese Taipei's computer reuse team for the Basel Convention.

Located: Chinese Taipei

www.ier.org.tw (Chinese)

THE INTERNATIONAL CENTRE FOR THE STUDY OF EAST ASIAN DEVELOPMENT (ICSEAD)

The International Centre for the Study of East Asian Development, Kitakyushu (ICSEAD) is a non-governmental research institute based in Kitakyushu, Japan.

Located: Japan

www.icsead.or.jp (Chinese, English and Japanese)

KOREA INSTITUTE OF INDUSTRIAL TECHNOLOGY (KITECH)

A government research institute established in 1989 to help develop technologies for the domestic industry, with a focus on export competitiveness and SMEs.

Located: Korea

eng.kitech.re.kr (English and Korean)

KOREA NATIONAL CLEANER PRODUCTION CENTER

KNPC was established in 1999 to improve resource productivity and expanding green management throughout Korea.

Located: Korea

www.kncpc.or.kr (Korean)

THE NATIONAL CENTER FOR REMANUFACTURING AND RESOURCE RECOVERY (C3R)

The National Center for Remanufacturing and Resource Recovery (C3R) at Rochester Institute of Technology is a leading center for research and development in the remanufacturing field. The Center was established as a partnership between industry, academia and the government to support industry advancement.

Located: The United States

www.reman.rit.edu

SINGAPORE INSTITUTE OF MANUFACTURING TECHNOLOGY (SIMTech)

The Singapore Institute of Manufacturing Technology (SIMTech) is a research institute of the Agency for Science, Technology and Research (A*STAR).

Located: Singapore

www.simtech.a-star.edu.sg

SYSTEMS REALIZATION LABORATORY, GEORGIA TECH

George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology

Research topics include Environmentally Conscious Design and Manufacture, i.e., the development of (sustainable) technologies that not only increase industrial competitiveness, but also reduce the impact of our actions on the environment. Specific thrusts are in design for de- and remanufacturing; impact, cost and risk assessments; recycling, configuration design, and material and process selection.

Located: The United States

www.srl.gatech.edu

UNIVERSITI KEBANGSAAN MALAYSIA FACULTY OF ENGINEERING & BUILT ENVIRONMENT

Universiti Kebangsaan Malaysia's Faculty of Engineering and Built Environment has conducted research relevant to remanufacturing. Publications include "Initiating automotive component reuse in Malaysia."

Located: Malaysia

www.deepdyve.com/lp/elsevier/initiating-automotive-component-reuse-in-malaysia-3boiEH0dJb

pkukmweb.ukm.my/jkees/index.php/en/ (English and Malaysian)

III. REMAN INDUSTRY ASSOCIATIONS

ASSOCIATION OF JAPAN CARTRIDGE REMANUFACTURERS

The Association of Japan Cartridge Remanufacturers was formed by 33 individual remanufacturers. Member companies account for 90% of remanufactured toner cartridges sold in Japan.

Located: Japan

www.aicr.jp

AUSTRALASIAN CARTRIDGE REMANUFACTURERS ASSOCIATION INC (ACRA)

ACRA is an association of remanufacturers that provide high quality, fully remanufactured toner or ink cartridges. ACRA is a not-for-profit organization with members from all over Australia, New Zealand and the Asia Pacific Region.

Located: Australia

www.acra.asn.au

AUTOMOTIVE PARTS REMANUFACTURERS ASSOCIATION (APRA)

An association of over 2000 member companies that rebuild automotive related parts.

Located: The United States

www.apra.org

CHINESE INTERNAL COMBUSTION ENGINE INDUSTRY ASSOCIATION

An internal combustion engine industry association that publishes the *China Internal Combustion Engine Industry Yearbook* each year and holds a yearly expo, Engine China, a specialized engine exhibition.

Located: China

www.enginechina.com.cn (Chinese)

HEAVY EQUIPMENT MANUFACTURER ASSOCIATION OF INDONESIA (HINABI)

HINABI is an association of heavy equipment manufacturers in Indonesia for construction and mining, road construction, and other equipment.

Located: Indonesia

www.hinabi.org

THE INTERNATIONAL COMPRESSOR REMANUFACTURERS' ASSOCIATION

ICRA is an association of remanufacturing in the air conditioning and refrigeration service industry. Members include companies from Australia, Canada, Mexico, the United States, and others.

Located: The United States

www.icracomp.com

THE INTERNATIONAL IMAGING TECHNOLOGY COUNCIL

The International Imaging Technology Council is a trade association that represents the interests of the world's imaging supplies industry, including office machine retail and repair, office supply retail and remanufacturing, computer retail, repair and networking companies and all related industry suppliers.

