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FRAUNHOFER INSTITUTE FOR MANUFACTURING TECHNOLOGY AND ADVANCED MATERIALS IFAM

BREMEN BONDING

TRAINING CENTER FOR ADHESIVE BONDING TECHNOLOGY



COURSE PROGRAM

2016

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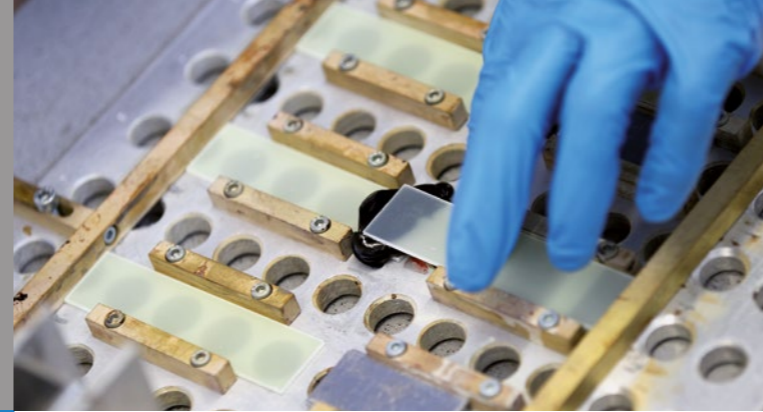
TRAINING CENTER FOR ADHESIVE BONDING TECHNOLOGY

Fraunhofer Institute for Manufacturing Technology
and Advanced Materials IFAM

– Workforce Qualification and Technology Transfer –

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This brochure gives an overview of the courses at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Bremen, to be held in 2016.

The **European Adhesive Bonder**, **European Adhesive Specialist** and **European Adhesive Engineer** courses are offered in German or English.

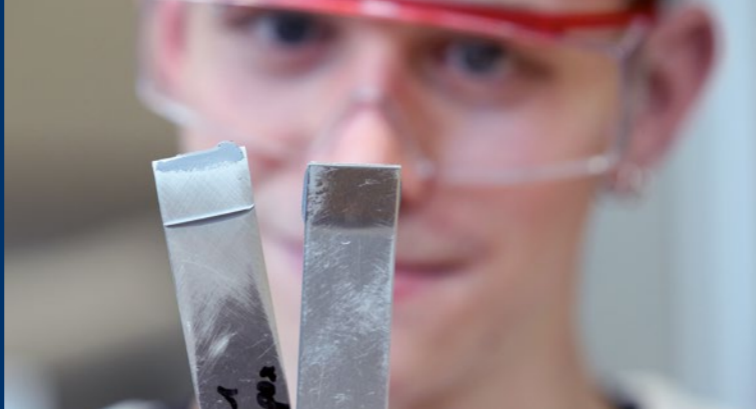
If you wish an in-house training course to be provided at your company, we are able to hold the courses in either German, English, or with translation into the respective national language at any suitable location anywhere in the world. Please contact us so that we can discuss the necessary arrangements for the relevant course and plan the timing. We hope you find our course program of interest and look forward to welcome you and your colleagues as participants in one of our courses.

The training team of the Fraunhofer IFAM

www.bremen-bonding.com

www.academy.fraunhofer.de/en.html

Request registration form via e-mail
register@ifam.fraunhofer.de or download at
www.bremen-bonding.com



→ EUROPEAN ADHESIVE BONDER (EAB)

IN ACCORDANCE WITH GUIDELINE EWF 515

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Objectives of the training course

The participants will become trained for using adhesive bonding technology in industrial production. The course provides a fundamental understanding of adhesive bonding, enabling the special aspects of bonding processes to be understood and taken account of in production. The relevant context and importance of work instructions hence become clear. Successful completion of the course enables participants to independently undertake bonding work in a technically competent way.

