

ebalta tooling resins

Contemporary solutions in mould and tool making

Tooling Resins Blocks Auxiliaries Silicones



ebalta

Solution Takes Shape

Tooling resins are our world. The power of innovation is our motor.

*In 30 years of the production of high-quality tooling resins, **ebalta** has developed new resin systems for the optimisation of the production of parts again and again. Especially the high requirements in the making of moulds and tools motivate us to find more and more efficient solutions. Today, **ebalta** tooling resins mark a new standard for this demanding area – as an economical alternative to all the conventional materials.*

Factor progress: growing demands require new ways of thinking

Formula 1, aerospace, shipbuilding – plastic compounds today characterise the most sensitive and modern technologies and fields of research since they are much cheaper and lighter than metallic materials, although they are as solid as them. For the same reasons, the materials being used here also offer an enormous potential for the making of moulds and tools: the time and cost expenses in the production of parts are clearly reduced – and your competitive advantage is enhanced. This is a valuable aspect with regard to the growing competitive pressure.

The strategy of success: resin systems that are adapted to your requirements, a broad range of additional products aligned to these and the intense dialogue. These three pillars guide you from the first consultation on the selection of materials through to the support in the production directly to your goal: a perfect result of a convincing quality.

Whoever goes new ways proves to be farsighted. And deserves the most experienced advisors.

Many ways lead to the mould: as different as the production processes and materials used may be in mould and tool making, the framework conditions are the same everywhere. Increasing time and cost pressure may not affect precision, rapidity and the high technical quality of the production. Efficient approaches to a problem with new materials and the continuous advice of our very experienced technicians offer a promising perspective for this.

Plastics instead of metals – benefit from our experience

The most convincing criterion for the use of tooling resins: You obtain an enormous competitive advantage. In order to facilitate the correct handling of these new materials, we ensure that you are supported by skilled experts right from the beginning. In this, experience is the best advisor: on the basis of numerous successful projects, we find the solution which perfectly satisfies your needs. Already the right choice of materials and processes is a decisive factor:

- What does your tool have to perform?
- What is the target life cycle?
- Would the use of tooling resins fulfil your target or would a metallic material suit better?

Whenever you are looking for advice, our experts are at your disposal for the complete duration of the project.

ebalta materials for mould and tool making

- Surface and casting resins
- Blocks and boards
- Silicones, lay up pastes
- Additional products and auxiliaries

Fast, guaranteed: worldwide distribution network

ebalta will deliver your product quickly and reliably – including customer support, order assembly and shipping – so that you can concentrate on what's important to you: tool making.

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ebalta tooling resins for the highest precision and safe production cycles in mould and tool making

*Wherever perfection, precision and process safety are demanded, high-quality tooling resin systems are the more economical and safer solution. Our product portfolio which was developed especially for this area of use is manifold. **ebalta** offers you a high-performance product for any kind of requirements.*

The sum of all the advantages is your competitive advantage.

Moulds made of **ebalta** tooling resins offer numerous advantages. Depending on the manufacturing process in which moulds of plastic are used, there are great potentials for saving costs. Regardless of the requirements to the mould, you will always achieve an optimum price-performance ratio with plastics – and of course the result is of the highest quality. With many applications and especially with very complex geometries, tooling resins are the only possibility to have the production carried out economically.

Time

Thanks to the quick availability of **ebalta** tooling resins, such moulds lead to a considerable reduction of the overall duration of the project – depending on the process, it can be reduced to up to 30% of steel moulds, for example.

Material

Very often, the material used is the highest cost factor. Due to their low specific weight the use of plastics can contribute to a clear reduction in cost here, too, with

sufficient strength. Especially with big moulds, the use of material can be decreased to up to 50 %.

Geometry

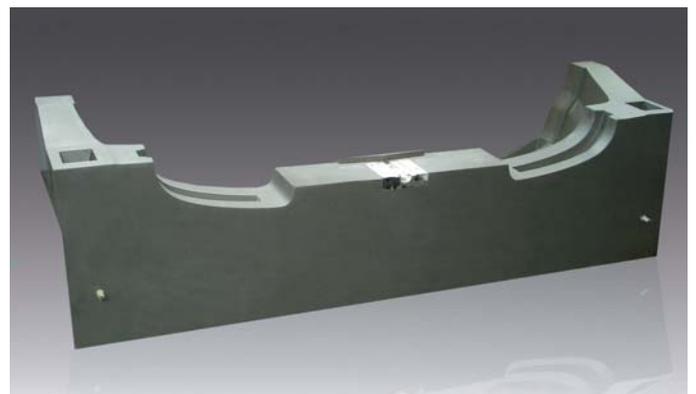
The increasing complexity of the geometries can be much easier implemented with **ebalta** tooling resins than with metals. This is the only possibility to get big bended open-die surfaces.

ebalta tooling resins versus metals – all the advantages at a glance

- quick
- at a favourable price
- considerably lower weight
- smooth production, even of very big and complex moulds
- easy carrying out of alterations
- individual alignment to the respective application
- heating close to the contours
- moulding of already existing models or parts
- quicker milling



RTM mould with a surface of **OH 50**
Picture credits: First Composites GmbH



RIM mould with a surface of **OH 35**
Picture credits: Ajas GmbH

30 years of experience are the best expert knowledge: ebalta shows you new potentials and individual solutions

*As a manufacturer of tooling resin systems as well as of block and board materials, **ebalta** has gained a maximum of competence and experience in the making of moulds and tools, which is now the best basis for developing new tooling resin systems exactly adapted to the application practice. Every project is a new challenge, and even experienced mould makers seek advice from our experts. This does not only but especially apply for the switch towards an innovative technology.*

Special tasks require special solutions

Which possibilities do our materials offer you? What has to be observed in the manufacturing process? Are the geometries of the parts limited? All these questions will be answered by our team of experts whenever you need to be supported. In addition, we supply you with a material which fulfils the requirements to the desired tool or the mould by 100 %. If necessary, it will be aligned with your specific requirements in our company laboratory. **ebalta** tooling resins have proved to be reliable materials offering you an exceptionally broad range of characteristics.