Affiliates exist in Australia, Japan, Korea, and Latin America.

Located: The United States

www.i-itc.org

MOTOR AND EQUIPMENT REMANUFACTURERS ASSOCIATION

A news source and advocacy group for motor and equipment remanufacturing.

Located: The United States

www.mera.org

REMANUFACTURING INDUSTRIES COUNCIL

The Remanufacturing Industries Council was established to assist in the development of the remanufacturing across a broad range of industries and promote the markets for remanufactured products, raising awareness of their quality and availability within the business, government and consumer communities.

Located: The United States

www.remancouncil.org

REVERSE LOGISTICS ASSOCIATION

The Reverse Logistics Association is not a remanufacturer, but rather a trade association offering reverse logistics services for the aftermarket supply chain.

Located: The United States

www.reverselogisticstrends.com

IV. REMANUFACTURERS IN THE APEC REGION

CATERPILLAR

Since 1973, Caterpillar has remanufactured diesel engines and components for its own machines and power systems. What began as a small operation to meet the product support needs of our truck engine customers has grown to include more than 700 products, including hydraulics, drivetrain, fuel systems and even tires. Today, Caterpillar's remanufacturing operations include nearly 4,000 team members and 17 facilities worldwide serving the product support needs of Cat dealers and external customers.

Cat Reman has facilities in the US, Mexico, Europe, China, Indonesia, Singapore, and Viet Nam.

Located: The United States

www.caterpillar.com/brands/cat-reman

CHINESE INTERNATIONAL AUTO PARTS EXPO (CIAPE)

The Chinese International Auto Parts Expo, sponsored by the Chinese Ministry of Commerce (MOFCOM), offers opportunities for aftermarket companies interested in planning their market entry or business expansion in China's fast-growing aftermarket. The Expo provides numerous educational, networking events and other opportunities for U.S. suppliers, retailers, distributors and service providers, to network and establish new business relationships, and to promote their brands, products and services to potential Chinese aftermarket business partners and customers.

Located: China

www.iapechina.com (Chinese)

CLOVER TECHNOLOGIES GROUP

Clover Technologies Group was founded in 1996 and provides resellers, mass merchants and value-added specialty suppliers with total environmental solutions including the recycling and remanufacturing of consumable imaging supplies. Clover is the world's largest collector and recycler of cell phones, inkjet and laser cartridges.

Clover has facilities in Australia, Mexico, New Zealand, Singapore, the United States and Viet Nam.

Located: The United States

www.clovertech.com

FLEXTRONICS

Singapore-based firm Flextronics offer full-spectrum design, manufacturing, remanufacturing and logistics services vertically integrated with world-class component capabilities to help OEMs create market leading products.

They operate in the Americas (incl. Canada, Mexico, and the United States), Europe, and Asia (incl. China, Indonesia, Japan, Korea, Malaysia, Singapore and Chinese Taipei).

Located: Singapore

www.flextronics.com

GE ENERGY

GE Energy is a multinational firm whose activities include remanufacturing of oil drilling equipment.

Located: The United States

www.ge-energy.com/products_and_services/services/capital_drilling_equipment_services/remanufactured_equipment.jsp

HITACHI CONSTRUCTION MACHINERY

Hitachi Construction Machinery currently operates global recycling programs in seven markets, including Japan, China, Indonesia, Malaysia, and Australia. Along with further expansion of the recycling program in the above seven locations, plans are in place for expansion to Russia.

Located: Japan

http://www.hitachi-c-m.com/global/parts_service/parts/component.html

JOHN DEERE REMAN

John Deere is an agricultural machinery manufacturer with a well-developed remanufacturing program.

Located: The United States

www.deere.com/en_US/reman

KOMATSU

Komatsu offers remanufactured components for engines, torque converters, transmissions, axles, hydraulic devices, electronic devices and other machine components through seven Reman Centers throughout the world (United States, Europe, Japan, Indonesia, Australia, South Africa and Chile).

Located: Japan

www.komatsu.com/ce/support/v04412/index.html

PT HEXINDO ADIPERKASA

PT Hexindo Adiperkasa Tbk is a wholesaler of a wide range of construction and mining equipment. Remanufacturing facilities exist throughout Indonesia.

Located: Indonesia.

www.hexindo-tbk.co.id/parts_service/parts/component.html

REMY INTERNATIONAL, INC.

Remy provides alternators, starters and hybrid motors for the heavy duty and light duty original equipment markets, as well as remanufactured alternators and starters to the aftermarket.

Facilities in China, Korea, Mexico, Peru and the United States.

Located: The United States

www.remyinc.com

ROCKWELL AUTOMATION

Rockwell is an international industrial automation firm. Details on its seven-step remanufacturing process are available on the website.

