



MORSA
CASTING WAXES

MOR-CAST

High performance investment casting waxes and materials



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ABOUT MORSA

MORSA is one of the oldest known companies in Europe with a history dating back to the year 1647.

In the last decades MORSA has gained extensive special knowledge when it comes to the development of casting waxes.

This special knowledge and experience is the reason of our success in the development and production of investment casting waxes. We transferred and combined our expertise of producing waxes and other investment casting materials into our precision investment casting wax line.

The investment casting process is an art that goes back thousands of years.

As the ultimate quality of castings in this process depends primarily on the quality of wax patterns, each casting can only be as good as the wax model previously prepared. Thus we comply the ever increasing quality requirements for modern investment casting waxes.

Foundry industry sectors served include automotive, aerospace, sports, industrial turbines, medicals, communications and electronics, jewelry etc.

It is our experience in wax processing combined with our wax industry specific knowledge that gives us the expert know-how and creates unique selling points when it comes to the development of casting waxes and other investment casting materials.



Our philosophy

Producing state-of-the-art casting waxes is more than just wax chemistry,
– we believe it is a science of its own.



MORSA certifications

Certification to ISO 9001:2015, ISO: 13485: 2016 certification and monitoring waste management facility were all completed successfully and must be renewed annually. These processes ensure quality and consistency of our products. Our main production facility, company headquarters and distribution center is situated in Krumbach (Germany).

Incoming used wax & raw material input control

The incoming wax from a foundry is specially marked and kept strictly separate so each customer receives back their own material in order to ensure exclusion of unwanted elements. Each customer receives a certificate of analysis for every batch.



TODAY'S REQUIREMENTS

For modern investment casting waxes there are highest component requirements as well as preconditions regarding constant characteristics of the component:

- Ideal flexibility to avoid brittle fractures in thin-walled parts of the model
- Formation of very smooth, sufficiently hard surfaces in solid states
- Sufficient strength to warrant the geometric stability in large models
- Minimum shrinkage within the temperature range liquid-plastic-solid
- Exact reproduction of the form
- Excellent surface quality
- Minimal ash content
- High temperature stability
- Defined melting behaviour
- Defined shrinkage
- Quick cooling down



When recommending waxes, MORSA does not only consider these fundamental qualities but also important specific foundry properties such as:

- Form of wax
- Filled or unfilled waxes
- Injection equipment
- Size of patterns
- Dewaxing methods, ... etc.
- thermo conductivity
- dewaxing
- autoclave

THE COMPLEXNESS OF CASTING WAXES

The complex composition of modern casting waxes manifests itself in a physical behaviour a lot different to that of other substances.

Unlike other homogeneous chemical compounds, wax does not melt instantly on heating but passes through several intermediate states:



The structure and the components used in an investment casting wax will influence the characteristics. Our wax blends consist of up to 15 components including polymeric waxes, hard waxes, paraffins, resins and many different fillers.

Polymers affect temperature and flexibility whilst paraffins influence viscosity and melting behaviour. The most common resins used are Carbon 5 and Carbon 9 chains which in turn cover a wide range of modifications.

Fundamentally the length as well as the complexity of the carbon chains of the various components influences the properties of the final wax.

Accordingly a lot of variations are formulated to suit differing foundry requirements and key properties such as melting point, hardness, viscosity, expansion and contraction, setting rate, etc. Those characteristics are influenced by the composition of the actual wax compound.

Some pattern wax components and their functions:

Hard wax	effects the surface, strength and the temperature stability.
Paraffin	effects melting behaviour and viscosity.
Resin	effects the shrinkage behaviour.
Polymeric wax	effects temperature stability and flexibility.
Filler	effects the shrinkage.

MOR-CAST PRODUCT RANGE

We offer state-of-the-art investment casting waxes which are considered among the best available materials on the market.

Our **MOR-CAST** investment casting waxes can be processed on normal wax injection machines in short cycle times, ideally suited for series products as well as individual products. All of our waxes can be injected in paste, liquid or billet

format and as well be reconstituted to almost virgin wax like quality standard to match the original virgin wax performance characteristics. In order to meet the best possible results for precision investment casting waxes, **MORSA** provides different lines of **MOR-CAST** products. All of them are designed with reclamation in mind to provide our customers a cost effective way of utilizing the system waxes.