*Compare it – here comes an overview of the advantages of **ebalta** tooling resins*

- complete product range
- very high quality of characteristics
- individual complete solutions according to your requirements
- individual development of materials: materials are modified or customised for the respective application

Performance and service for mould and tool making

- 30 years of experience
- Deep know-how: counselling by application engineers, model and tool makers with many years of experience
- Intensive advice during the overall duration of the project
- High technical level
- Competent customer service
- Quick delivery
- Certified quality management system according to DIN EN ISO 9001:2000
- Certified environmental management system according to DIN EN ISO 14001
- Company laboratory



Mechanical testing of the materials



Development and modification in the company laboratory

Production methods

Various production methods require flexible products – and good counselling

For the production of moulds and tools, different methods are used. The most common ones are the build-up and the casting method as well as milling. Our experts are at your disposal with a lot of expert knowledge and practical experience for the right choice of method and materials.

The methods:

- Build-up method
- Casting method
- Milling

This is how we find the right method

- Size
- Precision
- Equipment available
- Time available
- Initial situation: CAD data, master model, part or drawing

Product diversity includes a diversity of solutions

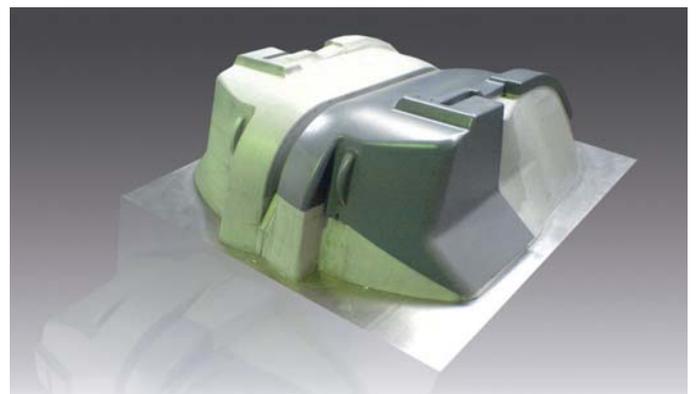
- Surface resins (OH)
- Coupling pastes (KP)
- Laminating and general purpose resins (LH + AH)
- Casting resins (GH)
- Pastes (PS)
- Blocks and boards
(*ebablock*[®], *ebaboard*, *ebazell*)
- Silicones
- Additional products and auxiliaries

ebalta avails of the right material and an economical solution for you for any type of task. You have the task, we have the experience for aligning the material exactly with your task and the production method. Our team knows which product is the right one for your special application.

If necessary, your material will be individually developed in our laboratory. All the *ebalta* materials are tested according to all the quality standards and technically faultless.



Foam mould of **GH 781**
Picture credits: Frimo Group GmbH

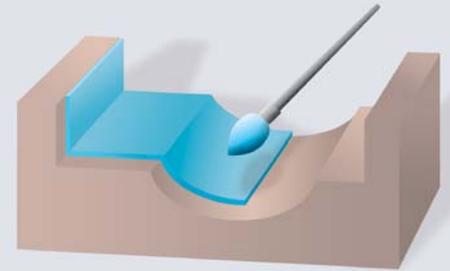


Vacuum forming double tool of **GH 705** (1200 x 1200 x 400 mm³)

The build-up method

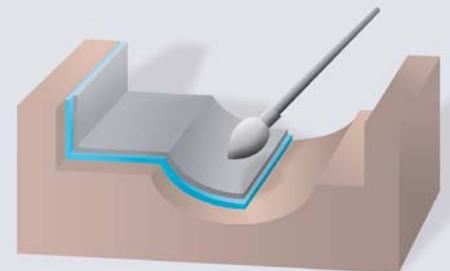
1. Surface layer

The surface resin has to be aligned with mechanical, thermal and chemical requirements and with the loads to be expected. Within the pot life, a surface layer of 1-2 mm thickness is applied free of blisters to the counter mould, to which a release agent has been applied.



2. Coupling layer

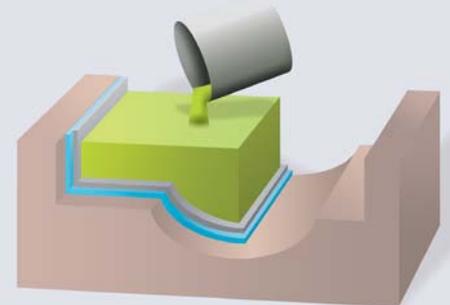
The coupling layer is applied with a thickness of max. 1 mm to the slightly cured but still sticky surface layer. This ensures a good adhesion of the surface resin to the backfilling. Furthermore, this grants for a sufficiently long processing time for the following working cycles.



3. Backfilling

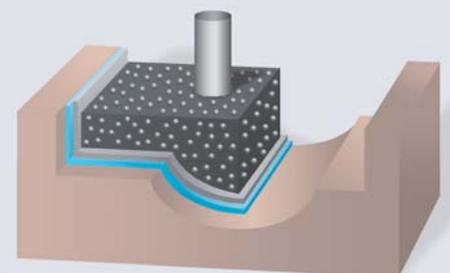
Backfilling casting

The next step is the casting with a casting resin system which in most of the cases is additionally filled with granular materials such as e.g. aluminium grit. In doing so, shrinkage is reduced and the casting volume is increased.



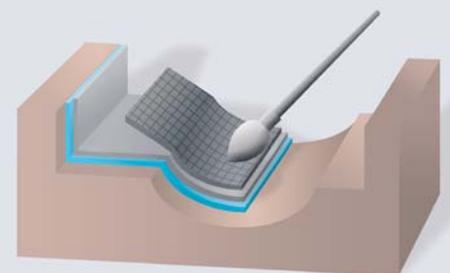
Backfilling stamping

A general purpose resin is filled with granular materials such as aluminium grit for example in order to get a stamping mass. This is stamped to the coupling layer in several layers. Due to the stamping, the material solidifies to a compact mass which is able to absorb developing forces.



Backfilling laminating

A laminate is made of glass fabrics and laminating resin. The laminate should be manufactured symmetrically and with as little resin as possible. Instead of fabrics, it is also possible to work with laminate paste. The support of the laminate layer is achieved with a frame construction.

