

REMANUFACTURING UPDATE MARCH 2014

RESEARCH & DEVELOPMENT NEWS FROM BAYREUTH



Editorial

Dear Readers,

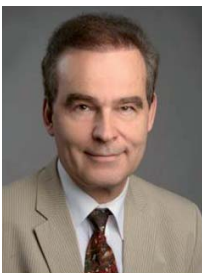
twelve days ago, our remanufacturing expert engineer Sandra Seifert, who always puts together this our quarterly newsletter for you, gave birth to her first child. Congratulations!

It is a young boy named Theo and both mother and baby are well.

But luckily Sandra considers this newsletter also „her baby“ - so you are receiving today's edition from her home office.

Enjoy reading!

Rolf Steinhilper



→ **Rolf Steinhilper**
University Professor
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Development of a Reman Methodology for Carbon Fiber Components

Reman companies operate very successfully in the field of worn parts. A potentially strong future market is predicted for the remanufacturing of lightweight products and more specifically for components made from carbon fiber reinforced plastics (CFRP). Components made of CFRP are used in the automotive, aviation, and wind power industry due to their excellent mechanical properties and their high specific material characteristics.

Yet, this market perspective stays widely unconsidered by reman companies, especially due to the nonexistence of satisfactory repair strategies. The challenge for the repair of CFRP is to restore its initial product properties like its structural strength. Previously used repair strategies are based on empirical values and are processed manually. However this approach is not suited to ensure a consistent quality level with good reproducibility and a defined component strength. For that reason today's common practice is to replace the damaged component by a new one.

To ensure a sustainable use of lightweight materials the Fraunhofer Project Group Process Innovation developed a methodology to repair CFRP components. In the corresponding scientific project ReCarbofit both users and manufacturers of CFRP components benefit from the development of a holistic repair methodology for carbon fiber reinforced components. In the scope of the project the complete repair process was covered including damage detection, damage classification, repair strategy selection and strength verification of the repaired component.

With the experience drawn from numerous projects in the CFRP industry a representative database with different typical dama-

ge cases was created. In order to gain information on the damaged area and the possible effects of the damage, the components were analyzed with different non-destructive testing methods. The results have been used to develop a classification model. This includes different damage classes and proposes specific repair technique to the presented damage.

Additionally a cost efficient non-destructive testing technique was established. Therefore alternative techniques like ultrasonic testing, active thermography, X-ray inspection and computer tomography were analyzed and evaluated. The best results for the requirements of the participating companies could be found by active thermography.

The main objective of the research project was the definition of method-based repair techniques for CFRP components. For that purpose different repair techniques were tested and evaluated according to the restored component strength and the technical feasibility of its repair procedures. Thereby, different material removal techniques, surface preparations, repair materials and layup orientations were evaluated for their influence on tensile strength. The results provide a possibility to choose an applicable repair technique as a function of the extent of damage.

CFRP repair is expected to receive increased attention in the future due to a rising demand for lightweight materials. In terms of economic and ecological aspects further research efforts are necessary to maintain thermoset plastics in the product life cycle for as long as possible.

→ **Florian Ellert**
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Cooperation Network E-NV: Solving the Challenges of Obsolescence Management for Electronic Assemblies

Rising component complexity, increasing globalization and rapidly growing diversity of variants steadily shorten the life cycle of electronic assemblies. Because of these facts many electronic assemblies are obsolete just a few years after their launch. This causes problems both on customer's and on manufacturer's side.

On the one hand it is often not possible to repair an electronic assembly because of obsolete components. That's why the customers have to dispose their defect products and buy some new. On the other hand manufacturers of electronic assemblies have to do expensive redesigns to produce and support those for a long time. Both cases are causing an economic and environmental damage. To solve the described problems the cooperation network E-NV was established in January 2014. The main objective of the cooperation network is to develop an innovative, economic and practicable solution for extending the life cycles of electronic assemblies. Focused industries are automotive, railway, and automation. To achieve this objective the network has the following technological priorities: Long time

storage, remanufacturing, reverse engineering, reliability engineering and obsolescence management.

At the moment the cooperation network consists of ten small and medium-sized enterprises and one research institute. Network manager is the Fraunhofer Project Group Process Innovation in Bayreuth. If you are interested to become a partner of the cooperation network or if you like to get further information please visit our network homepage: www.e-nv.de.



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Save the Date

17 - 20/03/2014

RLA @ Supply Chain & Transportation in Atlanta, USA

07 - 08/04/2014

RLA @ Home Delivery World 2014 in Atlanta, USA

29 - 30/04/2014

RLA @ Home Delivery World UK 2014 in London, United Kingdom

21 - 23/05/2014

APRA European Remanufacturing Symposium with Exhibition in Rimini, Italy

17 - 18/06/2014

RLA Conference & Expo in Amsterdam, Netherlands

02 - 03/07/2014

Exzellente Fabriken planen und bauen in Aachen, Germany

05 - 06/08/2014

RLA Conference & Expo: São Paulo 2014

23 - 24/09/2014

RLA Conference & Expo in Singapore

01 - 03/11/2014

BigR ReMaTec USA in Las Vegas, USA
RLA Conference & Expo: São Paulo 2014

Meet one of our Experts - Today: Dipl.-Ing. Frank Kübler

Today we would like to introduce Dipl.-Ing. Frank Kübler to you. Mr. Kübler is our expert for resource efficient manufacturing and remanufacturing operations.

Frank Kübler

Age: 32

Nationality: German



Career: 2004-2010 degree in mechanical engineering from Technical University of Munich.

2010 research assistant at Professor Steinhilpers Chair Manufacturing and Remanufacturing Technology.

What are your activities in remanufacturing research?

I manage the transnational research project sustainability in remanufacturing operations www.siro-research.eu. In this project, my team and myself are optimizing processes of automotive parts remanufacturing with focus on sustainability.

How did you come to remanufacturing?

One of my first projects at the Chair Manufacturing and Remanufacturing Technology was to improve the productivity of a Swedish remanufacturing company. Because of my insights, I became fond of the business model remanufacturing.

What do you do in your free time?

Restore wooden classic yachts, equestrian

What gives you pleasure?

Enjoying a fresh breeze on the seaside. When my team and myself are successful.

What are your wishes for the reman branch?

Remanufacturing will be an obligatory end of life alternative for most products.

Imprint

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