MOR-CAST line 100 – 199

Filled pattern casting waxes

Filled with cross linked polystyrene / acrylic, Iso and Terephthalic acid etc.
Extraordinary dimensional pattern reproducibility

MOR-CAST line 200 – 299

Unfilled pattern casting waxes

for casting of intricate pieces, low viscosity, fast forming

MOR-CAST line 300 – 350

Runner waxes

Our high quality runner waxes can be used to effectively save costs at the pattern manufacture process

MOR-CAST line 400 – 450

Stick and Dip Seal waxes

We carry several sticky waxes with enhanced bonding properties to attach parts to runners or very complex multi-segmented parts

MOR-CAST line 800 – 990

Reconstituted waxes

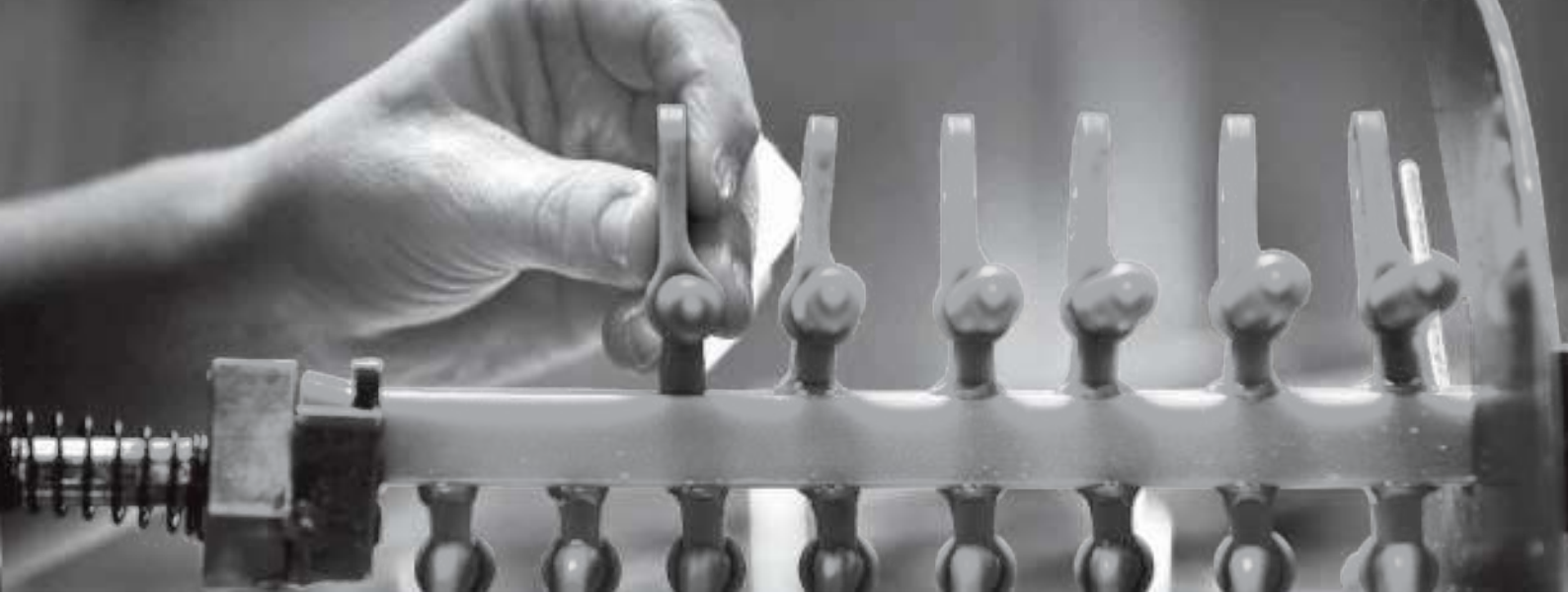
Reclaimed waxes with almost virgin wax like quality standard to match the original virgin wax performance characteristics

Tailor-made wax solutions

Extruded wax shapes & Jewelry waxes

We offer a wide variety of sizes and wax additives to lower melting points

We have a full line of blends that can be custom tailored to fit your needs and requirements in terms of technological parameters. **We can manufacture your special MOR-CAST wax.**



MOR-CAST CASTING WAX

All **MOR-CAST** lines show minimal cavitation, excellent dimensional stability and are easy to melt out.

All **MOR-CAST** lines perform well in traditional liquid and paste automatic injection machines but also well on high speed pattern extruders. For maximum injection speed, we recommend using **MOR-CAST** wax as a paste.

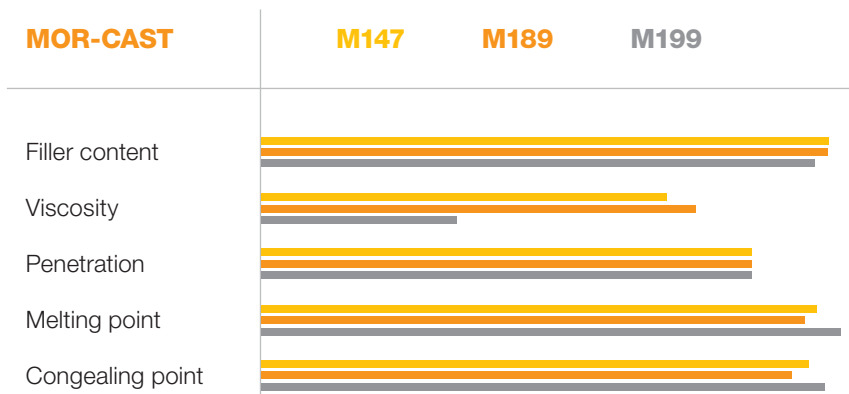
For paste injection, **MOR-CAST** waxes demonstrate low cavitation and even surface texture for all grades. Due to the rapid set up characteristics, flow rates are maximized with higher filler concentrations. During the initial set up we recommend to start at full flow and then reduce temperature to match the capabilities of the equipment given.