Located: The United States

www.rockwellautomation.com/services/repair/remanufacturing.html

SANGGAR SARANA BAJA

PT. Sanggar Sarana Baja (PTSSB) is an Indonesian company whose activities include component remanufacture of heavy equipment.

Located: Indonesia

www.ptsb.co.id

SCHAEFFLER AUTOMOTIVE AFTERMARKET

Schaeffler Automotive Aftermarket's product range includes applications for engine, chassis and drivetrain.

Facilities in Australia, Canada, China, Mexico, Singapore, and the US.

Located: Germany

www.schaeffler.com

SHIN-ETSU DENSO

Shin-Etsu Denso Co., Ltd. remanufactures automotive rotating electrics. It exports its products to North America, Europe, the Middle East, South East Asia, Central and South America, and Oceania.

Located: Japan

www.shine-reman.com

TRU-MARINE

Tru-Marine is a Singapore-based company that remanufactures turbocharger components.

Located: Singapore

www.trumarine.com.sg

V. ENVIRONMENTAL AND ECONOMIC BENEFITS

BUILDING A SUSTAINABLE FUTURE THROUGH INNOVATIVE TECHNOLOGIES

Presentation to the APEC Market Access Group on sustainability and remanufacturing.

aimp.apec.org/Documents/2007/MAG/WKSP1/07_mag_wksp1_002.pdf

CARBON IMPACT STUDIES: TONER CARTRIDGES

This study concludes that carbon impact of remanufactured cartridges was 22.8 kgCO₂eq compared to 35kg CO₂eq for new ones when the use phase excluded, generating an approximate 35 percent carbon savings for remanufactured cartridges.

Kara, Hüdai. *Carbon Impact of Remanufactured Products*. Centre for Remanufacturing and Reuse. 12 November, 2008.

LIFECYCLE ASSESSMENT OF THE ENVIRONMENTAL BENEFITS OF REMANUFACTURED PRODUCT WITHIN A “GREEN” SUPPLY CHAIN

This study posits that the telecom industry is moving towards a “greener” supply chain for manufacturing and explores the environmental benefits of remanufacturing electronic equipment and reselling it to customers in lieu of manufacturing new like-kind equipment.

Goldey, Charles L., Ernst-Ulrich Kuester, Renee Mummert, Thomas A. Okrasinski, P.E., Donald Olson, and William J. Schaeffer, Sr., P.E. *Lifecycle Assessment of the Environmental Benefits of Remanufactured Product within a “Green” Supply Chain*. Presented at the “IEEE International Symposium on Sustainable Systems and Technology,” Washington D.C., May 17-19, 2010.

www.reman.org/Papers/Lifecycle_Assessment.pdf

PRACTICE GUIDELINES: DEVELOPMENT OF A FRAMEWORK FOR ASSESSING THE ECONOMIC BENEFITS OF REMANUFACTURING

This publication presents a cost estimation framework assessing the cost of a whole system of remanufacturing is a proper mean to assess the economic benefit of remanufacturing.

Japke, Onome E. *Practice Guidelines: Development of a framework for assessing the economic benefits of remanufacturing*. Cranfield University. April, 2009

www.remanufacturing.org.uk/pdf/story/1p331.pdf

RECONDITIONING: THE ULTIMATE FORM OF RECYCLING

According to this white paper, the reuse, reconditioning, and remanufacturing use a fraction of the energy of new production, keep millions of tons of waste from landfills every year, reduce raw material consumption, and create three to five times more skilled jobs than automated production lines.

Professional Electrical Apparatus Recyclers League. *Reconditioning: The Ultimate Form of Recycling*. August, 2010.

www.reman.org/Papers/PEARL_WhitePaper_2010.pdf

REMANUFACTURE YOUR BUSINESS ENVIRONMENT

Extending the life of existing products through remanufacturing would reduce the amount of manufactured equipment subject to EPA standards and produce profit margins 50-100% higher than new products.

Giuntini, Ron. "Remanufacture Your Business Environment." *Material Handling & Logistics*. April, 2013.

http://www.reman.org/Articles/0413Make_Remanuf.pdf

REMANUFACTURING: A KEY ENABLER TO SUSTAINABLE PRODUCT SYSTEMS

This study advocates for remanufacturing as an integral part of the product development process, both at the product strategy level and the detailed product and manufacturing engineering level.