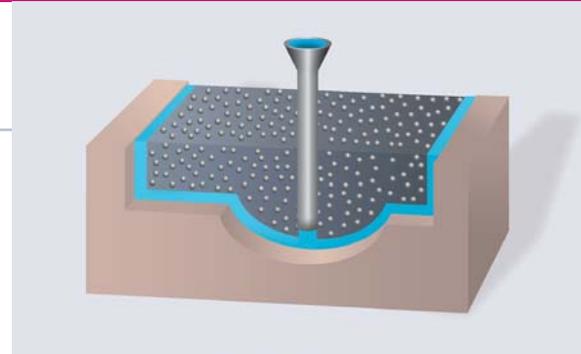


The casting method

For face casting and for mass casting, **ebalta** offers different casting resin systems depending on the task.

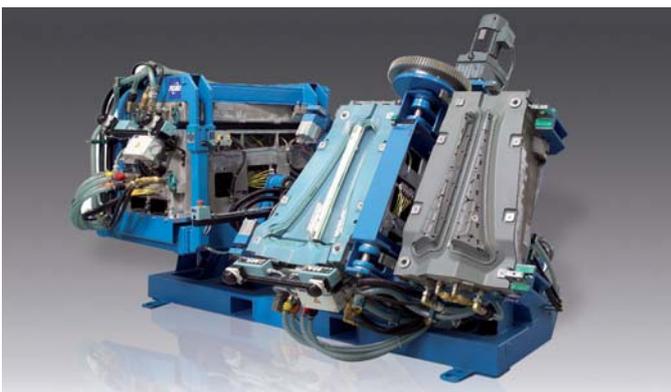
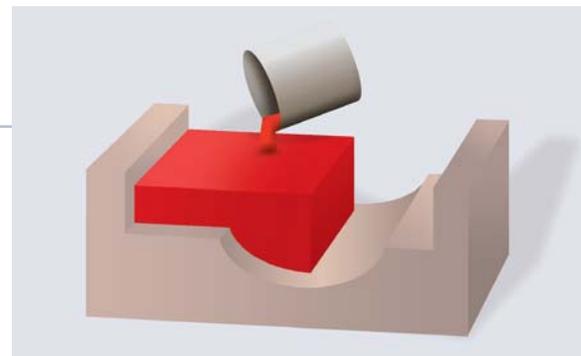
Face casting

In this method, an easily castable resin system is applied with a thickness of 10-20 mm to a prefabricated carrier or a core. This allows for building large surfaces with complex structures.



Mass casting

Small to medium volumes are mass cast with a filled casting resin system – very simple, very quick.



Double tool of **GH 781** and **GH 705** (face casting)
Picture credits: Frimo Group GmbH



Fixture of **SG 2000** (mass casting)

The milling

The blocks and boards of **ebalta** are especially suited for milling. For the optimum machining, we offer you the material-dependent milling parameters for all the **ebablock**[®], **ebaboard** and **ebazell** products. The milling resistance of plastics is lower so that shorter machine runtimes are achieved.

*Milling of the block material **ebablock**[®]*

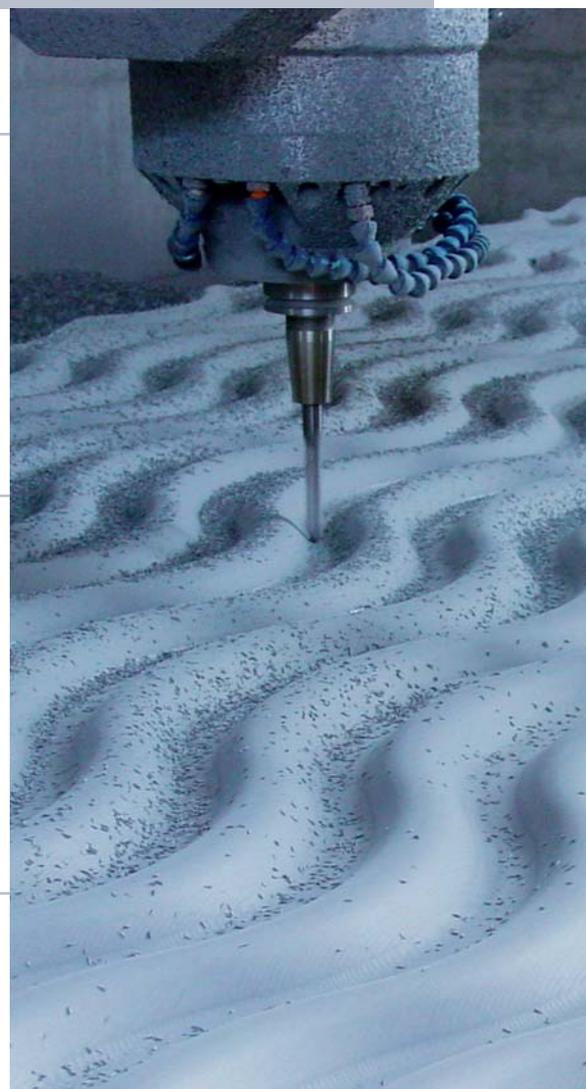
A contour block cast and customised according to your individual requirements is milled to the final dimensions. The result: a homogenous surface free of joints is achieved (c.f. page 20/21).

*Milling of the board material **ebaboard** + **ebazell***

The board material **ebaboard** and **ebazell** are available in various standard dimensions. A milling blank which will finally be milled to its final dimensions is manufactured by cutting and gluing the boards with the recommended **ebalta** glues.

Milling of lay-up paste

In this manufacturing process, PU or EP paste systems are machine-applied with a layer thickness of up to 40 mm to a carrier and then milled to their final dimensions after the paste has hardened.