MOR-CAST 150-190 pattern waxes

(filled with cross linked Polystyrene powder, Terephthalic acid or other types of filler) have a smooth surface for finest details. They have very good mechanical properties making it suitable for the injection of thin walled sections. The melt viscosity is quite low, giving excellent flow properties and also good de-waxing. They have a nearly instant set-up and are capable of producing patterns of almost all sizes, sophisticated geometrics and thin or thick sections.

MOR-CAST 200-250 unfilled casting waxes

can compete against high filled waxes with respect to injection, speed, cavitation and dimensional repeatability.



WAX RECYCLING + „RE-NEW“ SPECIAL RECONSTITUTION TECHNOLOGY

Reclamation of wax is a process where MORSA elaboratively dewater, cleans and homogenizes a foundry's used wax for the purpose of re-use. The unique three stage reclaim process applies no thermal stress to the wax, as processing temperatures rarely exceed 90° C.

Because of our innovative reclamation process, no virgin additives are needed as an additive to maintain agreed usable specifications as a **gate or runner wax**. Ash can be removed, using a choice of processing options, to ensure the final wax meets all the required specifications.

Reconstitution of wax is an advanced recycling technique developed by MORSA where MORSA elaboratively dewater, cleans and homogenizes a foundry's used wax for the purpose of re-use.

In this process via a special in house developed technology the wax will return to the original specifications for the use as a **pattern wax**.

The final properties are very much in line with those of the virgin material.

Ash content levels below 0,02% can be achieved. Our, in house designed centrifuge works very differently to standard centrifuges at low temperatures, so very little thermal stress is caused.

With reconstituted wax, big cost savings are achievable, with little to no loss of performance or quality.

WAX RECLAMATION – PROCESSING ROUTE

Customers' used autoclave wax is sent to MORSA for reprocessing where it is kept strictly separate from other returned wax and then reconstituted and cleaned to the agreed specifications.

Recycled wax is then returned to the customer as:

**(Non or low/high –filled) Reconstituted pattern wax for pattern production
or
Reclaimed wax for runner systems (filled and unfilled)**

The use of reconstituted pattern wax allows the production of a complete range of patterns with significant cost benefits and little to no reduction in quality.

In-house innovations of our recycling process make our recycling very advantageous:

For example: very little thermal stress of the wax is caused due to heating constantly below 90°C. This also means our process is very environmental friendly. Also there are no additives needed.

The actual volumes of recycling wax are mainly dependent of the quantity of contaminants and water present in the autoclave wax.

However it is possible that often even more than 70% of the used wax can be reconstituted.

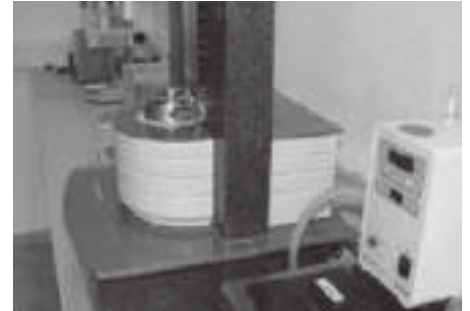


LABORATORY QUALITY CONTROL

It is very important for the production of high quality castings that wax properties are correctly controlled in our laboratories. The very strict quality control procedures employed by MORSA ensure consistency and compliance with important specifications. For example:

1. drop melt point
2. congealing point
3. ash content
4. penetration
5. viscosity

Beside these standard wax tests many more are possible like, ie. DSC, Linear expansion, rheology etc.



Incoming used wax & raw material input control:

The incoming wax from a foundry is specially marked and kept strictly separate so each customer receives back their own material in order to ensure exclusion of unwanted elements. Each customer receives a certificate of analysis for every batch.

Quality comparison: reconstituted versus virgin wax

No disadvantage to chemistry can be found in reconstituted wax.

There are no significant increases in key elements as well as no significant increases in ash content.