Nasr, Nabil and Michael Thurston. *Remanufacturing: A Key Enabler to Sustainable Product Systems*. Rochester Institute of Technology, n.d.

www.mech.kuleuven.be/lce2006/key4.pdf

REMANUFACTURING, A NEW LIFE CYCLE (SPANISH)

Israel M. Morales, former President of Maquiladora and Manufacturing (Full-tolling) Export Industry Association in Nuevo Laredo, Mexico and CNIMME's Director for Foreign Trade and Customs Committee (National Counsel of Manufacturing and Maquiladora Export Industry, in Mexico) is the writer of the CNN Expansion article in Spanish titled "*Remanufactura, una nueva vida útil*" (Remanufacturing, a new life cycle). In this article he not only describes the remanufacturing process but also the agenda and achievements of the Mexican Government related to the elimination of trade barriers in order to facilitate remanufacturing operations in Mexico.

Morales, Israel M. *Remanufactura, una nueva vida útil*. CNN Expansion. 1 April, 2008.

www.cnnexpansion.com/manufactura/tendencias/remanufactura-una-nueva-vida-util

REMANUFACTURING: AN ANSWER TO GLOBAL WARMING

This publication illustrates the potential for remanufacturing automotive products to conserve energy and reduce the rate of global warming.

Automotive Parts Rebuilders Association. "Remanufacturing: An Answer to Global Warming." n.d.

www.reman.org/pdf/Remanufacturing_Answer_Global_Warming.pdf

REMANUFACTURING AND PRODUCT DESIGN

This study concludes that remanufacture can offer a business model for sustainable prosperity, with reputed double profit margins alongside a significant reduction in carbon emissions and 15% of the energy required in manufacture.

Gray, Casper and Martin Charter. *Remanufacturing and Product Design: Designing for the 7th Generation*. The Centre for Sustainable Design, University College for the Creative Arts, Farnham, UK. n.d.

cfsd.org.uk/Remanufacturing%20and%20Product%20Design.pdf

REMANUFACTURING: THE ULTIMATE FORM OF RECYCLING

The purpose of this publication is to explain the concept of remanufacturing as “recycling by manufacturing ‘good as new’ products from used products.”

Steinhilper, Rolf. *Remanufacturing: The Ultimate Form of Recycling*. Fraunhofer IRB Verlag, Stuttgart. 1998.

www.reman.org/Publications_main.htm

REMANUFACTURING UPGRADE FOR GREEN MAINTENANCE

A study on remanufacturing for sustainability.

Sheng, Zhu and Yao Jukun. *Remanufacturing Upgrade for Green Maintenance*. Remanufacturing Technology Committee of CAPE, Beijing. n.d.

www.delta3n.hu/world-congress-on-maintenance-2008/session2/03-remanufacturing-upgrade-for-green-maintenance.pdf

VI. ADDITIONAL PUBLICATIONS

AN INTRODUCTION TO REMANUFACTURING

Parker, David and Phil Butler. *An Introduction to Remanufacturing*. Oakdene Hollins, 2007.

www.remanufacturing.org.uk/pdf/reman_primer.pdf

GLOBAL MRO MARKET: MARKET ASSESSMENT

AeroStrategy Management Consulting. *Global MRO Market: Market Assessment*. Prepared for The Aeronautical Repair Station Association (ARSA). Ann Arbor, MI. August 21, 2009.

www.arsa.org/files/ARSACivilAircraftMROMarketOverview-20090821.pdf

GUIDELINES FOR PROMOTING THE DEVELOPMENT OF THE REMANUFACTURING INDUSTRY

China National Development and Reform Commission (NDRC). "Guidelines for Promoting the Development of the Remanufacturing Industry." No. 991, May 31, 2010.

www.ndrc.gov.cn/zcfb/zcfbtz/2010tz/t20100531_350189.htm

REMANUFACTURED GOODS: AN OVERVIEW OF THE U.S. AND GLOBAL INDUSTRIES, MARKETS, AND TRADE

U.S. International Trade Commission (USITC). "Remanufactured Goods: An Overview of the U.S. and Global Industries, Markets, and Trade." USITC Publication 4356. October, 2012.

<http://www.usitc.gov/publications/332/pub4356.pdf>

THE REMANUFACTURING INDUSTRY: ANATOMY OF A GIANT

Hauser, William, and Robert T. Lund. *The Remanufacturing Industry: Anatomy of a Giant*. Boston University, 2003.

<http://www.bu.edu/remman/GetReports.htm>

REMANUFACTURING INSPECTION MODELS

Errington, Mark. *Remanufacturing Inspection Models*. Exeter University, n.d.