Duration of the training course and examination

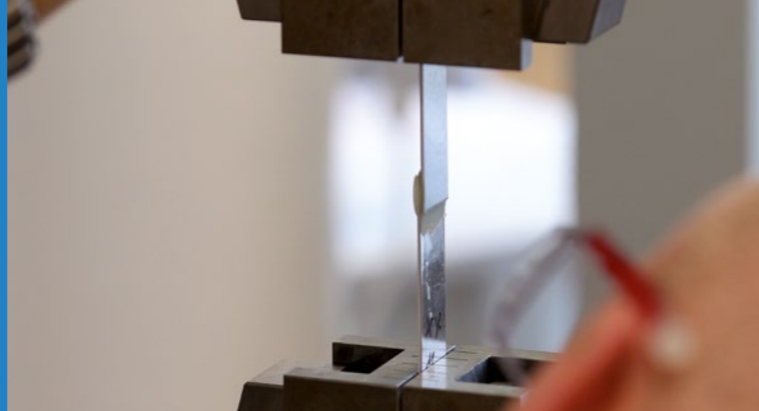
The EWF-European Adhesive Bonder training course is fulltime and lasts 40 hours (one week), including the examination. To aid the learning, the theoretical part is backed up by practical assignments. The course ends with an examination (practical, written and oral). A prerequisite for taking the examination is regular attendance at the course sessions.

Preliminary course

The computer-based preliminary course touches topics which will be covered in the actual course and is offered to participants in advance online to freshen up their knowledge, if they wish. The learning program was developed to ease introduction to the theory and to refresh old knowledge. This preliminary course can be studied at any time and place which is convenient for the course participant and allows customized preparation for those who will take the actual training course.

Target groups and prerequisites for participation

The target groups are employees in companies which use and make adhesives who carry out bonding work independently following work instructions. Participants must have a good knowledge of the course language to enable them to understand the course material and take the examination in that language.



Information about the training course

Information about the course content



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Registration



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Course fee European Adhesive Bonder – EAB (one week)

The course fee is **1395 €** and covers:

- Preliminary course
- Course documentation
- EWF certificate
- Lunch and drinks during breaks

There is an additional one-off examination fee of **235 €**.

Course dates 2016 – EAB

The training course will be held at Bremen.

Seminar code

EAB-E-1-16

28.11.–02.12.2016

The final examination is on the last day of the course.

The number of participants is limited.

Concerning In-house courses please contact us.

COURSE CONTENT

Fundamentals

The course starts by introducing fundamental aspects of adhesive bonding technology. A comparison is made between adhesive bonding technology and other joining techniques. The integrity of bonds and the factors that influence the quality of a bond are explained using the concept of bonding forces. Participants acquire a fundamental understanding of the properties of adhesives.

Adhesives

In this section of the course the participants are familiarized with the most important types of adhesives used in industry and learn about the properties of those adhesives and their main areas of application. Emphasis is put on the importance of processing and applying the adhesives in the correct way and on the curing conditions for the different adhesive systems. These aspects are reinforced by practical assignments.

Surface treatment

Customized surface treatment is vital if a bond is to function correctly and have good long-term stability. The course introduces surface treatment techniques that are normally carried out by workers as a direct part of the adhesive bonding process. Practical experiments give participants experience applying

these techniques to a variety of substrates. Particular emphasis is put on the use of primers and adhesion promoters.

Test methods

In the practical part of the course adhesive bonds are created and then tested using commonly used procedures. Evaluation of the bond strengths and the fracture patterns allows adhesive bond defects and their effects to be recognized, so complementing the theoretical part of the course.

Manufacturing technology

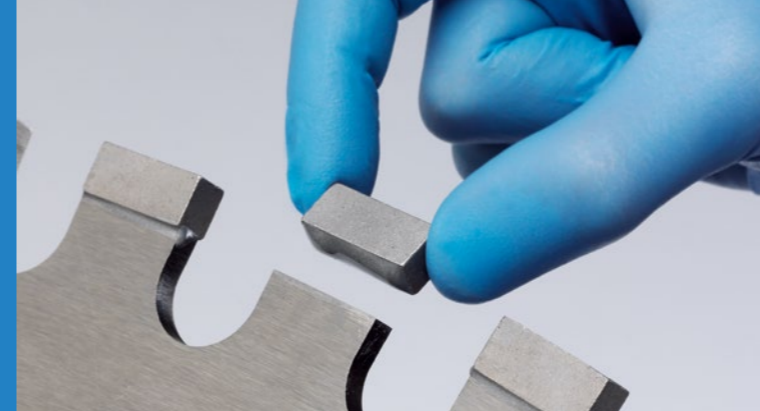
The participants will be introduced in the fundamental aspects of manual and automatic production engineering. Besides they will be instructed how to identify and avoid sources of error.

