

Dear customers and friends of DIETERMANN,



at DIETERMANN, we have always seen ourselves not only as a foundry but also as a solution provider for all tasks assigned to us by our customers.

This means, that we take your requests seriously and handle them as if they were ours. Moreover, this means that we would like to offer solutions for all problems related to the foundry and metallurgy world. Thus, in this latest issue of **IN FORM** you will find two very different examples of how we think and how we could solve your assigned tasks:

1. Our hand molding workshop is developing more and more into a department specialized into pushing the limits of what can be cast further and further. How we do this? We will give you a little insight just here.
2. To increase technical properties while decreasing environmental impact characterizes the challenges we face when advising customers concerning alloys. Representatively we introduce a heavy metal alloy, that fulfils just these requirements.

Thus, we hope to be able to present you two additional, possibly unknown and hopefully interesting parts of the wide variety of our profile.

Enjoy the reading!

Yours sincerely,



### Background story 1: hand molding

Dietermann is a customer foundry manufacturing cast parts in aluminium and heavy metal according to customer needs. A large part of our production is manufactured on modern automated molding lines.

Parts with dimensions too big for these automated molding lines, parts that come in very small quantities or with highest technical and casting properties, are produced in our hand molding workshop.

All of these hand molding workplaces are exclusively operated by fully trained personnel. Most of that staff has successfully completed their apprenticeships with us and look back on many years of experience.

The workplace layout as well as the melting capacity enables us to manufacture cast parts in flask sizes up to 6,8m x 2,0m and with a casting weight of up to 1t aluminium.



As molding material we use green sand, just like in the rest of our molding lines. However, when we have to cope with very complex, heavy, narrowly tolerated, very challenging or big geometries, the consistency of green sand is not sufficient. In order to serve these customer requirements as well, we produce the molds with the 'Sodium silicate - Ester' method. Sodium silicate consists of an alkali silicate (Na, K, Li), silicium (oxygen acid of silica) and water solution.

The Sodium silicate method is probably one of the oldest chemical core-making and molding methods. During the 70s, with the introduction of using organic



binders (Warm- and Coldbox method in core manufacturing and furan resin in molding), the Sodium silicate method got out of fashion in many other foundries and was removed from their manufacturing processes. However, we kept it in our production program as for us, the then new binders did not offer any relevant advantages, but rather disadvantages from an environmental and workplace safety perspective.



New guidelines and laws for ecological production and environment protection confirm now - although rather late - that we did it right, as the Sodium silicate method belongs to the non-organic and odourless foundry binders. When burning the binder neither formaldehyde nor phenol will be set free as it would with organic binders. Hence, the impact on employees, neighbours and the environment is very low - during molding as well as during disposal.

The increase of environmental awareness as well as these legal restrictions becoming more and more stringent has led to a process of rethinking for the producers of foundry binders and ends in a renaissance of non-organic binders. All relevant suppliers of auxiliary foundry materials are currently working with high pressure on the further development of existing binder systems. The related technical media is full of articles regarding new research, test runs and pilot productions of the Sodium silicate molding method - a technology we have been using throughout the last decades! Needless to say, that we certainly are observing which of these new developments might help us to keep our 'pioneer status' or to even expand it.

The method of solidification of the Sodium silicate sand by CO<sub>2</sub> gassing, which was often used in the past, is not being seen as future oriented by most of the manufacturers. Nowadays, the curing of the sodium silicate is done by using different ester. This allows systematic control of the binding process of the sand. As for core making, research is focussed on a method of gassing with hot air. Results for practical use are to be expected shortly.

Summing up, binder manufacturers focus their research work on the application of core making, the improvement of decay after molding and regeneration of the sand, which today is usually disposed at high cost. We participate in the efforts to make the use of sodium silicate for hand molding and core making more effective and ecologically worthwhile, too - since decades.

by T. Zöbisch, Operations Manager



### Background story II: New heavy metal alloy

„The best of all“ – Casting alloys have to fulfil more and more requirements at the same time: adherence to high mechanical and chemical parameters, optimised processability in casting and machining as well as low impact to the environment.

Dietermann meets the challenge with its new "EnviC" (our internal name for this material) casting alloy even in the field of heavy metals. EnviC offers various advantages compared to standard heavy metal alloys, or rather it



combines their different advantages and is used as a standard alloy at Dietermann.

Advantages and fields of application of this copper, zinc and silicium based alloy are as follows:

A) The mechanical properties of EnviC achieve highest values. Compared to a standard brass, the parameters for tensile strength ( $R_{m \leq 400}$  MPa) and yield stress ( $R_{p0,2 \leq 190}$  MPa) are clearly above those of a standard alloy as CuZn39Pb3 ( $R_m = 220$  MPa;  $R_{p0,2} = 80$  MPa). Also the hardness surpasses those of a standard brass; with 120HB it reaches almost the area of a nickel aluminium bronze. Even in chemical reaction, i.e. corrosion resistance, EnviC reaches or surpasses characteristics of seawater-resistant bronzes.

	EnviC	NiAl-Bronze G-CuAl10Ni	Standard Brass G-CuZn39Pb3	„GBz10“ G-CuSn10
Casting characteristics	Very good	Fair	Good	Fair
Tensile strength	400 Mpa	600 Mpa	220 Mpa	250 MPA
Elongation	10%	13%	15%	18%
Hardness	120 HB	140 HB	65 HB	70 HB
Corrosion resistance (atmosphere)	Very good	Very good	Good	Good
Corrosion-resistance (seawater)	Good	Very good	Fair	Good
Cutting properties-index	90	80	100	35
Metal-cost index	140	135	100	150
Welding	Good	Good / Very good	Poor	Fair / Good
Brazing	Good	Fair	good	Good / Very good

B) Cutting/machining properties are not affected negatively by the lack of lead. Quite the contrary: the important task of the lead is to ensure a chip breaking effect which is now done by a special phase shape of the mixed crystal system. As a result, EnviC comes close to the cutting properties of standard brass and even beats those of the bronze clearly. You will certainly notice when you see the machining costs!

C) Free of lead: For drinking water and end-of-life vehicles, the usage of alloys containing lead or nickel is becoming more restricted by law. The brass alloys being normally used contain about 3% lead which is necessary for machining. Alternatives so far were cast steel or red brass alloys, but for a good corrosion resistance they need a high percentage of nickel. EnviC does not require lead in order to achieve these characteristics and has therefore already been approved for drinking water applications!

D) The excellent mold filling and feeding characteristics of EnviC are of particular importance for costs arising in a foundry as ours. The special composition of this alloy has a very positive impact on the important characteristics for the founding process. Thus, we are able to lower casting temperatures, reduce melting energy for the ingate system and grinding work related to it. Furthermore, the scrap rate can be lowered and wall thicknesses can be reduced.

All these positive characteristics of EnviC allow us to strike new paths together with our customers, in terms of construction, design and machining concept. High technical quality combined with excellent foundry characteristics: what in former times excluded each other is reality today. We are happy to give you more detailed expert advice at anytime.

by P. Hippler, Sales Project Manager

**Outlook**

The reconstruction of our sand regeneration and processing plant is going ahead at full speed. We are looking forward to put the heart of our foundry into operation within the next weeks, thus being able to produce even better and even more stable quality castings for you.