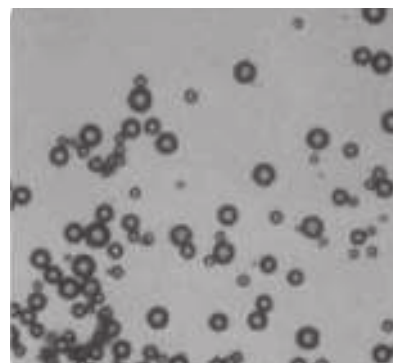
Specialised Waste Management license



LAB FACILITIES

Services:

- Wax testing
- Quality assurance according to ISO 9001:2008
- Research and Development
- Testing of raw input materials
- Technical reports
- Evaluation of incoming used wax
- Tailor / customer specific developments
- Collaboration with universities and external institutions
- Quality control of batches



RENEW Process

RENEW Wax Re-virginization Technology is a chemical process to rejuvenate used autoclave wax and works differently than traditional physical filtration processes

The re-virginization of the wax components is possible as RENEW can remove the ash producing linkages that join onto the broken hydrocarbon chain ends. Renew can then reattach carbon chain fragments to each other and restore the physical characteristics of each of the individual components of the wax. This is an oversimplified explanation of the actual reaction kinetics that take place in the process. However, the linkages that are restored by RENEW are the same as the ones that occur during the formation of the carbon chain structures that compose the resins used to make IC waxes. The linkages and formations of carbon chains are not new technology or information to the people who make hydrocarbons. In fact, these reactions follow very specific steps and rules that have been commonly known in their art for the last 50 years

- Residual ash after burnout negatively affects all shell types, regardless of alloy or market. Reducing ash levels always benefits the foundry. RENEW wax technology helps create virgin or reclaimed wax with minimal organic and metallic contaminants. In tests, RENEW reduced ash by over 80% after 300–500 reclaiming cycles—even in older systems.
- Ash can also come from poor boiler water treatment, introducing elements like sodium, potassium, phosphorous, calcium, and manganese. RENEW effectively removes these. Phosphorous is particularly harmful, as it multiplies ash content post-burnout by forming phosphorous pentoxide.
- The process selectively removes **ash-producing linkages** and oxidized fragments that form at the termini of broken hydrocarbon chains.
- It facilitates **controlled reattachment of carbon chain fragments**, mimicking the natural polymerization steps used during the manufacture of hydrocarbon-based resins.
- As a result, the wax’s physical characteristics—such as thermal stability, flow behavior, and shrinkage control—are effectively returned to a **virgin-equivalent state**.

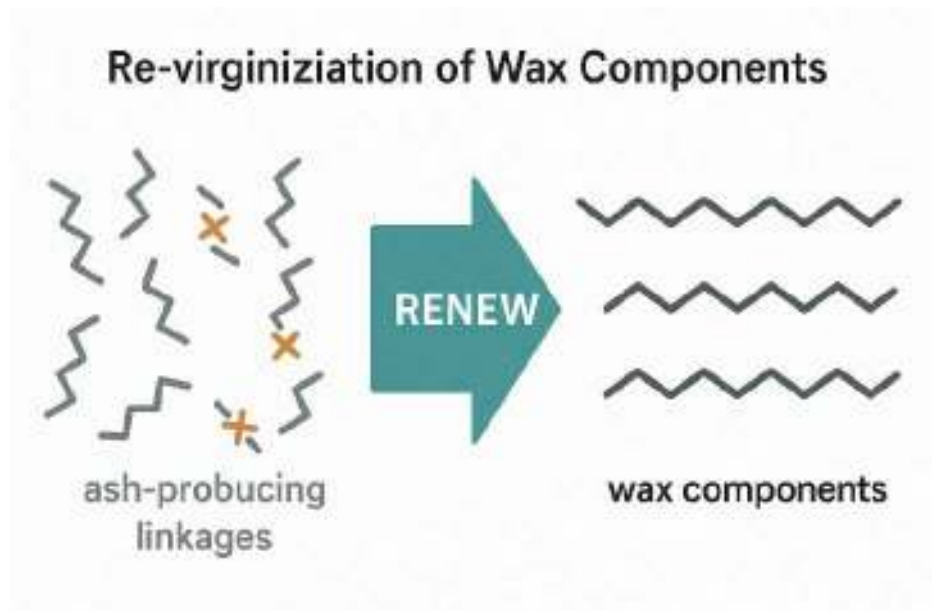
Beyond achieving low residual ash levels, the RENEW process has demonstrated the capability to restore and, in some cases, enhance the performance of reclaimed pattern waxes beyond that of the original virgin wax. This performance uplift is achievable under two primary conditions:

1. Symbiotic Wax System Engineering

When pattern wax and sprue wax are designed to function in a complementary manner, their combined use and subsequent reclamation through RENEW can yield a more consistent and optimized formulation. In this context, the integration of components allows for improved flow, mechanical stability, and dimensional accuracy.