Vacuum forming mould of **ebablock**[®] W

Foam and RIM moulds

For producing rigid and flexible foam parts, **ebalta** tooling resins are especially suited. Their dense surface presents even the finest surface details true to nature. To PU foam and release and cleaning agents, they are highly resistant. They are abrasion resistant and heat resistant and are very accurate to dimension.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Heat resistance (HDT) ISO 75 [°C] | Compressive strength [MPa] |
|------------------------|--------------------------|-----------------|--------------------|---|-----------------------------|--------------------------|-----------------------------------|----------------------------|
| Build-up method | | | | | | | | |
| Surface layer | OH 3-1 | CH-1 | yellow | styrene and solvent resistant | 15-20 | 20-22 | 104 ± 3 | 135 ± 10 |
| | OH 35 | CH-1 | black | resistant to chemicals, can be polished | 20-30 | 16-24 | 98 ± 3 | 105 ± 10 |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. | n. a. |
| Backfilling Casting | GH 705 + alu grit | TL | alu-grey | heat resistant, very dimensional accurate | 65-75 | 16-24 | 91 ± 3 | 80 ± 5 |
| Backfilling Stamping | AH 110 + alu grit | TL | yellow-transparent | unfilled, high fillable | 85-95 | 24-28 | 100 ± 3 | 115 ± 10 |
| | PS 06 | TL | alu-grey | heat resistant, conductive | 50-60 | 12-18 | 120 ± 5 | 105 ± 10 |
| Backfilling Laminating | AH 110 + fabrics | TGL | yellow-transparent | unfilled, high strength | 55-65 | 15-18 | 101 ± 3 | 115 ± 10 |
| | PS 05 | TLB | grey | heat resistant, glassfiber-filled | 50-60 | 16-24 | 105 ± 5 | 75 ± 5 |
| Casting method | | | | | | | | |
| Face casting | GH 781 | GH 781-S | grey | heat resistant, high strength | 90-110 (1000 g) | 12-14 | 116 ± 3 | 145 ± 10 |
| Mass casting | GH 754 | GH 754 | alu-grey | heat resistant, thick pouring | 100-120 | 18-24 | 101 ± 3 | 120 ± 10 |
| | SG 150 | Hardener powder | grey | heat resistant, fast curing | 18-22 | 0.5-1 | 163 ± 5 | 90 ± 10 |
| Milling | | | | | | | | |
| | ebablock® W | - | grey | high strength, wear resistant | n. a. | n. a. | 76 ± 2 | 110 ± 10 |
| | ebaboard PW 920 | - | green | very easy to machine, good edge strength | n. a. | n. a. | 80 ± 3 | 95 ± 5 |

Vacuum forming moulds

ebalta tooling resins are perfectly suited for the stress of surfaces of vacuum forming. The good heat resistance, the very good making and the easy handling are characteristics of these high-quality materials.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Heat resistance (HDT) ISO 75 [°C] | Compressive strength [MPa] |
|------------------------|--------------------------|-----------------|--------------------|---|-----------------------------|--------------------------|-----------------------------------|----------------------------|
| Build-up method | | | | | | | | |
| Surface layer | OH 38 | SR | alu-grey | good grinding, aluminium filled | 20-30 | 16-24 | 99 ± 3 | 110 ± 10 |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. | n. a. |
| Backfilling Casting | GH 754 + alu grit | GH 754 | alu-grey | heat resistant, high dimensional accuracy | 100-120 | 18-24 | 101 ± 3 | 120 ± 10 |
| Backfilling Stamping | AH 110 + alu grit | TL | yellow transparent | unfilled, high fillable | 85-95 | 24-28 | 100 ± 3 | 115 ± 10 |
| | PS 08 | TL | alu-grey | air permeable, aluminium filled | 45-60 | 16-24 | 80 ± 3 | 16 ± 2 |
| Backfilling Laminating | AH 110 + fabrics | TGL | yellow transparent | unfilled, high strength | 55-65 | 15-18 | 101 ± 3 | 115 ± 10 |
| | PS 05 | TLB | grey | heat resistant, glassfiber-filled | 50-60 | 16-24 | 105 ± 5 | 75 ± 5 |
| Casting method | | | | | | | | |
| Face casting | GH 781 | GH 781-S | grey | heat resistant, high strength | 90-110 (1000 g) | 12-14 | 116 ± 3 | 145 ± 10 |
| Mass casting | GH 705 | TL | alu-grey | heat resistant, aluminium filled | 65-75 | 16-24 | 91 ± 3 | 80 ± 5 |
| | GH 754 | GH 754 | alu-grey | heat resistant, thick pouring | 100-120 | 18-24 | 101 ± 3 | 120 ± 10 |
| | SG 150 | Hardener powder | grey | heat resistant, fast curing | 18-22 | 0.5-1 | 163 ± 5 | 90 ± 10 |
| | ebatemp | PUR 5 | alu-grey | fast curing, aluminium filled | 4.5-5.5 | 1-2 | 90 ± 3 | 56 ± 5 |
| Milling | | | | | | | | |
| | ebablock®1050 | - | light grey | well workable, fine microstructure | n. a. | n. a. | 98 ± 3 | 50 ± 5 |
| | ebablock® W | - | grey | high strength, wear resistant | n. a. | n. a. | 76 ± 2 | 110 ± 10 |

n. a. = not applicable

Moulds for the production of composites

ebalta epoxy resin systems were developed especially for the production of moulds for highly resistant components strengthened with glass or carbon fibers. They are chemical and styrene-resistant, easily polishable and have a very dense surface.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Heat resistance (HDT) ISO 75 [°C] |
|------------------------|------------------------|----------------|--------------------|--|-----------------------------|--------------------------|-----------------------------------|
| Build-up method | | | | | | | |
| Gelcoat layer | OH 4 | SR | white | universal | 15-20 | 3-5 | 82 ± 3 |
| | OH 50 | Hardener 03 | black | dense surface | 12-18 | 16-24 | 93 ± 3 |
| | OH 6-1 | CH-1 | blue | very abrasion resistant | 20-25 | 20-24 | 98 ± 3 |
| | OH 35 | CH-1 | black | chemical resistant | 20-30 | 16-24 | 98 ± 3 |
| | OH 35 | HM | black | heat resistant | 20-30 | 16-24 | 143 ± 5 |
| | OH 82 | TM | black | high heat resistant | 220-260 | 24-48 | 175 ± 5 |
| | OH 30 | OH 30 Hardener | white | high heat resistant | 160-200 | > 48 | > 170 |
| Coupling layer | KP 6 | TGL | grey | aluminium filled | 30-40 | 8-12 | n. a. |
| | KP 7-1 | TM | grey | heat resistant | 240-360 | 24-48 | n. a. |
| Backfilling stamping | AH 110 + alu grit | TL | yellow-transparent | highly fillable | 85-95 | 24-28 | 100 ± 3 |
| | PS 06 | TL | alu-grey | heat conductive | 50-60 | 12-18 | 120 ± 5 |
| | PS 07-1 | TM | alu-grey | high heat resistance | 70-80 | 24-36 | 175 ± 5 |
| Backfilling laminating | BLH Epoxy 200 | K 25 | green-like | good wetting properties GL-approval | 20-25 (100 g) | 8-10 | 81 ± 2 |
| | AH 110 | TL | yellow-transparent | high strength | 85-95 | 24-28 | 100 ± 3 |
| | LH 26 | LH 26 Hardener | brown-transparent | heat resistant | 120-150 | 10-16 | 147 ± 2 |
| | LH 28-1 | TM | brown-transparent | high heat resistance | 240-360 | 24-48 | 175 ± 3 |
| | LH 30 | LH 30 | brown-transparent | high heat resistance | 160-200 | > 48 | 181 ± 5 |
| | PS 03-1 | PS 03-1 | blue-grey | glassfiber-filled | 40-50 | 16-24 | 68 ± 2 |
| | PS 05 | TLB | grey | heat resistant | 50-60 | 16-24 | 105 ± 5 |
| | ebacryl L-1 | ebacryl EM-1 | light-beige | shrinkage free | approx. 35 | 8-12 | n. a. |