<http://www.remanufacturing.org.uk/pdf/story/1p298.pdf>

THE REMANUFACTURING OFFER: A CASE STUDY OF VOLVO CONSTRUCTION EQUIPMENT IMPLEMENTING AND EXPANDING REMAN IN RUSSIA

Sandvall, Fredrik and Carlos Stelin. *The Remanufacturing Offer: A Case Study of Volvo Construction Equipment Implementing and Expanding Reman in Russia*. University of Stockholm, 2006.

www.remanufacturing.org.uk/pdf/story/1p319.pdf

REMANUFACTURING: OPERATING PRACTICES AND STRATEGIES

Hauser, William, and Robert T. Lund. *Remanufacturing: Operating Practices and Strategies*. Boston University, 2008.

<http://www.bu.edu/remman/GetReports.htm>

WHAT IS REMANUFACTURING?

Automotive Parts Remanufacturing Association (APRA). "What is Remanufacturing?"

www.apra.org/About/Reman.asp

VII. PROMINENT REMANUFACTURING EXPERTS

NABIL NASR

Dr. Nabil Nasr is the Assistant Provost and Director, Golisano Institute of Sustainability, Rochester Institute of Technology. His expertise includes Sustainable Design, Remanufacturing, Life Cycle Engineering, and Manufacturing Strategies.

Located: The United States

ROLF STEINHILPER

Dr. Rolf Steinhilper has worked for over 30 years on remanufacturing technology. He is professor of the Chair for Manufacturing and Remanufacturing Technology.

Located: Germany

SHENG ZHU

Professor Sheng Zhu is the Director National Key Laboratory for Remanufacturing in Beijing.

Located: China

VII. REMANUFACTURING MEASURES IN APEC ECONOMIES

CANADA

Goods remanufactured in Canada include motor vehicle parts, aerospace components, medical devices and equipment. The government does not distinguish between new and remanufactured goods; there are no official government statistics on trade in remanufactured goods.

CHINA

China's remanufacturing industry is of relatively recent origin, only having been formally established in 2008. Remanufacturing activities are primarily regulated through two government-led pilot programs—one for the motor vehicle parts remanufacturing sector and another for the industrial machinery and electrical equipment remanufacturing sector. Only firms that are approved to participate in these programs may remanufacture. China maintains restrictive measures on foreign trade in remanufactured goods and related cores. Statistics on Chinese remanufacturing production, foreign trade, and employment are largely unavailable, due in part to the relatively young age of the industry.

In 2010, the NDRC and 11 other ministries and agencies issued a guidance document for promoting the development of China's remanufacturing industry. The document listed the industries and particular products that should be promoted for remanufacturing, established broad goals for remanufacturing, noted the major

challenges, and presented a strategic road map for implementation. Additional guidance released in September 2011 sought to ensure that remanufacturing pilot projects achieved tangible results and to expand the number of industries approved for remanufacturing.

More at <http://www.usitc.gov/publications/332/pub4356.pdf>

KOREA

Remanufacturing in Korea is reportedly limited, but occurs in the motor vehicle parts, heavy duty and off-road (HDOR) equipment, IT products (primarily printer cartridges), medical devices, and military defense sectors. In 2011, the Korean government identified remanufacturing as an industrial activity that could foster sustainable growth in “green” industries, create employment, and stabilize prices in the country. The Korean Institute for Industrial Economics estimates that remanufacturing can conserve 85–90 percent of the materials and energy used to manufacture new products.

More at <http://www.usitc.gov/publications/332/pub4356.pdf>

MALAYSIA

Goods remanufactured in Malaysia include motor vehicle parts (estimated to be \$7 million annually) and MRO activities.

MEXICO

Goods remanufactured in Mexico include consumer electronics, IT products (printers and printer cartridges), and motor vehicle parts. There are approximately 60 known remanufacturers in Mexico. There are no specific laws that regulate remanufacturing as an industrial activity. However, in 2008, Mexico implemented the “Three Rs” (reduce, reuse, and recycle) initiative to promote sustainability and to reduce waste in industrial activities.

NEW ZEALAND

Goods remanufactured in New Zealand include motor vehicle parts, machinery, and IT products (printer cartridges).

RUSSIA

Goods remanufactured in Russia HDOR equipment, IT products (copier machines and printer cartridges). There is no direct legal restriction on remanufactured products.

SINGAPORE

Remanufacturing in Singapore occurs in the HDOR equipment, motor vehicle parts, medical devices, electrical apparatus, and marine equipment remanufacturing sectors. The Singapore government does not distinguish between remanufactured and other goods (new or used) and does not impose specific marking or labeling requirements for remanufactured goods. Cores to be remanufactured are imported freely, and remanufactured products are sold domestically and exported regionally to Association of Southeast Asian Nations (ASEAN) countries and Australia.