Work and environmental protection

Participants learn about the principles for recognizing potential dangers when working with adhesives and auxiliary materials used in adhesive bonding processes. The importance of using protective equipment and wearing protective clothing is highlighted.

→ EUROPEAN ADHESIVE SPECIALIST (EAS)

IN ACCORDANCE WITH GUIDELINE EWF 516



Objectives of the training course

The participants will become trained for using adhesive bonding technology in industrial production and for product development. On successful completion of the course, participants will be able to prepare work instructions and supervise European Adhesive Bonders and other employees on theoretical and practical matters relating to adhesive bonding. You will also be able to plan, organize, and monitor adhesive processes, monitor process parameters, and if necessary adjust them. You will be in a position to identify irregularities in production processes and respond accordingly. Successful completion of the course qualifies the person to take on the tasks and responsibilities of the supervisor in charge of adhesive bonding work in a company (in accordance with DIN 6701-2 and guidelines DVS® 3310 and 3311).

Duration of the training course and examination

The total duration of the course, including the examination, is 120 hours and is split into three one-week sections focusing on different topics. To aid the learning, the theoretical part is backed up by practical assignments. Each course week concludes with a written intermediate examination. The practical examination takes place during the second week of the course. The final examination must be taken within a period of twelve months. A prerequisite for taking the examination is regular attendance at the course sessions.

Preliminary course

The computer-based preliminary course touches topics which will be covered in the actual course and is offered to participants in advance online to freshen up their knowledge, if they wish. The learning program was developed to ease introduction to the theory and to refresh old knowledge. This preliminary course can be studied at any time and place which is convenient for the course participant and allows customized preparation for those who will take the actual training course.

Target groups and prerequisites for participation

Target groups are employees of adhesive users in industry and the handicrafts sector, adhesive manufacturers, the adhesives trade, and testing and quality assurance personnel. The course is aimed at master craftsmen in the handicrafts sector and industry and technologists and specialized technical employees with a professional qualification and leading function who wish to expand their knowledge in adhesive bonding technology. Participants must have sufficient knowledge of the course language to enable them to understand the course material and take the examinations in that language.

Information about the training course

Information about the course content



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Course fee European Adhesive Specialist – EAS (three one week sections)

The course fee is **1495 €** per course week and covers:

- Preliminary course
- Course documentation
- EWF certificate
- Lunch and drinks during breaks

There is an additional one-off examination fee of **420 €**.

Course dates 2016 – EAS

The training course will be held at Bremen.

Seminar code

EAS-E-1-16

Week 1	11.04. – 15.04.2016
Week 2	18.04. – 22.04.2016
Week 3	25.04. – 29.04.2016

The final examination is on the last day of the course.

The number of participants is limited.

Concerning In-house courses please contact us.



COURSE CONTENT

Fundamentals

The course starts off by introducing fundamental aspects of adhesive bonding technology. The advantages and limitations of adhesive bonding technology will be covered and a comparison will be made with other joining techniques. Participants will acquire a fundamental understanding of bonding mechanisms and the properties of adhesives. The key importance of wetting for the adhesive bonding process and how this can be influenced by various parameters will be highlighted.

Adhesives

There are thousands of different adhesive products. The range of products extends from elastic-soft polyurethanes right through to high strength epoxy resins. Participants will learn which types of adhesives are most important for industry and will get an insight into their distinctive properties and how they differ. Instruction on the processing and application of adhesives – accompanied by practical exercises using different types of adhesives – are key aspects of the first week of the course.

Substrates

The course will provide the participants with knowledge about the structure and behavior of substrate materials when they are subjected to external forces and environmental influences. This will help participants estimate deformation and property changes in adhesive layers, and so understand the resulting requirements of material specific surface treatments.

Surface treatment

The importance of the condition of the surface of substrates for the adhesive bonding process is another topic covered in the course. Participants will gain theoretical and practical knowledge of the most important methods of surface treatment for a variety of different materials. The topics covered will range from cleaning the surfaces of substrates via mechanical, physical and chemical pre-treatment methods right through to the use of primers and adhesion-promoters.

