Mulilo Danish Vocational Education & Training Program in

Composite Technology

Education Materials (Examples)





In our MDVP Composite Technology vocational education and training program, you will get access to a wide variety of education and training materials, covering all you need to know about working with composite materials and moulds, as well as the chemicals and production, finishing, and repair techniques applied in the composite industry.

Here, we want to give you a little taste of the types of materials you will be meet during the program.

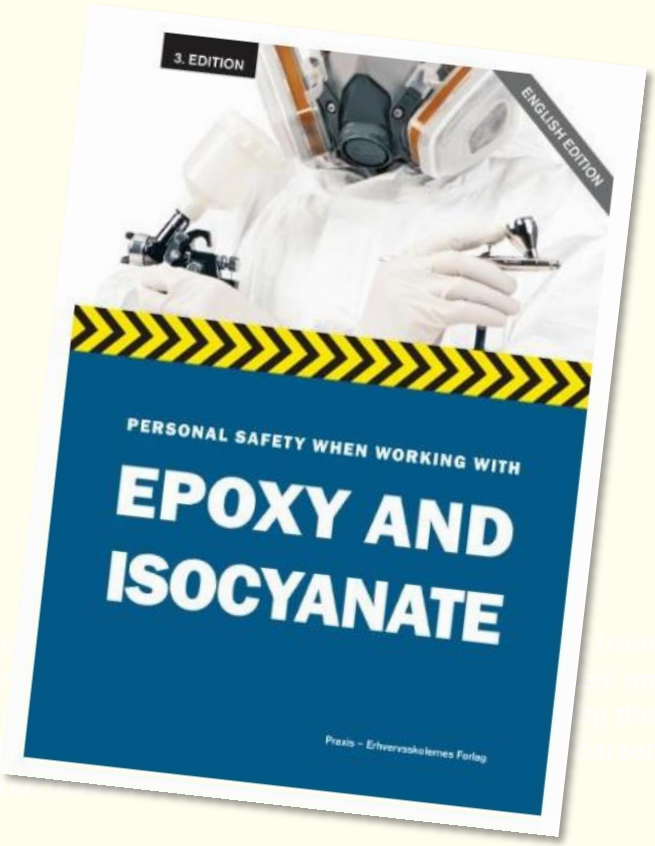
All materials are yours to keep and use – also after you complete your vocational education and training at Techcollege.

1. Safety Handbook

As part of your training, you will receive your own personal copy of the book: “Personal Safety when working with Epoxy and Isocyanate (English Edition)”.

This book contains all the important safety precautions and European professional standards for working safely and professionally with composite technology processes.

We will use the standards of this book actively in each and every workshop exercise and process throughout your training.



TECHCOLLEGE

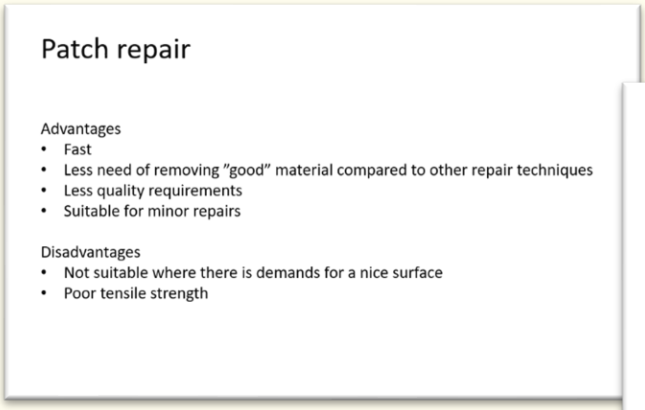
2. Presentations of theory and technical subjects