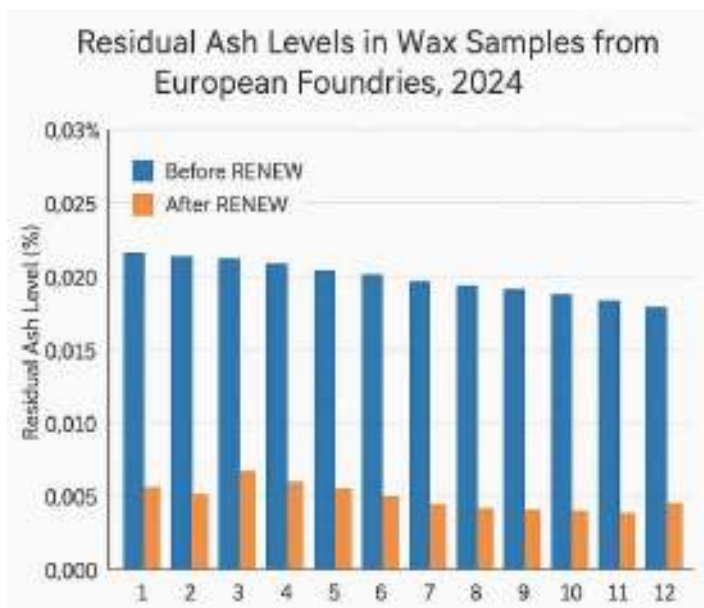
2. Superior Additive Selection and Rebalancing

In some cases, the additives and component ratios used during reclamation may exceed the quality or efficiency of those used in the original virgin wax. By incorporating higher-grade materials or optimizing their proportions, RENEW can surpass the baseline properties of the original formulation.



At the core of this performance restoration lies RENEW's ability to **rejuvenate degraded hydrocarbons:**

- The process selectively removes **ash-producing linkages** and oxidized fragments that form at the termini of broken hydrocarbon chains.
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- As a result, the wax's physical characteristics—such as thermal stability, flow behavior, and shrinkage control—are effectively returned to a **virgin-equivalent state**.
- While the explanation above simplifies the underlying **reaction kinetics**, it is important to note that the **mechanisms involved in chain scission, purification, and re-polymerization** align with well-established principles in hydrocarbon chemistry. These reaction pathways have been widely understood and applied in petrochemical and polymer industries for over five decades.



Can RENEW Improve Reclaimed Wax Beyond Virgin Quality?

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MOR-CAST PRODUCT RANGE

	Overview wax types	Color	Drop melting point °C	Ash content %	Penetration 25°C	Viscosity 100°C [mpas]	Filler content XLPS [%]
Unfilled waxes <i>good for cores</i>	MOR-CAST 140.25	green-blue	74 ± 3	max 0,05	4,5 ± 1,5	350 ± 200	0 <i>free shrinkage 0,9-1,0 %</i>
	MOR-CAST 241	blue	70 ± 3	max. 0,05	11,5 ± 2,5	50 ± 300	0
	MOR-CAST 252	blue	69 ± 2	max. 0,05	5 ± 2	100 ± 50	0
	MOR-CAST 255	deep blue	69 ± 2	max. 0,05	4,5 ± 1,5	150 ± 30	0
Filled waxes <i>Specially for IGT 65 C best working temperature</i>	MOR-CAST 153	light blue	77 ± 2	max. 0,05	3,5 ± 1,5	325 ± 175	25 ± 2
	MOR-CAST 105	light blue	69,5 ± 2,5	max. 0,05	5 ± 2	450 ± 150	35 ± 2 <i>linear shrinkage 0,8 %, hindered 0,3 %</i>
Filled <i>shrinkage 0,9-1,1</i>	MOR-CAST 125	deep blue	74,5 ± 2	max. 0,05	4,5 ± 1,5	350 ± 150	25 ± 2
Filled	MOR-CAST 126	deep green	74,5 ± 1,5	max. 0,05	4,5 ± 1,5	350 ± 150	25 ± 2
	MOR-CAST 131	light green	75 ± 2	max. 0,05	4 ± 1	350 ± 150	30 ± 2
	MOR-CAST 170	dark blue	73 ± 3	max. 0,2	4,5 ± 1,5	700 ± 300	35 ± 2
	MOR-CAST PW F60250	light green	72 ± 4	max. 0,05	4,5 ± 2,5	350 ± 300	30 ± 3
	MOR-CAST 150	greenish	72 ± 3	max 0,02	4,5 ± 1,5	350 ± 300	31 ± 2
Recycling waxes	MOR-CAST 840	greenish	74 ± 4	max. 0,06		350 ± 200	0-10 % <i>filler content, linear shrinkage 0,9-1,1</i>
	MOR-CAST 841	greenish	69 ± 4	max. 0,10		350 ± 200	12 ± 8
	MOR-CAST 970	greenish-blue	72 ± 7	max. 0,03		170 ± 200	0
Sticky wax	MOR-STICK KW 1	light yellow	89,5 ± 2,5	max. 0,05	7,2 ± 2,5	200 ± 50	
Water soluble wax	MOR-SOL WS 900	grey	65 ± 4			850 ± 150	
Dip seal wax <i>Additive for runner wax to lower drop melting and viscosity</i>	MOR-DIP		57-66 C				
	MOR-ADD PW 931-33	ivory	60 ± 2	max. 0,03			0

MORSA 3D PRINTING WAX FILAMENT

When used for lost wax casting, the burnout is extremely clean (much better than using plastic filament). This product can also be polished, machined, and carved MUCH easier than plastic filaments.