Properties of the adhesive layer

In order to assess the suitability of an adhesive for a particular application it is necessary to appraise the deformation behavior. Put another way, the factors that determine the deformation behavior set the limitations for the use of a particular adhesive system. Fillers and absorbed moisture can affect the deformation behavior just as significantly as temperature and adhesive layer thickness.

Test methods

The quality of an adhesive bonded joint concerns far more than merely high strength after curing. Other factors that are just as important are reproducibility and long-term stability. The necessity to use destructive test methods to determine the quality of joints is demonstrated using samples which the participants will make themselves during the course. The limitations regarding the transferability of results from standard tests to real components will become clear.

Work safety and environmental protection

“Ignorance” is the main cause of accidents at work. The correct handling of adhesive systems hence requires an extensive fundamental knowledge of the specific hazards associated with the materials being used. This does not only apply to the adhesives but also to the many auxiliary materials that are used in the adhesive bonding process.

→ EUROPEAN ADHESIVE ENGINEER (EAE)

IN ACCORDANCE WITH GUIDELINE EWF 517

Objectives of the training course

The EWF-European Adhesive Engineer course trains employees to supervise the whole spectrum of bonding work from product development to production and on to repair activities. For correct technical application of adhesive bonding technology this function requires interdisciplinary thought, decision-making and actions, as well as being able to oversee and take account of the entire product life cycle in a responsible way. Successful completion of the course qualifies the person to take on the tasks and responsibilities of the supervisor in charge of adhesive bonding work (in accordance with DIN 6701-2 and guidelines DVS® 3310 and 3311).

Duration of the training course and examination

The total duration of the course, including the examination, is 332 hours and is split into 8 one-week sections focusing on different topics. The course weeks are spread out over a period of 9 months. The first seven course weeks finish with a written examination. The whole course must be completed within a maximum period of 3 years and ends with an oral examination.

Target groups and prerequisites for participation

The target groups are engineers and scientists in all disciplines and sectors of industry who either currently use adhesive bonding technology or wish to use this technology in the future. The EWF-European Adhesive Engineer course fulfills the requirements of DIN EN ISO 9001 for specially qualified personnel for supervising

processes whose results cannot be fully verified and which are hence also referred to as "special processes".

A precondition for participation is a degree in engineering or natural sciences (Bachelor degree and higher) at a university or technical college. Persons interested in the course, but who do not fulfill these requirements, can participate in the course as guests, but will not be allowed to take the examinations accredited by DVS/EWF. Full course attendance will be confirmed by the issue of a certificate of attendance. This is a recognized qualification for taking on the tasks and responsibilities of the supervisor in charge of adhesive bonding work in a company (in accordance with DIN 6701-2 and guidelines DVS® 3310 and 3311). Participants must have sufficient knowledge of the course language to enable them to understand the course material and other technical literature and take the written and oral examinations in that language.

Information about the training course

Information about the course content



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Registration



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Course fee European Adhesive Engineer – EAE (eight one week sections)

The course fee is **1635 €** per course week and covers:

- Preliminary course
- Course documentation
- EWF certificate
- Lunch and drinks during breaks

There is an additional one-off examination fee of **705 €**.

Course dates 2016/2017 – EAE

The training course will be held at Bremen.

Seminar code

EAE-E-1-16 / 17

Week 1	19.09. – 23.09.2016
Week 2	24.10. – 28.10.2016
Week 3	28.11. – 02.12.2016
Week 4	16.01. – 20.01.2017
Week 5	20.02. – 24.02.2017
Week 6	27.03. – 31.03.2017
Week 7	08.05. – 12.05.2017
Week 8	12.06. – 16.06.2017

The final examination is on the last day of the course.

The number of participants is limited.



COURSE CONTENT

Principles of materials

This topic covers the fundamental principles for understanding adhesive bonding technology. This includes knowledge about the primary and secondary structures of polymers and other materials and the relationship between this structural information and application-related properties.

Bonding properties of materials to be joined

The subject matter here concerns the bonding properties (bulk and surface) of metals, plastics, fiber reinforced plastics, and glass. These are key aspects for understanding the necessity for and effects of material specific surface treatment methods.

