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NIDA CORE
STRUCTURAL HONEYCOMB MATERIALS

541 NW Interpark Place Port St. Lucie FL 34986 USA

ZERO SHRINK *TOOLING RESIN SYSTEMS FOR THE RAPID PRODUCTION OF COMPOSITE MOLDS*

Manufactured by: ZA route d 'Amiens - 80890 CONDE FOLIE FRANCE

NORD COMPOSITES

www.nida-core.com

NORESTER RM 3000

NEW GENERATION TOOLING RESIN

FOR THE RAPID PRODUCTION OF HIGH PERFORMANCE COMPOSITE MOULDS

manufactured by **NORD COMPOSITES**
ZA route d 'Amiens - 80890 CONDE FOLIE Tel 03 22 31 57 57 e-mail nord-composites@wanadoo.fr

NORD COMPOSITES

RM 3000 TOOLING RESIN

- *One component system, easy to use*
- *Vinyl ester for thermal, chemical & mechanical properties*
- *High heat distortion temperature*
- *Fast reacting, make a mould in one day*
- *Zero shrinkage, in thick or thin sections*
- *Tough, durable, long life moulds*

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Properties of RM 3000

- Pre accelerated resin with fillers added
- Low VOC (HAP) system
- High solids, low viscosity resin
- Room temperature cure with MEKP catalyst
- Distortion free low exotherm curing system
- Perfect surface replication on the cured laminate
- Complete dimensional stability
- Normal resin storage life without filler settlement
- Vinyl ester gel coats available for matched performance

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Typical Applications for RM 3000

As well as conventional composite moulds *RM 3000* can be used for:

- **Replacing epoxy moulds**
- **Heated moulds**
- **Thermoforming tools for acrylic, ABS, etc**
- **RTM Light, thin, top (B face) moulds**
- **Prototype thermoplastic tools**
- **Lightweight tools (with foam stiffening core)**

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Comparison between RM 2000 & RM 3000

	RM 2000	RM 3000
Chemistry	Orthophthalic	Vinyl Ester
Cure System	CATA 2000	MEKP
Gel Time @ 20C	45 mins	40 mins
Peak exotherm degC	140	113
Viscosity (Brook sp4, 100rpm)	1400	1560
HDT degC	85	110
Barcol Hardness (5hrs)	30	15
Barcol Hardness (24hrs)	45	40
Tensile Strength Mpa	81	87
Flexural Strength Mpa	178	209
Elongation at Break (laminate)	6%	8%

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RM 2000 & RM 3000

Product Similarity

- User friendly, one component system
  - No mixing of fillers or accelerator
- Fast, make a mould in one day
  - Speed of production cuts mould making costs
- Zero shrinkage, on the cured laminate
  - Complete dimensional stability
  - No fibre print through
- Produces tough, durable, long life moulds

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RM 2000 & RM 3000

Product Similarity

- Filled, thixotropic systems
- Medium viscosity resins
- Resin to glass ratio 4:1
- Room temperature cure
- Gel time 40-45 minutes
- Low styrene content
- Uses 1% catalyst
- Can be sprayed with conventional equipment

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RM 2000 & RM 3000

Product Differences

- **RM 3000** is a low exotherm system
- No need for a vinyl ester skin coat with **RM 3000**
- Zero shrink in thin laminates with **RM 3000**
- Standard MEKP catalyst used with **RM 3000**
- Higher HDT with **RM 3000**
- Better mechanical, chemical & thermal properties with **RM 3000**

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CONSTRUCTION OF A RM 3000 MOULD

Construction Sequence

- Manufacture of the plug
- Application of a release agent
- Application of an appropriate gel coat
- Application of the first layer of RM 3000
- Building the RM 3000 laminate layers
- Adding stiffening ribs and struts
- Releasing the mould from the plug