CRP component of *ebalta* epoxy resin



RTM mould of *ebalta* epoxy resin

Customised block material: with **ebablock**[®], you receive a product that is manufactured individually according to your requirements allowing you to manufacture joint-free moulds and tools.

| Method | Product recommendation | Colour | Material properties | Heat resistance (HDT) ISO 75 [°C] | Coefficient of thermal expansion [10 ⁻⁶ K ⁻¹] | Density at 20 °C [g/cm ³] |
|----------------|------------------------------------|------------|-----------------------------|-----------------------------------|--|---------------------------------------|
| Milling | | | | | | |
| | ebaboard L-1 | ochre | very easy to machine | 92 ± 2 | approx. 66 | 0.45 ± 0.02 |
| | ebablock[®] P 185 | blue | low thermal expansion | 115 ± 5 | approx. 39 | 1.86 ± 0.05 |
| | ebablock[®] EP 138 | mint-green | heat resistant up to 140 °C | 140 ± 3 | approx. 49 | 0.82 ± 0.02 |
| | ebablock[®] EP 678 | light-blue | very fine surface | 119 ± 3 | 35.7 ± 2 | 0.71 ± 0.02 |
| | P 26 | red-brown | layer up to 50 mm, EP | 54 ± 2 | approx. 65 | 0.75 ± 0.03 |
| | P 27 | grey | heat resistant | 86 ± 3 | 50-52 | 1.0 ± 0.03 |

Further EP boards available on request

ebalta lay-up pastes for moulds and tools

The machine-applied paste systems of **ebalta** produce joint-free surfaces of moulds and tools. They can be easily applied, can be easily milled and render dense surfaces.

Advantages EP lay-up paste P 26

- very exact with high dimensional accuracy
- layer thicknesses of 30-50 mm in one step
- low exothermy
- joint-free models and moulds for the automobile industry and vehicle design

Advantages EP lay-up paste P 27

- 15-30 mm layer possible in one step
- very well workable and dimensionally stable
- no sagging at vertical surfaces
- moulds for low temperature prepregs, Vacuum infusion tools and Vacuum thermoforming tools



Base construction for car wheel rim made of **ebaboard L-1, EP lay-up paste P 26**



Design study about high speed train by means of **EP lay-up paste P 26**

Sheet metal forming tools

Tooling resins are especially an alternative to steel in the production of deep-drawing tools. The use of **ebalta** tooling resins as a material for your sheet metal forming tasks offer you numerous advantages in comparison to the conventional use of metals. Our tooling resins for the forming of sheet metal are available as casting systems, boards and blocks.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20°C [min.] | Curing time at RT [hrs.] | Heat resistance (HDT) ISO 75 [°C] | Compressive strength [MPa] |
|------------------------|----------------------------|----------|--------------|---|----------------------------------|--------------------------------|---|----------------------------------|
| Casting method | | | | | | | | |
| Face casting | GH 760 | GL | grey | very dimensional accurate, abrasion resistant | 45-55 | 18-24 | 63 ± 2 | 120 ± 10 |
| Mass Casting | GM 708 + filler F-B | PUR 4 | beige | unfilled, high fillable | 45-60 | 16-24 | 76 ± 3 | 80 ± 8 |
| | GM 725-7 | PUR 13 | beige | thick pouring, high dimensional accuracy | 40-50 | 12-16 | 51 ± 2 | 76 ± 8 |
| Build-up method | | | | | | | | |
| Surface layer | OH 11 - steel | PUR 3 | oxide red | good surface slip, wear resistant | 20-25 | 3-5 | 68 ± 2 | 55 ± 5 |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. | n. a. |
| Backfilling Casting | GM 708 + filler F-B | PUR 4 | brown | unfilled, high fillable | 45-60 | 16-24 | 76 ± 3 | 80 ± 8 |
| | GM 725-7 | PUR 13 | beige | thick pouring, very dimensional accurate | 40-50 | 12-16 | 51 ± 2 | 76 ± 8 |
| Backfilling Stamping | AH 100 + filler F-B | TGL | trans-parent | unfilled, high fillable | 65-75 | 18-20 | 76 ± 2 | 100 ± 8 |
| Backfilling Laminating | AH 100 + fabrics | TGL | trans-parent | unfilled, slow curing | 65-75 | 18-20 | 76 ± 2 | 100 ± 8 |
| Milling | | | | | | | | |
| | ebablock® W | - | grey | high strength, wear resistant | n. a. | n. a. | 76 ± 3 | 110 ± 10 |
| | ebablock® 708 | - | beige | high strength, wear resistant | n. a. | n. a. | 70 ± 3 | 95 ± 8 |

n. a. = not applicable

Advantage counselling competence: Service right from the beginning

Our team of experts will support you with the choice of the right material for sheet metal forming. Three parameters are decisive:

- the geometry: drawing depth, radii, etc.
- the sheet metal material: alloy, thickness of the metal sheet
- the quantity

According to these three parameters, **ebalta** will supply you with the optimum advice: optimum feasibility, optimum safety, highest economic efficiency.