Adhesives, bonding mechanisms and application properties

The processing characteristics and curing mechanisms of different types of adhesives and their properties in the solid state are key topics of adhesive bonding technology. An insight into the composition and formulation of adhesives will also be given. A practical session will take place to consolidate the theoretical information.

Analysis of adhesives and surfaces

Amongst the analytical methods mentioned in the course are:

- Differential Scanning Calorimetry (DSC)
- Dynamic Mechanical Analysis (DMA)
- Thermal Gravimetric Analysis (TGA)
- Infrared Spectroscopy (IR)
- Liquid, gas and gel permeation chromatography
- Differential Thermal Analysis (DTA)
- Electron Spectroscopy for Chemical Analysis (ESCA)
- Auger Electron Spectroscopy (AES)
- Scanning Probe Microscopy (SPM)
- Transmission Electron Microscopy (TEM)

Adhesion

The main focus and objective is to provide knowledge about the principles of adhesion and to give an insight into the current research that is being carried out in this area. The understanding of the fundamental forces and principles, which are the basis of adhesive bonding technology but which also provide limitations, is used for critical appraisal of many established models, proposals and processes. Practical experiments will also be undertaken.

Surface treatment

This topic covers the specialized cleaning of different surfaces as well as the effectiveness and areas of application of material specific pre- and subsequent treatment techniques.

Manufacturing technology

The rheological behavior of adhesives as well as application and curing techniques are dealt with in this part of the course. This includes the construction and performance of the individual components of manual, semi-automatic and fully automatic equipment.

Joining techniques

This section will include a discussion of welding, clinching, punch bolting and blind bolting. The aim is to identify synergies when these techniques are combined with adhesive bonding and to hence open up new applications for which the individual techniques alone are inadequate.

Construction

Further development of dimensioning and calculation methods for adhesive bonding technology is currently a hot topic of research. This course gives an insight into rules of thumb and fundamental analytical as well as numerical models and describes

their practical relevance. Using examples, the procedure for solving a variety of constructional tasks will be explained. Attention will also be put on matters relating to the evaluation of constructions and safety-factors.

Quality management, test methods (destructive and non-destructive), ageing

To supplement a general quality management system, which is not dealt with here, the course covers the topic of quality management from a specific technological point of view. The entire process chain from the conception stage right through to the end of the lifetime of the product is considered from a quality assurance perspective. The focus is put on non-destructive test methods and the ageing of bonded joints.

Work safety and environmental aspects

The area of responsibility of an EAE also involves participation in decision making on matters relating to work safety and environmental protection. The course hence covers physiological and environmental issues, statutory regulations and protective measures relating to adhesives.

IN-HOUSE COURSES

➔ EUROPEAN ADHESIVE BONDER

in accordance with guideline EWF 515

➔ EUROPEAN ADHESIVE SPECIALIST

in accordance with guideline EWF 516

For companies who wish to train a large number of their employees at the same time, there is the option of holding courses at your company. Each adhesive bonding technology course has from 10 up to a maximum of 18 participants.

The prerequisites for participation, length of the courses, objectives and course materials are identical to the courses held at the Training Center for Adhesive Bonding Technology in Bremen. On successful completion of the course, including the examination, the participants will receive an EWF certificate (adhesive bonding technology) for the relevant course.

General requirements for training courses held outside the Training Center for Adhesive Bonding Technology are as follows:

- The availability of, if possible, two separate rooms
- Theory room with table, flip-chart or whiteboard, including pens, etc.
- Practical room with work benches, adequate ventilation and air extraction, plus facilities for waste disposal. If agreements are made, production areas can also be used.

One part of the practical training of the adhesive bonding courses covers the destructive testing of lap shear specimens. If no testing machine is available at the company, the Fraunhofer IFAM will make available a universal testing machine for the duration of the course.

All equipment and consumables required for the practical part within the adhesive bonding courses such as adhesives, substrate materials, etc. will be made available by the Training Center for Adhesive Bonding Technology and transported to the venue prior to the course.

In consultation with the company, certain aspects of the course can be tailored so that they have particular relevance to production-related issues.

➔ In-house courses – national and international

If you wish an in-house training course to be provided at your company, we are able to hold the courses in

- German,
- English, or
- with translation into the respective national language at any suitable location anywhere in the world.