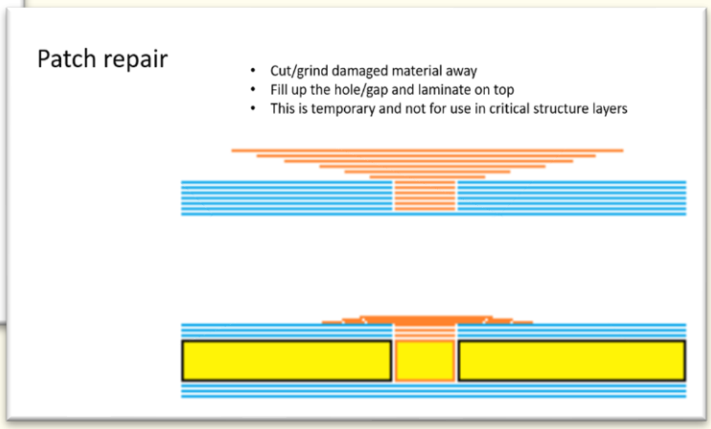
Your trainer will introduce and present new theory and new technical subjects with the use of digital presentations (made in Microsoft PowerPoint or similar). All of these presentations will be placed on our **Digital Learning Platform** for you to download and store on your own computer.

The goal of the presentations is to give you a quick overview of the most important concepts and learning points of the subject – and you can add your own notes to each presentation to help you remember the key details.

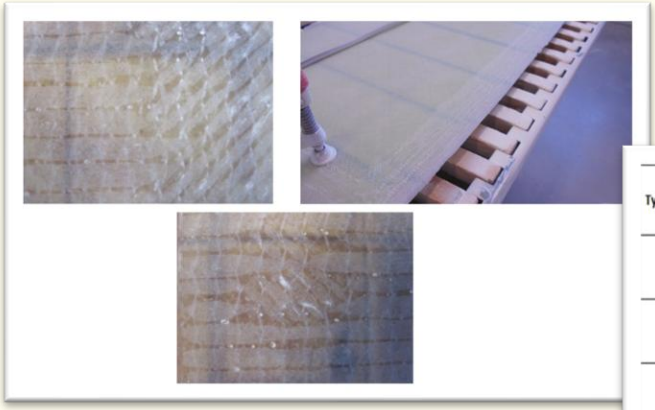
Here is an example of (parts of) a presentation introducing various repair techniques, which may be used on composite products:

Presentation of one repair technique in headlines:

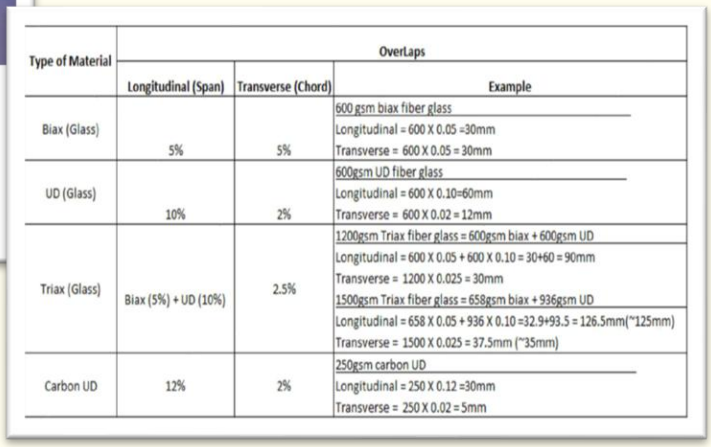




Illustrations of repair technique application:



Technical specifications reference table:



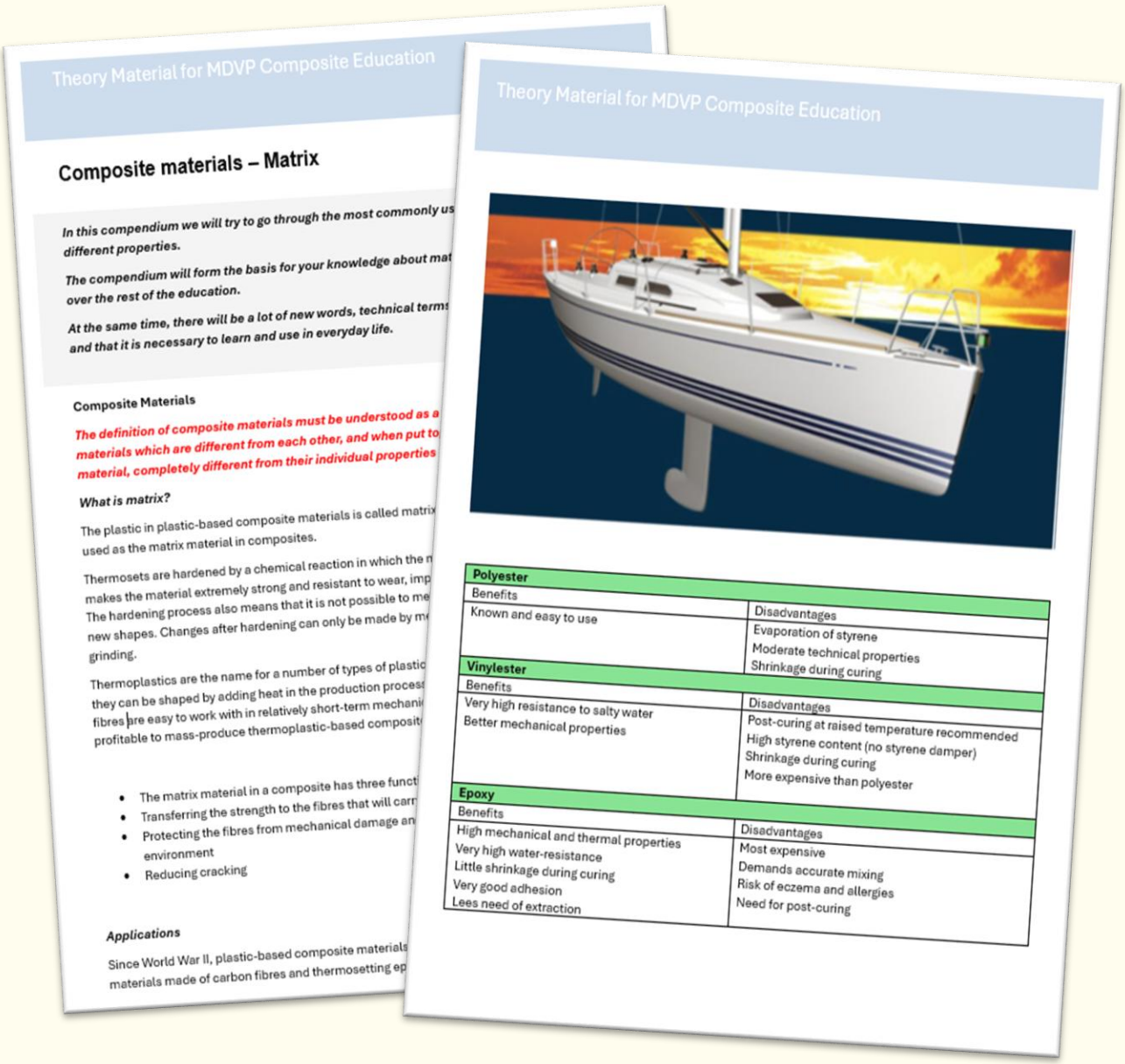
Type of Material	OverLaps		
	Longitudinal (Span)	Transverse (Chord)	Example
Biax (Glass)	5%	5%	600 gsm biax fiber glass Longitudinal = 600 X 0.05 =30mm Transverse = 600 X 0.05 = 30mm
UD (Glass)	10%	2%	600gsm UD fiber glass Longitudinal = 600 X 0.10=60mm Transverse = 600 X 0.02 = 12mm
Triax (Glass)	Biax (5%) + UD (10%)	2.5%	1200gsm Triax fiber glass = 600gsm biax + 600gsm UD Longitudinal = 600 X 0.05 + 600 X 0.10 = 30+60 = 90mm Transverse = 1200 X 0.025 = 30mm 1500gsm Triax fiber glass = 658gsm biax + 936gsm UD Longitudinal = 658 X 0.05 + 936 X 0.10 =32.9+93.5 = 126.5mm(~125mm) Transverse = 1500 X 0.025 = 37.5mm (~35mm)
Carbon UD	12%	2%	250gsm carbon UD Longitudinal = 250 X 0.12 =30mm Transverse = 250 X 0.02 = 5mm

3. Material Compendia for you to use as Reference

For the different subjects in your vocational education and training, we put together a number of digital compendia, which you may download from our **Digital Learning Platform,** store on your own computer, and use as reference material to help you when you are working on exercises and project assignments.