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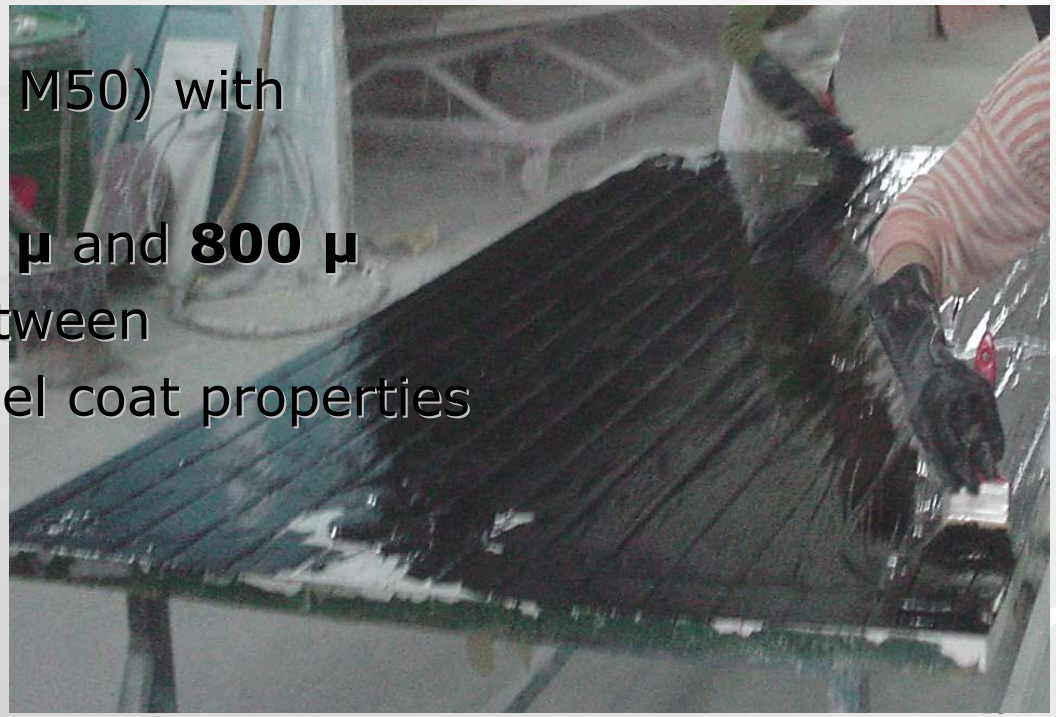
APPLICATION OF THE GEL COAT

- Gel coat can be applied by brush or spray
- Use a quality tooling gel coat such as:
  Norester GC 206 or 207 (Vinyl ester)
- Catalysation:
  1.5% to 2% of MEKP (Butanox M50) with an active oxygen index of 9%
- Gel coat thickness between **600 µ** and **800 µ**
- Workshop temperature to be between **18°C and 25°C** for optimum gel coat properties



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FIRST 'SKIN' LAYER BETWEEN THE GELCOAT AND THE RM 3000 LAMINATE

IMPORTANT

- **Ensure that the gel coat is completely cured before adding the first laminate layer**
- **First layer can be one layer of 150, 225, 300 gm/M2 or a backing tissue. The first layer can also be a thin evenly sprayed layer**
- **Resin used should be RM 3000 catalysed with 1% MEKP (depending on temperature)**
- **Ensure that all the air is removed from the first layer and that the reinforcement conforms into all the sharp angles on the mould**
- **It is important that the first layer is fully consolidated and all the air has been removed**

NOTE: After the first layer has been consolidated, it is possible to build more layers with RM 3000 before the first layer is cured (wet on wet). However, there is a danger that with this technique, that when laminating the 2nd & 3rd layers, the first, skin layer may be disturbed causing voids. This is more likely to happen with a complex shaped mould. With a complex shape, therefore, it is better to cure the first layer before adding more layers.

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Laminating with RM 3000

- Stir the RM 3000 resin before use
- Ensure that the workshop temperature is between 18° C and 25° C
- Catalyse with 1% of MEKP (depending on temperature)
- Depending on the thickness of mould required, glassfibre can be sprayed or hand laid to the required weight of laminate
- Resin glass ratio is typically 4:1

NOTE: RM 3000 can be treated like a normal resin and laminated in any thickness from 300g/M2 and above. There is NO requirement to build up thickness to activate low shrink components as with RM 2000 and other conventional tooling resins

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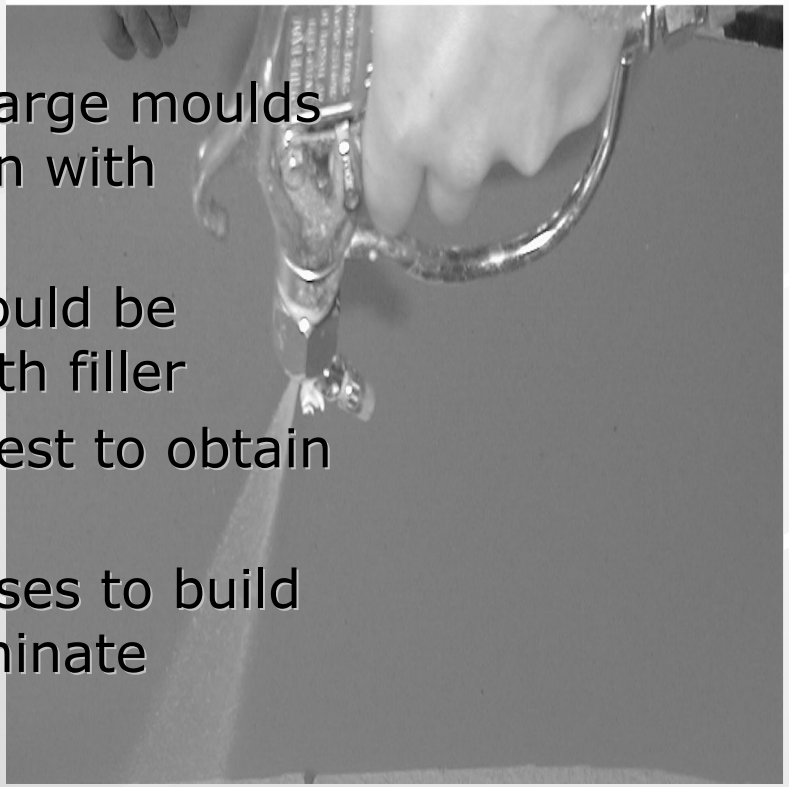
Spraying with RM 3000