Please contact us so that we can discuss the necessary arrangements for the relevant course and plan the timing.

Contact



European Adhesive Bonder

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European Adhesive Specialist

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Training establishment

The Training Center for Adhesive Bonding Technology is a DVS®/EWF-accredited training establishment in accordance with DIN EN ISO/IEC 17024.

Venue

Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM
– Adhesive Bonding Technology and Surfaces –

Training Center for Adhesive Bonding Technology

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International Cooperation Partners

China

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Phone +31 6 49773178 | www.lijmacademie.nl

Poland

Instytut Spawalnictwa
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Phone +48 32 33 58 329

If you have any questions about applying a training course, then please contact

Petra Theuerkauff

Training Center for Adhesive Bonding Technology

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Hotel accommodation for courses in Bremen

Single room hotel accommodation is available at a special rate at the

Atlantic Hotel Universum | Wiener Strasse 4 | 28359 Bremen | Germany
Phone +49 421 2467-0 | reservierung.ahu@atlantic-hotels.de
www.atlantic-hotels.de

Please contact the hotel directly to make a reservation, quoting booking code **"IFAM 2016"**

7THINGS my basic hotel | Universitätsallee 4 | 28359 Bremen | Germany
Phone +49 421 2202-603 | info@7things-hotel.de | www.7things-hotel.de
Please contact the hotel directly to make a reservation, quoting booking code **"Fraunhofer-IFAM"**

Ringhotel Munte am Stadtwald | Parkallee 299 | 28213 Bremen | Germany
Phone +49 421 2202-0 | info@hotel-munte.de | www.hotel-munte.de
Please contact the hotel directly to make a reservation, quoting booking code **"Fraunhofer"**

The hotels are only a 10 minute walk from the venues in Bremen.

Cancellation

If a place on a course is cancelled more than four weeks before the start of the course, 15% of the total course fee is still payable. If a place on a course is cancelled more than seven days (but less than four weeks) before the start of the course, 50% of the total course fee is still payable. Cancellation at shorter notice will mean the whole course fee still has to be paid. Naturally, it is possible for another person to take your place. If there are an insufficient number of participants for a course, we reserve the right to cancel the course giving seven days' notice.

The number of participants on each course is limited.
The invoice for the full course fee is issued after the start of a course.
The prices are valid until 30.06.2017.

Please note that it is not possible to reimburse any part of the course fee, for example in the event a participant does not complete the course, does not pass the examinations, or wishes to take a different course at another time.

Training courses abroad

Please contact us so that we can discuss the necessary arrangements for the relevant course and plan the timing.

TRAINING COURSE VENUE

Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM – Adhesive Bonding Technology and Surfaces –

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Training course venues

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Wiener Strasse 12 | 28359 Bremen | Germany
www.bremen-bonding.com

– Training Center for Fiber Composite Technology –

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FRAUNHOFER ACADEMY



Fraunhofer IFAM is a founding member of the Fraunhofer Academy

Handling new technology and new methods and processes wants to be learned. If current research knowledge is to unfold its innovative potential in companies, smart minds with the relevant know-how are needed. The Fraunhofer Academy, the consortium of all Fraunhofer Institutes with a focus on advanced training, provides the necessary qualification for specialists and managers. It is the expert supplier for advanced training on the job. Specialists and managers profit from a unique knowledge transfer flowing from Fraunhofer Research to the companies. The “knowledge generators” simultaneously act as “knowledge transmitters”.

What started out as a project, has developed into a well established and renowned institution of the German education and training landscape.

Since the founding the Fraunhofer Academy has continually grown. In the beginning phase the academy comprised the activities of four Fraunhofer Institutes offering one program each, today 17 facilities are responsible for 25 programs in five thematic areas:

- Technology and Innovation
- Energy and Sustainability
- Logistics and Production
- Production and Testing Technology
- Information and Communication

Due to the close co-operation with industry and businesses, Fraunhofer knows the current technical as well as social challenges and turns research results into usable innovations in an efficient and targeted way. This up-to-date knowledge from experience is reflected in the course offers of the Fraunhofer Academy.

For further information about the Academy’s program
www.academy.fraunhofer.de/en.html



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