A sophisticated service concept for sheet metal forming

Besides well-grounded advice, **ebalta** will offer continuous support for your project, including support for the construction of tools and the process design, if you want this. Of course, we are at your disposal if you have any technological or constructive questions. At any time and also at your site.

ebalta tooling resins for your sheet metal forming task – all the advantages at a glance

Advantage of saving time

- Casting systems and boards will be delivered within a short time, individually cast blocks within 5-7 work-days in Germany
- Quick processing: **ebalta** tooling resins can be processed with clearly higher milling speeds and cutting depths. This results in a timely advantage of ca. 60 % in comparison to the grey casting GG25CrMo.

Advantage of saving costs

- Material, personnel, processing: the use of tooling resins as a material for your sheet metal forming task offers a high potential for cost savings in comparison to the use of steel. Our service team will gladly prepare a comparison of costs for you.

Advantage of flexibility

- The variety of the **ebalta** tooling resins allows for a flexible production. You can prepare any of our systems for the sheet metal forming technology as a casting system, standard board or an individually cast block.

Advantage of enlarged forming limits

- Higher maximum drawing ratios, lower maximum stamping forces, more even sheet thicknesses – the optimum sliding characteristics of **ebalta** tooling resins for sheet metal forming allow for numerous extensions of the forming limits.



Sheet metal forming tool of **ebablock**® W (outside door layer of a luxury sedan)



Formed sheet part (outside door layer of a luxury sedan)

Moulds for plaster, concrete and ceramics

Moulds for materials such as plaster, concrete and ceramics have to be very chemical-resistant, absorb little water and have a high-quality surface. Elastic systems should furthermore have a high tear strength. **ebalta** tooling resins fulfil all of these requirements to the highest extent.

| Method | Product recommendation | Hardner | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Shore hardness [Shore A/D] | Tensile strength [MPa] | Tear strength [kN/m] |
|-------------------------------|-----------------------------|---------|-------------|---|-----------------------------------|--------------------------------|----------------------------------|------------------------------|-------------------------|
| Build-up method | | | | | | | | | |
| Surface layer | OH 48 | Comp. B | green | very abrasion resistant, hard elastomeric | 25-30 | 20-24 | D 65 ± 3 | 26 ± 2 | n. a. |
| | GM 951 Thix | Comp. B | black | spreadable, high tear strength | 25-30 | 2-5 | A 55 ± 5 | 2.0 ± 0.5 | 10 ± 0.5* |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. | n. a. | n. a. |
| Backfilling Casting | GM 708 + filler F-B | PUR 4 | brown | unfilled, high fillable | 45-60 | 16-24 | D 82 ± 3 | 50 ± 5 | n. a. |
| | GM 725-7 | PUR 13 | beige | thick pouring, high dimensional accuracy | 40-50 | 12-16 | D 87 ± 3 | n. a. | n. a. |
| Backfilling Stamping | AH 100 + silica sand | TG | transparent | unfilled, high fillable | 40-50 | 10-12 | D 82 ± 3 | n. a. | n. a. |
| Backfilling Laminating | AH 100 + fabrics | TGL | transparent | unfilled, slow curing | 65-75 | 18-20 | D 87 ± 3 | n. a. | n. a. |
| | PS 03-1 | PS 03-1 | blue | glassfiber-filled, soft | 40-50 | 16-24 | D 75 ± 2 | n. a. | n. a. |
| Casting method | | | | | | | | | |
| Face casting/ Mass Casting | GM 951-1 | Comp. B | black | well castable, good tear propagation resistance | 40-50 | 16-24 | A 75 ± 2 | n. a. | n. a. |
| | GM 958 | Comp. B | red brown | very low water absorption, good flow properties | 20-30 | 20-24 | A 60 ± 3 | 5.5 ± 0.8 | 9.2 ± 5** |
| | GM 959 | Comp. B | amber | good flow properties, good degassing | 22-28 | 20-24 | A 45 ± 2 | 3.8 ± 0.3 | 9.2 ± 0.3** |
| Milling | | | | | | | | | |
| | ebaboard PW 920 | | green | very well workable, good edge strength | n. a. | n. a. | D 85 ± 3 | n. a. | n. a. |

n. a. = not applicable

* angle test specimen

** arcuate specimen with a notch of 1 mm

Fixtures and gauges

With **ebalta** tooling resins, fixtures and gauges can be manufactured in the easiest and quickest way. Compared to metallic materials, they facilitate the production and clearly save weight.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Shore hardness [Shore D] |
|---------------------------|---|----------|--------------------|---|--|-----------------------------|-----------------------------|
| Build-up method | | | | | | | |
| Surface layer | OH 4 | SR | white | very well spreadable, easy to grind | 15-20 | 3-5 | 90 ± 3 |
| | OH 6-1 | SR | blue | very abrasion resistant, very hard | 15-20 | 5-8 | 85 ± 3 |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. |
| Backfilling Laminating | AH 110 + fabrics | TGL | yellow-transparent | unfilled, slow curing | 55-65 | 15-18 | 85 ± 3 |
| | PS 03-1 | PS 03-1 | blue | glassfiber-filled, smooth | 40-50 | 16-24 | 75 ± 2 |
| Casting method | | | | | | | |
| Mass Casting | GM 708 + filler F-B | PUR 4 | brown | unfilled, high fillable | 40-50 | 1.5-2 | 88 ± 2 |
| | GM 725-7 | PUR 13 | beige | thick pouring, high dimensional accuracy | 40-50 | 12-16 | 87 ± 3 |
| | SG 2000 + filler F-B | Comp. B | amber | unfilled, high fillable | 2.5-3.5 | 0.5-1 | 72 ± 2 |
| Milling | | | | | | | |
| | ebablock® 1200 ebaboard 1200 | - | light beige | low thermal expansion, good edge strength | Coefficient of thermal expansion [10 ⁻⁶ K ⁻¹]: approx. 54 | n. a. | 82 ± 2 |
| | ebablock® 1750 ebaboard 1750 | - | beige | low thermal expansion, good edge strength | Coefficient of thermal expansion [10 ⁻⁶ K ⁻¹]: approx. 43 | n. a. | 89 ± 3 |

Advantages of **ebalta** tooling resins for fixtures

- high dimensional accuracy
- very low linear expansion coefficient
- low weight, simple handling of the gauge
- mechanical load capacity, dimensional stability