Morsa 3D wax is softer than traditional plastic filaments. Because of this, some extruder feed drives may need to be modified in order to properly feed the filament. The easiest way to determine if your printer will need any modification is to find out if other people are already using any of the flexible filaments on your machine. Many of the rubbery, flexible filaments on the market are even softer and more flexible than Morsa 3D Wax filament. Because of this the modifications necessary for them also work well for Morsa 3D Wax filament. There are two key points to keep in mind when printing softer filament material.

1. Guide the filament through the entire drive to prevent curling.
2. Provide proper tension on the guide arm bearings that presses the filament into the drive gear to prevent grinding.

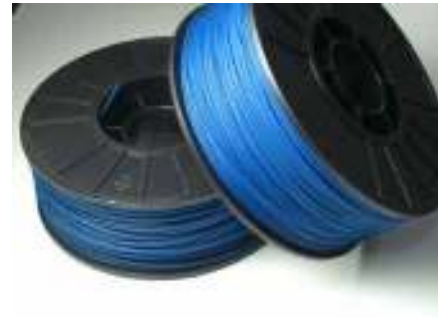
For bed adhesion, our personal experience has had the best results using multiple layers of „extra super hold“ hair spray on a heated glass bed. We recommend spraying the glass with 6 light coats, letting them dry in between coats.

A second option for bed adhesion would be to use cloth athletic tape or gaffers tape.

Here are a few startup recommendations to help get you started. Please keep in mind that these suggestions can be dependent on both your printer design and the geometry of the object you are printing.

- Extrusion temperature = 140°C-150°C
- Bed temperature = 80°-90°C
- Shells = 2-3 (for most models)
- Print speed is typically 20 to 70mm/s
- Prints best when layers have enough time to cool. This can be achieved in several ways. A skirt/brim with all layers, active cooling fan (on low), printing multiple identical items, sacrificial pillar, or extra pause time between layers. A caution here is to not cool too fast. This will cause exaggerated warp.

Packaging:
1kg spool 1.75mm article Number : 3D000100FA804



MORSA 3D MILLING WAX

Morsa 3D Milling Wax disks are a slightly more waxy and carveable formula for Dental CAD/CAM applications. Our machinable wax for dental CAD/CAM is put through an additional manufacturing step that we call MicroFine. The result is a machining wax that gives you the ability to create exceptional detail and have a minimum of cleanup after you are finished.

Packaging:
pack of 6 disks 50mm x 100 mm

MORSA
CASTING WAXES

Tel.: +49(08282)80044-0
Nordstraße 3
D-86381 Krumbach (Germany)

E-Mail: info@morsa.de
www.morsa.de

Binder

MOR-SOL+ is a range of fast drying, colloidal silica binders that are suitable for use in forced and natural drying conditions. They build a shell with significantly higher green strength, increased permeability, reduced shell cracking/buckling, with a shorter shell building time and easier shell removal. MOR-SOL+ binders can be used on automated or manual shell building systems, in primary and back up slurry applications.

Zircon

Morsa Zircon is manufactured using fully calcined African zircon. The particle size distribution is specifically designed for investment casting shell production. It is compatible with colloidal silica or ethyl silicate binders and can be used in manual and automated shelling.

Particle Size

	200 mesh		300 mesh		Sand
	min	max	min	max	
Malvern d10	2	3	1	2,5	
Malvern d50	16	24	9	16	
Malvern d90				45	
53 micron					3%

Alumino Silicate

MORSA Alumino Silicate is a calcined natural alumino silicate with very low impurities. Its high performance, enables it to be used in all investment casting shell building processes. It is compatible with all colloidal silica binders and is recommended for use with the MOR-SOL range of binders.

Range:

Flour Size: 200, 270, 325Mesh

Stucco Size: 40-80, 30-60,16-30

Fused Silica

This material is processed specifically for the investment casting process, with specific chemistry, particle shape and distribution to give maximum performance in the shell. With low thermal expansion Fused Silica builds a dimensionally stable shell, that is easily removed following firing and casting. Fused Silica is compatible with all colloidal silica binders and is recommended for use with the Mor-Sol range of binders.

Product Range

Flour: 200, 270, 325

Sand: 50-100, 30-50, 16-30

Other grades are available upon request.

Wetting Agent

MORSA WET-IT is a complimentary blend of surfactants, specifically formulated for use in all water base investment casting slurries. It can be used in manual and robotic slurry systems, giving excellent slurry dispersion, wax adhesion and promotes uniform coating.