Although Singapore does not collect specific data on domestic remanufacturing production or trade in remanufactured goods, the government is committed to establishing a remanufacturing base and related R&D in an effort to increase value-added activities in the country's manufacturing sector. In 2011, the government launched the Advanced Remanufacturing and Technology Center, an R&D center that works with local universities and remanufacturers to develop remanufacturing technologies for the aerospace, motor vehicle parts, marine, and HDOR equipment sectors.

More at <http://www.usitc.gov/publications/332/pub4356.pdf>

UNITED STATES

The United States is the world's largest producer, consumer, and exporter of remanufactured goods. The sectors that account for the majority of remanufacturing activity in the United States include (in alphabetical order) aerospace, consumer products, electrical apparatus, HDOR equipment, information technology products, locomotives, machinery, medical devices, motor vehicle parts, office furniture, restaurant equipment, and retreaded tires.

More at <http://www.usitc.gov/publications/332/pub4356.pdf>

ANNEX 1: REMAN FACILITIES IN APEC ECONOMIES

Note: A United States International Trade Commission publication on remanufacturing is pending release, at which time additional information on remanufacturing facilities in the United States will be included in this resource guide.

Economy	Location	Firm	Sector
Australia	Perth, Brisbane, Wacol	Komatsu	Construction Equipment
Australia	Sydney	Fuji Xerox	Electronics, ICT
Australia	Bayswater	Siemens	Industrial Automation
Australia		SKF	Railway
Australia	Victoria	Rockwell Automation	Industrial Automation
Australia	Sydney	WEMtech	Electric Motors and Drives
Australia	Victoria	Clover	Printer consumables
Australia	Scoresby	Cummins	Automotive/Engineering
Australia	Para Hills	Liebherr-Australia	Mining/construction equipment
Australia	Marrickville	Active Power Steering	Automotive
Australia	Clayton	Australian Automotive Aftermarket Assoc.	Automotive
Australia	Villawood NSW 2163	Euro Car Parts	Automotive
Australia	Hallam, Victoria 3803	Injectronics Australia Pty Ltd	Automotive
Australia	Brendale	Zanwave Pty. Ltd.	Automotive
Canada	Quebec	Infolaser	Electronics, ICT
Canada		Pitney Bowes	Mail processing equipment
Canada	Edmonton	Deere Reman	Construction Equipment
Canada	Ontario	Rockwell Automation	Industrial Automation
Canada	Ottawa, Mexical BC	Clover	Printer consumables
Canada	Toronto	Fenwick Automotive	Automotive/Engineering
Canada	Conception Bay South	A & S Rebuilders	Automotive
Canada	Quebec	ABSCO Brake Limited	Automotive
Canada	Deer Lake	Adams Alternator Starter	Automotive
Canada	Sault Ste. Marie	Algoma Auto-Electric Rebuilders	Automotive
Canada	Rocky View	Allied Transmissions Ltd.	Automotive
Canada	Wasaga Beach	APRA 1984 Past President	Automotive
Canada	Coaticook	Armatures Coaticook, Inc.	Automotive
Canada	Ottawa	Ascot Alternator	Automotive
Canada	Brandon	Assiniboine Community College	Automotive
Canada	Terrebonne	Atelier Dynamo	Automotive
Canada	Uxbridge	ATL Industries	Automotive
Canada	Meadow Lake	Auto & Tractor Supply Co. Ltd.	Automotive
Canada	Winnipeg	Autoline Products Ltd.	Automotive
Canada	Edmonton	BAAN Powertrain Corp.	Automotive
Canada	London	Baymor Auto Electric	Automotive
Canada	Winnipeg	Beacon Auto Electric, Inc.	Automotive
Canada	Concord	Blue Streak Electronics	Automotive
Canada	Toronto	Boston Auto Electric of Canada, Inc.	Automotive
Canada	London	Brake & Steering Rebuilders	Automotive