Advantages of **ebalta** tooling resins for gauges

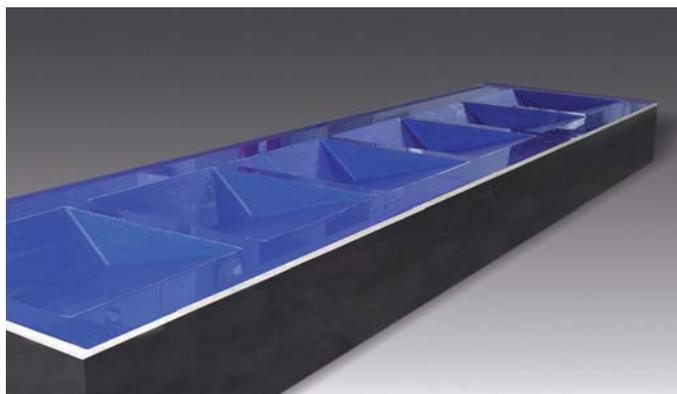
- very low linear expansion coefficient
- dimensional accuracy
- edge strength

Bath models for nickel shell tools

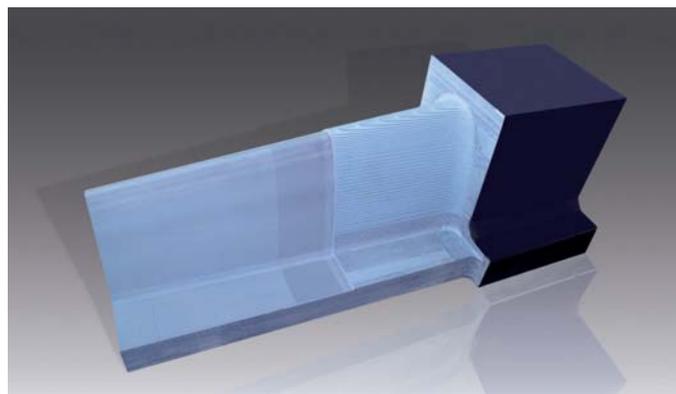
Nickel shells are mainly used for the presentation of leather pittings of synthetic leather in the automobile industry and for the production of big and strongly contoured composite parts, e.g. in aviation. The requirements on the materials are accordingly high. With **ebablock**[®] and special casting and surface resins, **ebalta** offers the ideal materials for this purpose.

| Method | Product recommendation | Hardener | Colour | Material properties | Pot life 200 g/20 °C [min.] | Curing time at RT [hrs.] | Coefficient of thermal expansion [10 ⁻⁶ K ⁻¹] |
|---------------------------|---|------------|------------------|--|-----------------------------------|--------------------------------|--|
| Casting method | | | | | | | |
| Face casting | GH 761 | GL | black | well castable, good compressive strength | 45-55 | 18-24 | approx. 52 |
| | Silastic S | Silastic S | green | excellent demoulding characteristics, good tear strength, 25 Shore A | 40-60 | 7 | n. a. |
| Build-up method | | | | | | | |
| Surface layer | OH 4 | SR | white | very well spreadable, easy to grind | 15-20 | 3-5 | n. a. |
| | OH 60 SP | GL | black | very well sprayable, low viscosity | 60-90 | 16-24 | n. a. |
| Coupling layer | KP 6 | TGL | grey | aluminium filled, heat resistant | 30-40 | 8-12 | n. a. |
| Backfilling Laminating | AH 100 + fabrics | TGL | trans- parent | unfilled, slow curing | 65-75 | 18-20 | n. a. |
| | PS 03-1 | PS 03-1 | blue | glassfiber-filled, smooth | 40-50 | 16-24 | n. a. |
| Milling | | | | | | | |
| | ebablock [®] EP 185 | - | blue | low thermal expansion, high heat resistance | n. a. | n. a. | Shore hardness [Shore D]: 90 ± 3 |

n. a. = not applicable



Blank for electroplating bath model **ebablock**[®] P 185 (5700 x 1600 x 540 mm³)



Electroplating bath model of **ebablock**[®] P 185

High-quality materials with the best characteristics for high-tech applications

Whether for large surfaces, complex geometries or the best optics for nickel shell tools – **ebalta** offers you a broad product portfolio with the appropriate material which can also be optimally used for complex tasks.

Requirements for the presentation of leather pittings

- high-quality surfaces of the models and accordingly high-quality materials for the production
- perfect suitability especially of **ebablock**® due to the joint-free homogenous tool surfaces

Requirements for the production of big composite parts

- big models if possible just made of one material in order to avoid irregular thermal expansion and distortion and/or irregularities

ebalta special synthetic resins for nickel shell tools – all the advantages at a glance

- use in the aviation with large surfaces and strongly contoured geometries
- ideal for the leather-covering of automobile interior models
- lead to joint-free surfaces up to 15 m² (very large surface possible with **ebablock**®)
- **ebablock**®: homogenous material for homogenous models (no gluing joints)
- very low linear expansion
- fine microstructure
- useable for several purposes
- complete product range for any type: epoxy casting resins and pastes, blocks, boards, silicones



Blank for electroplating bath model (aircraft component) of **ebablock**® M 007
Picture credits: Konrad Schäfer GmbH



Blank for electroplating bath model dashboard of **ebablock**® P 185 blue
Picture credits: Heinz Gaubatz Modell- und Formenbau GmbH / Galvanoform GmbH

ebablock®: the net-sized contour block material for jointless models, moulds and tools

*Customized block material for easier and more precise machining: **ebablock®** provides you with an individually created product prefabricated exactly to your specifications. Our experts are happy to advise you from the choice of materials to the final model or tool.*

A new technology for individual tasks

ebablock® is produced in close cooperation with the customer. **ebablock®** is manufactured according to your individual geometries as either block goods or net-sized blanks. Block thicknesses of up to 500 mm are possible. Outstanding performance features include the excellent surface quality, resulting from the homogeneously cast and stress-free tempered blocks with no adhesive joints. We can offer different qualities depending on the requirements profile. Common features of all of these are the good mechanical properties, easy machinability and a fine microstructure.

Higher performance, point by point

Each **ebablock®** makes models, moulds and tools more comfortable and efficient.

- You receive the block material to your specifications in individual sizes and geometries
- Models, moulds and tools are jointless
- Adhesive work and joints become a thing of the past
- The net-sized contour significantly reduces milling times

- Each **ebablock®** possesses outstanding dimensional stability
- Noticeable reduction in waste and refinishing
- No operating capital is tied up since no boards have to be stocked

Altogether these plus points add up to one thing for you: a higher quality in the production of models, moulds and tools.