Active Component Content	75%
Specific Gravity (25°C)	1.02 g/ml
Solubility (to water)	100%
SurfaceTension (0.1%)	23mN/m
Appearance	Clear\yellow liquid

Anti-Foam

MORSA FOAM-OUT is a polyether non-ionic antifoam suitable for all colloidal silica and water based organic binder slurries. It has excellent de-foaming properties and is formulated for increased active life, requiring less additions.

Active Content	100%
Specific Gravity(25°C)	0.98g/ml
Solubility (to water)	Dispersible
Appearance	Milky liquid

Wax Pattern Wash

A blend of detergents, specifically formulated to clean and slightly etch the surface of wax patterns and runner systems. Completely water soluble, rinses all surface contamination cleanly away leaving no residue.

Colour : transparent / light green

Supplied in 250 kg drums

Wax Pattern Release Agent

A silicone based, blended, high efficient release agent for use as an investment casting wax pattern release. Suitable for use in manual and automated hard tooling.

Supplied as a 330ml aerosol can.

12 cans per carton.

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Packaging: pack of 6 disks 50mm x 100 mm

We offer different kinds of

STANDARD TEST METHODS

DROP MELTING POINT

The melting point provides information on the solid-liquid phase-transition

The melting point is the temperature at which a sample subject to a load will detach itself from an enclosed ring mold. The results give a temperature which allows the wax to be forced from a shell without exerting sufficient force to cause shell cracking.

CONGEALING POINT

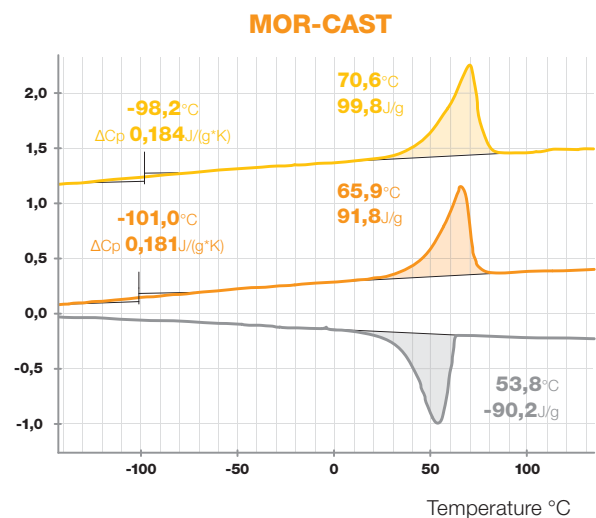
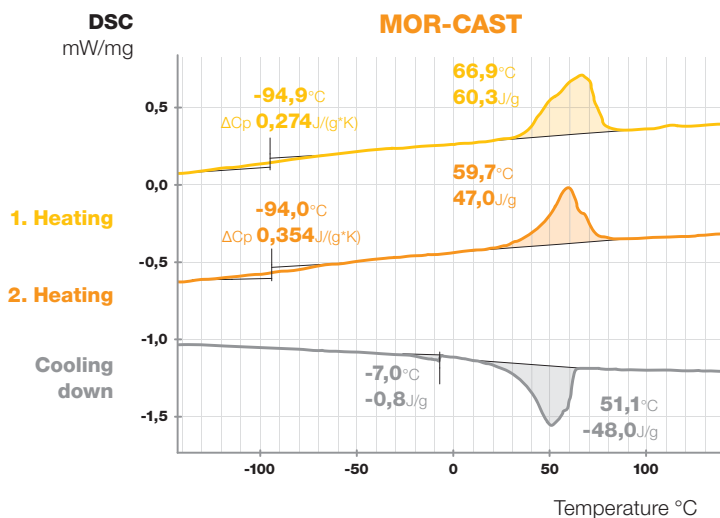
The congealing point provides information on the liquid-solid phase-transition

The congealing point is the temperature at which molten wax, when allowed to cool, ceases to flow. The results give a variation in temperature and a picture of what is happening to the wax. Most important: It gives a guide to temperatures required in the injection machine tank and the injection temperature itself.

DIFFERENTIAL SCANNING CALORIMETRY

Controlling heat flow during the solidification and melting stages of a casting process is very important. Therefore varieties in wax behaviour with changes in the thermal conductivity of the medium can be modelled via DSC analysis.

It is used to detect material changes and to look at solid shrinkage, crystallization of a wax, cloud points and rheometry which can provide a fingerprint for visco-elastic strength, flow, solidification and resistance to deformation.



Ash testing:

It represents the percentage of non-combustible solids contained in the compound. Low ash contents are a certainty for our investment casting waxes. Our laboratories rigorously test every lot to ensure residual ash levels meet our specifications.