Canada	Victoria	Brian Roberts Auto Electric Ltd.	Automotive
Canada	Richmond	Brighthouse Auto Electric	Automotive
Canada	Gratenhurst	Brunton Farm (Alternator Starter Shop)	Automotive
Canada	Scarborough	Canadian Auto Elec & CV Drives, Inc.	Automotive
Canada	Oshawa	CAS Products	Automotive
Canada	Abbotsford	CCON Auto Cores, Inc.	Automotive
Canada	North York	CSD INTERNATIONAL, INC.	Automotive
Canada	Lethbridge	Custom Auto Electric	Automotive
Canada	Woodbridge	D&V Electronics Ltd.	Automotive
Canada	St. Remi	Dayer, Inc.	Automotive
Canada	Mississauga	Denso Sales Canada, Inc.	Automotive
Canada	Edmonton	Discount Truck Parts Ltd.	Automotive
Canada	Concord	Dixie Electric Ltd	Automotive
Canada	Bridgewater	Dufferin Auto & Diesel Electric Co., Ltd	Automotive
Canada	Langley	Dundee Auto Electric Limited	Automotive
Canada	Edmonton	Edmonton Brake & Clutch Ltd.	Automotive
Canada	Chicoutimi	EM Frein	Automotive
Canada	Anjou	Embrayages Bernier Inc.	Automotive
Canada	Erskine	Erskine Auto Electric Ltd.	Automotive
Canada	Burlington	Euro-Drive Clutches Inc.	Automotive
Canada	Fergus	Fergus Starter & Alternator	Automotive
Canada	Toronto	Fil-Mor Automotive & Clutch Prod. Ltd.	Automotive
Canada	Chatham	Guspro, Inc.	Automotive
Canada	Sudbury	Herold Supply	Automotive
Canada	Kingston	Independent Alternator and Starter, Ltd.	Automotive
Canada	Saskatoon	Karam Auto Ltd.	Automotive
Canada	Calgary	KBR	Automotive
Canada	Saskatoon	Labelle's Alternator & Starter	Automotive
Canada	Red Deer	Ladwig's Automotive Ltd.	Automotive
Canada	Woodbridge	Launacore Auto Parts Inc.	Automotive
Canada	Chateauguay	Les Industries Powermotive Industries, Inc.	Automotive
Canada	Woodbridge	Litens Automotive Group	Automotive
Canada	Pintendre	LKQ Pintendre	Automotive
Canada	Concord	M & T - 2001 Limited	Automotive
Canada	Clarksburg	Mackey Auto Electric	Automotive
Canada	Elkford	McRae's Auto Electric Ltd.	Automotive
Canada	Ottawa	National Remanufacturing Centre	Automotive
Canada	Brampton	Newton's Electric, Inc.	Automotive
Canada	Fort St. John	Northern Auto Electric	Automotive
Canada	Nisku	O T S Auto Electric Ltd.	Automotive
Canada	Terrebonne	P M T Cores, Inc.	Automotive
Canada	Duncan	P.C. Auto Electric Ltd.	Automotive
Canada	Mississauga	Powerite Automotive	Automotive
Canada	Calgary	Pro-Built	Automotive
Canada	Montreal	Proceco Ltd.	Automotive
Canada	Saint-Laurent	Promecanix, Inc.	Automotive
Canada	Coteau Du Lac	Qualitek	Automotive
Canada	Toronto	R.T.A. Automotive Limited	Automotive
Canada	Concord	RCP, Inc.	Automotive
Canada	Rocky Mtn. House	Rocky Auto Electric & Diesel Repair Ltd.	Automotive

Canada	Vernon	Roko Service Ltd.	Automotive
Canada	Toronto	Stanford Electric Rebuilders Ltd.	Automotive
Canada	Toronto	Start Auto Electric Ltd.	Automotive
Canada	Edmonton	Superior Industrial Frictions, Ltd.	Automotive
Canada	Montreal	Techno CVC, Inc.	Automotive
Canada	Mississauga	Total Auto Core, Inc.	Automotive
Chile	Antofagasta	Komatsu	Industrial automation, mining
China	Shanghai	Caterpillar	Construction Equipment
China	Shanghai	Volkswagen	Automotive/Engineering
China	Shanghai	Shanghai Xingfu Ruibeide Powertrain Company	Automotive
China	Nankou (Beijing)	SKF	Railway, Bearings
China	Pudong, Shanghai	Rockwell Automation	Industrial Automation
China	Xiangfan	Cummins	Automotive/engineering
China	Yulin	Guangxi Yuchai Machinery Co., Ltd	Engines
China	Suzhou	Fuji Xerox	Office Equipment
China	Hunan Province	Liuyang manufacturing industry	Construction Equipment & auto parts
China		Lutong	Automotive/Engineering
China		Junan Fuqiang Power Company	Automotive/Engineering
China	Haicang, Xiamen	Cascade	Forklifts
China	Shanghai	Meiden and Applied Materials	Semiconductor chipmaking equipment
China	Shenzhen	IBM	Servers
China	Various	Print Rite	printer consumables
China	Wuhan	Sevalo	Hydraulic excavators
Hong Kong, China	Hong Kong	Print Rite	Printer consumables
Indonesia	Balikpapan, Kalimantan, Sumatra, Irian	Komatsu	Construction Equipment
Indonesia	Bali	P.T. Global Paper Indonesia	Printer consumables
Indonesia	Jakarta	Mitra Samanta Printech	Printer consumables
Indonesia	Bogor City	UD Moeri Indonesia	Printer consumables
Indonesia	Jakarta	PT Hexindo Adiperkasa	Earthmoving Equipment
Indonesia	Kawasan Industrial Park, Bekasi, West Java	PT Katsushiro Ind.	Industrial machinery
Indonesia	Bekasi, West Java	PT Hitachi Construction	Construction equipment/industrial machinery
Indonesia	Jakarta	PT Sanggar Sara Baja	Heavy equipment
Korea	(various)	Hyundai	Construction Equipment
Korea	Gyeonggi-Do	Combase, Inc.	Printer consumables
Korea	Soul-t'ukpyolsi	TNIRP Inc	Printer consumables
Macao, China	Macao	Utec	Printer consumables
Malaysia	Nilai	SKF	Bearings / Electrical Parts
Malaysia	Senai, Johor	Everspark	Automotive/Engineering
Malaysia	Johor and Parit Sulong	Motor Car Parts of America	Automotive/Engineering
Malaysia	Pulau Pinang	Net Peripheral	IT equipment
Malaysia	Pulau Pinang	Virtual Source Enterprise	Printer consumables
Malaysia	Kuala Lumpur	Genesis One Enterprise	Printer consumables
Malaysia	Johor Bahru	Mewatech Solutions Enterprise	Printer consumables
Malaysia	Seri Kembangan	Toner Express	Printer consumables