The goal of each compendium is to give you an easy reference access to key knowledge and data relevant for the relevant subject – that you can come back to and use whenever you need it.

Here is an example of an initial compendium, introducing you to the concept of "Matrix" in composite Materials:



Theory Material for MDVP Composite Education

Composite materials – Matrix

In this compendium we will try to go through the most commonly us
different properties.

The compendium will form the basis for your knowledge about mat
over the rest of the education.

At the same time, there will be a lot of new words, technical terms
and that it is necessary to learn and use in everyday life.

Composite Materials

The definition of composite materials must be understood as a
materials which are different from each other, and when put to
material, completely different from their individual properties

What is matrix?

The plastic in plastic-based composite materials is called matrix
used as the matrix material in composites.

Thermosets are hardened by a chemical reaction in which the n
makes the material extremely strong and resistant to wear, imp
The hardening process also means that it is not possible to me
new shapes. Changes after hardening can only be made by m
grinding.

Thermoplastics are the name for a number of types of plastic
they can be shaped by adding heat in the production process
fibres are easy to work with in relatively short-term mechani
profitable to mass-produce thermoplastic-based composit

- The matrix material in a composite has three funct
- Transferring the strength to the fibres that will carr
- Protecting the fibres from mechanical damage an
  environment
- Reducing cracking

Applications

Since World War II, plastic-based composite materials
materials made of carbon fibres and thermosetting ep

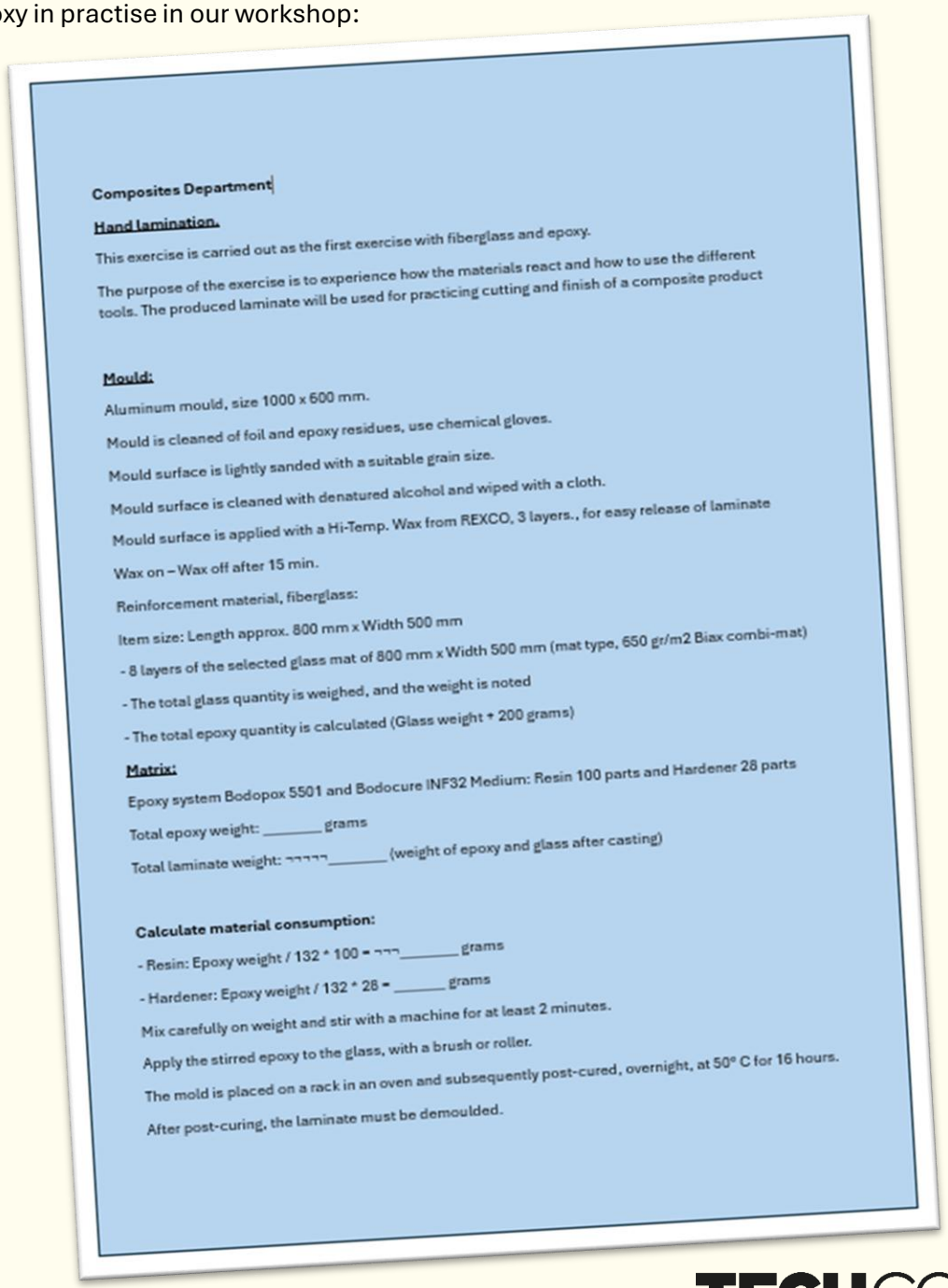
Theory Material for MDVP Composite Education