PARTICLE SIZE DISTRIBUTION TESTING

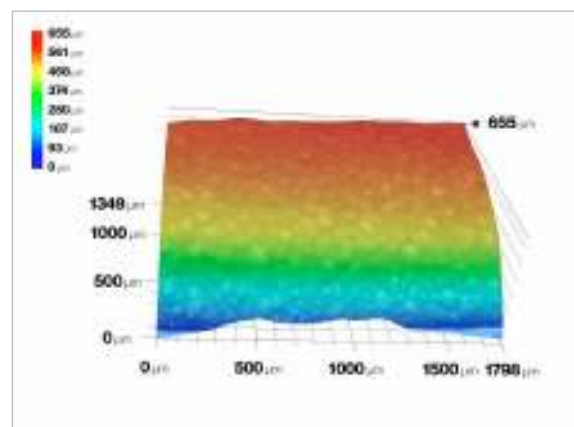
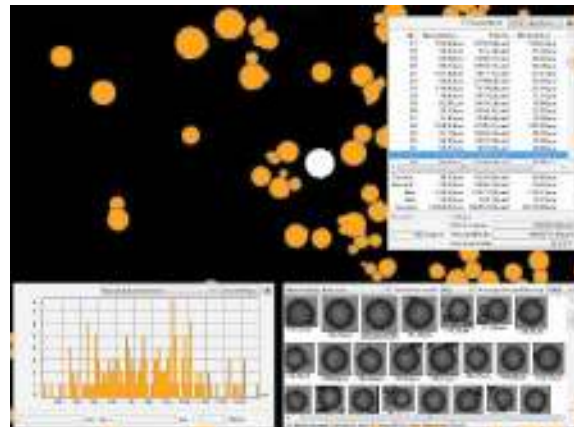
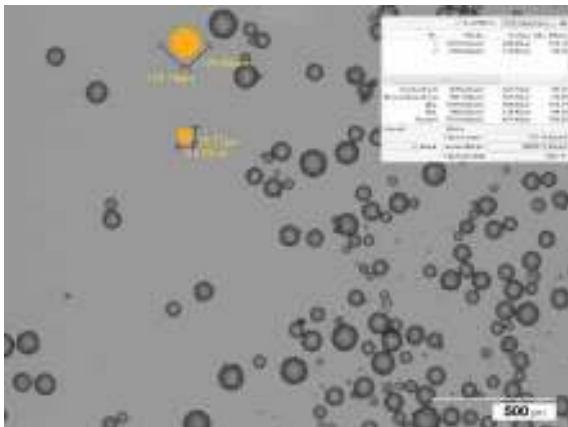


The PSD of a filler has a major impact on wax performance, especially surface finish, viscosity and dewaxability.

Today many waxes contain solid fillers that enable enhanced dimensional control. We know the degree to which a filler's particle-size distribution impacts the wax rheology. For this reason we use a particle-size analyzer for filler characterization.

3-POINT BENDING FLEXURAL TEST

According to **ISO 178** it provides values for the modulus of elasticity in bending, flexural strain and the flexural stress-strain response of the material, flexural stress.



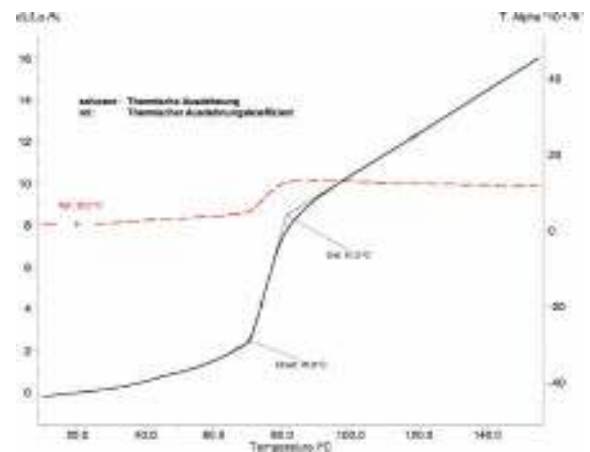


DIMENSIONAL PERFORMANCE TESTING

DPT shows the effect of wax temperature and injection pressure. We have a wide variety of tooling in order to simulate many of the daily foundry activities.

DYNAMIC MECHANICAL ANALYSIS

DMA measures 'free' wax expansion and contraction whilst exerting minimal force on the sample.



PRODUCT FORMS:

Form of delivery: reconstituted pattern / reclaimed runner wax

- either pellets / slabs / cartouches
- In 25 kilo bags
- In 500 kilo 'Big Bags'

Packaging:

- EU-Pallets, PE foil

Support:

Technical Support provided by our experienced engineering team is always available to help with customer trials. Comprehensive technical reports are issued on completion of technical projects. Materials are supplied in pastilles in 25 kg bags and big bags. **Euro pallets are available.**



MORSA
CASTING WAXES



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**We custom blend wax formulations
to improve your potentials.**