Malaysia	Senai	Everspark Industries	Automotive
Mexico	Nuevo Laredo	Caterpillar	Construction Equipment
Mexico	Tijuana	Motor Car Parts of America	Automotive/Engineering
Mexico	Guadalajara	Kodak	Single-use cameras
Mexico	Mexico	Contec de Mexico	Electronics, ICT
Mexico	Mexico City	Rockwell Automation	Industrial Automation
Mexico	Aguascalientes	Flextronics	Electronics, ICT, Printer consumables
Mexico	San Luis Potosi	Cummins	Automotive
Mexico	Monterrey	Fenwick Automotive	Automotive
Mexico	Mexico City	Agoce Frenos De Aire S.A. De C.V.	Air brake rebuilders
Mexico	Tlalneantla	Alta Mecanica Industrial, S.A. De C.V	Automotive: brakes
Mexico	Monterrey	Auto Mecanica Roel, S.A. De C.V.	Power steering rebuilders
Mexico	Monterrey	Ever Auto Partes	Automotive: various
Mexico	Queretaro	Expertos Entren Motriz SA De CV	Automotive: transmissions
Mexico	Toluca	Industrias Kirkwood	Automotive: various
Mexico	Naucalpan	M & G Quality Products	Automotive: various
Mexico	Chihuahua	Reconstructora Refamex	Automotive: various
Mexico	San Luis Potosi	Remy Remanufacturing De Mexico	Automotive: various
Mexico	Ocoyoacac	Schunk Electro Carbon, S.A. De C.V.	Carbon brushes
Mexico	Ciudad López Mateos	Multi Soluciones en Impresión	Printer cartridges
Mexico	Mexico City	Reciclados Profesionales de Mexico	Printer cartridges
New Zealand	Penrose	Siemens	Industrial automation
New Zealand	Auckland	Auto Clutch Limited	Automotive: clutch
New Zealand	Christchurch	Clutch Systems (NZ) Ltd.	Automotive: various
Peru	Lima	Motores Remanufacturados del Peru	Automotive: motors
Philippines	Antipolo City	CTL Image Enterprises	Printer Consumables
Philippines	San Pablo, Laguna	888 MB Ortega Industrial	Industrial machinery
Singapore	Singapore	Caterpillar	Construction Equipment
Chinese Taipei	New Taipei City	PLIT Ltd.	Printer consumables
Chinese Taipei	New Taipei City	Sunon Media	Printer consumables
Chinese Taipei	New Taipei City	Auto Mill & Supply Co. Ltd.	Automotive: various
Chinese Taipei	Changhua County	Procar International Co., Ltd.	Automotive: A/C
Chinese Taipei	Kaohsiung City	Yong Jun Turbotech Co. Ltd	Automotive
Thailand	Bangkok	TPS Solution Co., Ltd	Printer consumables
Thailand	Bangkok	TSK Automotive	Automotive/Engineering
Thailand	Bangkok	Inter Computer Service and Technology	Electronics, ICT
Thailand	Soi Prajit	Yic Thailand Co	Electronics, ICT
Thailand	Tasai	Thai Ribbon Technology Company	Electronics, ICT
Thailand	Ladprao	Interprint Imaging Company	Electronics, ICT
Viet Nam	Ho Chi Minh City	Cartridge World	Printer cartridges
Viet Nam	Hochiminh City	Clover	Printer consumables
Viet Nam		Sota Tractors	Tractors