High performance in customer support

The **ebablock®** product series includes comprehensive customer support from your first contact with us to the completion of your job.

- We accompany your project from the beginning to end
- We submit you with a precise and individualised offer
- We create your **ebablock®** based on your specifications, regardless of whether you provide them as a CAD file or a sketch
- We manufacture the moulds you need
- We can also provide milling parameters and additional products for the optimum machining of the **ebablock®**



ebablock® M 007 (3900 x 500 x 300 mm³)



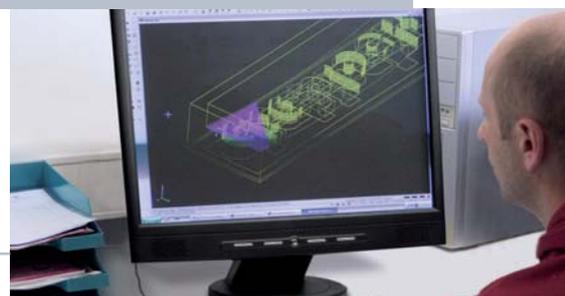
Blank for cubing model of **ebablock® M 007** (3200 x 1600 x 420 mm³)

Step by step to *ebablock*®

It's easy to receive your individually manufactured block material. We will ship your ready-to-machine *ebablock*®, depending on the complexity and volume of your order as quickly as possible.

1. Your order

You send us a drawing or CAD file with the specifications and dimensions for the *ebablock*® you require.



2. Mould making

We make a mould based on this data.



3. Mixing materials

We convert the raw material into a homogeneous mixture to meet your requirements 100%.



4. Casting the *ebablock*®

Then we cast your individual block material. The resin matrix is free from bubbles thanks to prior evacuation.



5. Postcuring the *ebablock*®

Once it has been cast, the *ebablock*® is postcured with an electronically controlled tempering process to rid the block of stresses and achieve optimal strength.



Production auxiliaries for mould and tool making

ebalta offers a complete product range of auxiliaries of any kind for all kinds of working steps related to the making of moulds and tools.

| | | |
|---|--|-----------------------------|
| <i>Adhesive, repair and casting compounds for blocks and boards</i> | two-component system for bonding, amendments | High strength |
| | and repairs of ebaboard , ebablock ® and ebazell in | Very good workable |
| | corresponding colours | Weathering- and moisture- |
| | | resistant |
| <i>Repair paste alu</i> | Two-component system for repairs of tools and models | Aluminium filled |
| | made of metal or tooling resin (also for cast parts | High heat resistance |
| | of aluminium or iron) | |
| <i>Release agent T 1-1</i> | For release of component surfaces | Very short curing time |
| | | Polishable |
| | | Apply with brush or spray |
| <i>Release wax T-2</i> | For release of temperature-stressed mould | Pasty |
| | surfaces. Suited for rough or porous surfaces | Polishable |
| | | Easy to apply |
| <i>Release wax T 7</i> | For applying on temperature-stressed mould surfaces. | Pasty |
| | Suited for epoxy and polyurethane resins, ebacryl and | Applicable up to 120 °C |
| | polyester | Very well polishable |
| <i>Fillers</i> | Mineral and metallic filling materials, available as powder | Good filling properties |
| | or granulate (aluminium grits and powders in different | |
| | grainings) | |
| <i>Glass fabrics</i> | Glass silk and staple fibre glass yarn in different basic weights. | High strengthening effect |
| | Glass silk short fibres with fibres of 6 mm length | Easy to process |
| <i>Wax sheets</i> | Normal and thermostable sheets, various types available | Fast and easy handling |
| | in different thicknesses | Adhesive-backed |
| <i>Pore sealer</i> | Primer for sealing porous surfaces (wood, plaster), creates | Quick drying |
| | highly smooth surfaces | Apply with brush or spray |
| <i>Synthetic gypsum ebacryl L-1</i> | lamine system for mould making, for fast fabrication | Very dimensionally |
| | of negatives, post-curing dishes or for casting of clay | Very short production time |
| | moulds, no health and safety problems | Low coefficient of thermal |
| | | expansion |
| | | Hardly flammable (flammable |
| | material class DIN 4102-B1) | |

Please contact us if you cannot find the product you are looking for.

The little helpers from ebalta

Developed specially for **ebalta** materials, this multi-facetted spectrum of little helpers makes it as easy as possible for you to handle our products.

| <i>Brushes</i> | |
|------------------------------------|---------------------|
| Flat brushes | 10 / 20 / 30 mm |
| Gussow brush | 12 mm |
| Gussow bristle brush | 20 mm |
| <i>Stirrers</i> | |
| Star stirrer | 90 / 130 mm |
| Spiral stirrer | 70 / 90 mm |
| <i>Gloves</i> | |
| Latex gloves with / without powder | S / M / L / XL |
| Vinyl gloves without powder | S / M / L / XL |
| Nitrile gloves without powder | M / L / XL |
| Cotton gloves | One size fits all |
| <i>Mixing Cups</i> | |
| Plastic mixing cup | 350 / 860 / 2100 ml |
| Cardboard mixing cup | Small / Large |
| <i>Adhesives</i> | |
| Dries-in-seconds adhesive AD 51 | 20 g bottle |
| Spray adhesive | 400 ml can |
| <i>Plasticine (kneadable wax)</i> | |
| Superplasticine | Yellow |
| <i>Miscellaneous</i> | |
| Cleaning solvent | 5 / 25 kg canister |
| Preservative spray | 0.23 kg can |



Other production auxiliaries can be found in our brochure „The little helpers from **ebalta**“.

Tooling Resins Blocks Auxiliaries Silicones

Mould and tool making

Design model making

Rapid prototyping

Foundry tooling

Composites

Electrical encapsulation

Further applications

We would be pleased to help you if you have any questions about our technology or products. Just call or make an appointment with your regional sales agent. We are looking forward to hearing from you!

ebalta Kunststoff GmbH
Erlbacher Straße 100
91541 Rothenburg ob der Tauber
Germany

Phone: +49 9861 7007-0
Fax: +49 9861 7007-77
info@ebalta.de
www.ebalta.de