- Lay down the first layer on the gel coat as in the previous instruction
- Spray up with RM 3000 allows large moulds to be produced much faster than with conventional tooling resins
- The **filters** of the spray gun should be removed to prevent clogging with filler
- A **single chopping roving** is best to obtain a good glass to resin ratio (4:1)
- Make several thin and even passes to build up the required thickness of laminate



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Gel Time, Temperature & Laminate Thickness

1% MEKP with RM 3000

Temperature °C	Gel Time - minutes
16	60
17	54
18	48
19	44
20	40
21	37
22	34
23	32
24	30
25	28
26	26
27	24
28	22
29	20
30	18

Optimum Temp. Range
Too cold - slow cure
Too hot - fast cure

	Layer Thickness	
Gel Coat	800 micron	0.8mm
1st Layer	300g/m2	0.9mm
Laminate	450g/m2	1.4mm
	900g/m2	2.8mm
	1350g/m2	4.2mm
	1800g/m2	5.6mm
	2500g/m2	7.8mm
	3000g/m2	9.3mm

TOTAL THICKNESS
3.1mm
4.5mm
5.9mm
7.3mm
9.5mm
11.0mm

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Mould Stiffening & Reinforcing

- Stiffening and reinforcing ribs can be added to the back of the mould
- Ribs can be added as soon as the mould is fully cured and at room temperature
- Ribs added will not cause sink marks or deformation to the mould surface

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RTM male and female

RTM Light

RTM moulds
produced from RM 3000

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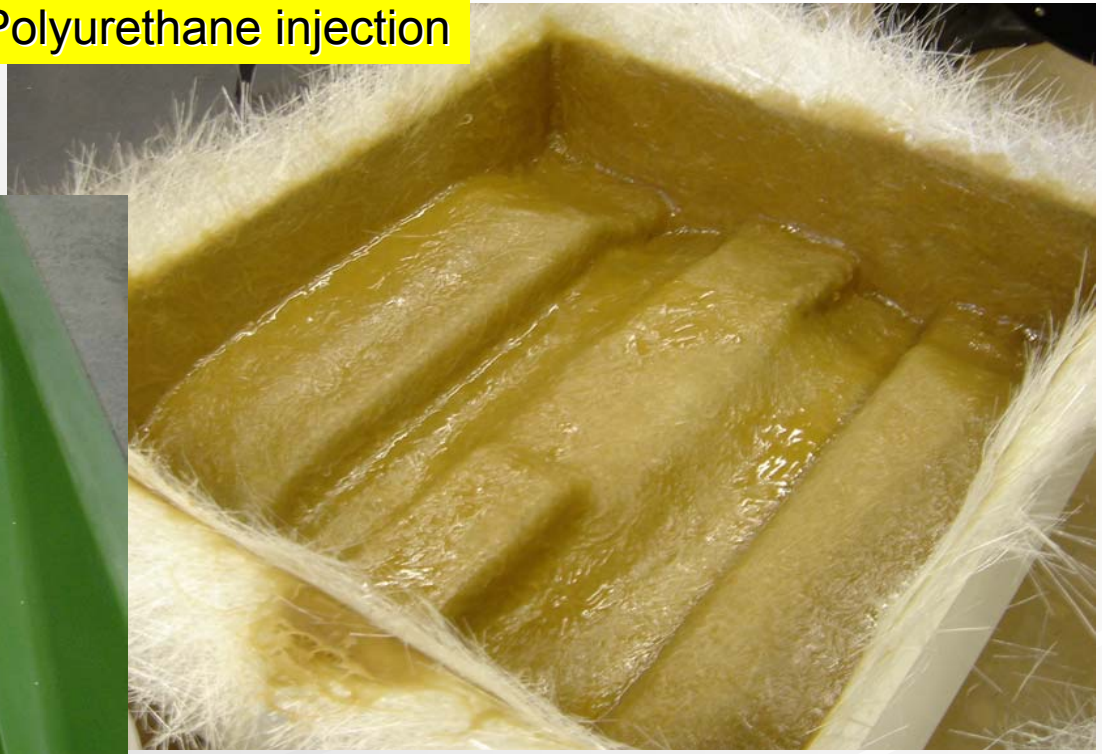
Polyurethane injection



Thermoforming

Prototype moulds produced from RM 3000

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541 NW Interpark Place
Port St. Lucie FL 34986
Tel:772.343.7300
Fax:772.343.9700

For product data sheets, distributor listings, MSDS or technical service, contact Nida-Core Corp.

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