Polyester	
Benefits	Disadvantages
Known and easy to use	Evaporation of styrene Moderate technical properties Shrinkage during curing
Vinylester	
Benefits	Disadvantages
Very high resistance to salty water Better mechanical properties	Post-curing at raised temperature recommended High styrene content (no styrene damper) Shrinkage during curing More expensive than polyester
Epoxy	
Benefits	Disadvantages
High mechanical and thermal properties Very high water-resistance Little shrinkage during curing Very good adhesion Lees need of extraction	Most expensive Demands accurate mixing Risk of eczema and allergies Need for post-curing

4. Workshop Assignments

During your training, you will perform many practical assignments in our composite workshop. Some are small exercises, some are larger projects, and you will work both individually and in teams. In many of the assignments, we have created realistic industry-like production or repair tasks, where you must calculate correct the production material amounts and measurements to use – and the perform the task in practise.

Here is the assignment description of the first assignment, you will meet in working with fibreglass and epoxy in practise in our workshop:



Composites Department

Hand lamination.

This exercise is carried out as the first exercise with fiberglass and epoxy.

The purpose of the exercise is to experience how the materials react and how to use the different tools. The produced laminate will be used for practicing cutting and finish of a composite product

Mould:

Aluminum mould, size 1000 x 600 mm.

Mould is cleaned of foil and epoxy residues, use chemical gloves.

Mould surface is lightly sanded with a suitable grain size.

Mould surface is cleaned with denatured alcohol and wiped with a cloth.

Mould surface is applied with a Hi-Temp. Wax from REXCO, 3 layers., for easy release of laminate

Wax on – Wax off after 15 min.

Reinforcement material, fiberglass:

Item size: Length approx. 800 mm x Width 500 mm

- 8 layers of the selected glass mat of 800 mm x Width 500 mm (mat type, 650 gr/m2 Biax combi-mat)

- The total glass quantity is weighed, and the weight is noted

- The total epoxy quantity is calculated (Glass weight + 200 grams)

Matrix:

Epoxy system Bodopox 5501 and Bodocure INF32 Medium: Resin 100 parts and Hardener 28 parts

Total epoxy weight: _____ grams

Total laminate weight: ררררר_____ (weight of epoxy and glass after casting)

Calculate material consumption:

- Resin: Epoxy weight / 132 * 100 = ררר_____ grams

- Hardener: Epoxy weight / 132 * 28 = _____ grams

Mix carefully on weight and stir with a machine for at least 2 minutes.

Apply the stirred epoxy to the glass, with a brush or roller.

The mold is placed on a rack in an oven and subsequently post-cured, overnight, at 50° C for 16 hours.

After post-curing, the laminate must be demoulded.