CORE INFUSION

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Background

Who is DIAB?

- The world's largest manufacturer of structural core materials
- Range of structural PVC foam cores and end-grain balsa
- Brands include:

Divinycell™

ProBalsa™

Resin Infusion Core Materials

We will cover

- Resin infusion using the structural core material as the resin transfer medium
- What is infusion
- Practical knowledge and accessories
- Common infusion methods and strategies

What is infusion?

- Infusion is a closed manufacturing process.
- Resin is drawn into a mould prepared with reinforcement fabrics assisted by vacuum pressure.

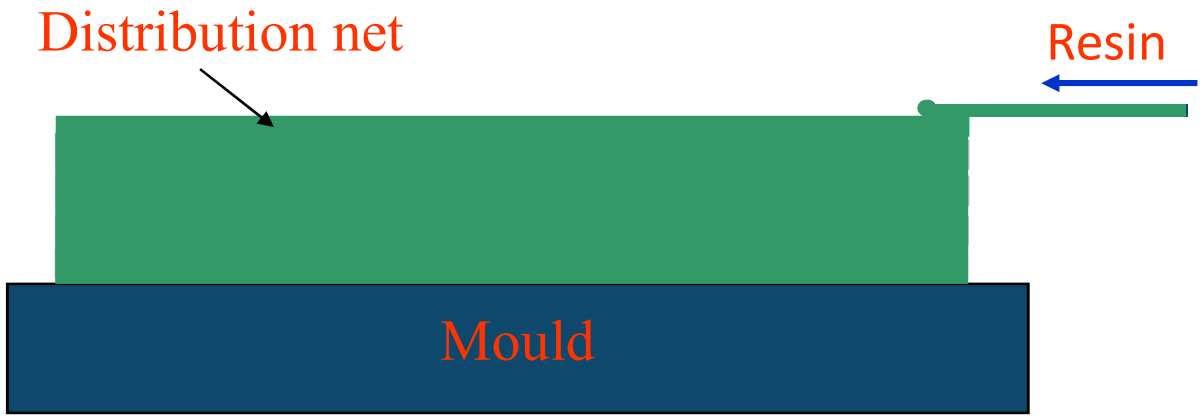
Why use Infusion?

- Benefits:
  - Improves part performance by:
    - Reduce resin usage
    - Improving fibre:resin ratio
    - Reducing part weight
  - Dry lay-up
  - Improves quality and introduces repeatability
  - Reduces styrene emissions

Possible flow paths

- **Above structural laminate:**
  - Distribution net
  - Vacuum bag with structure

Flow above laminate



Possible flow paths

- **Above structural laminate:**
  - Distribution net
  - Vacuum bag with structure
- **In structural laminate:**
  - Reinforcement with flow media (Rovicore)

Flow inside laminate

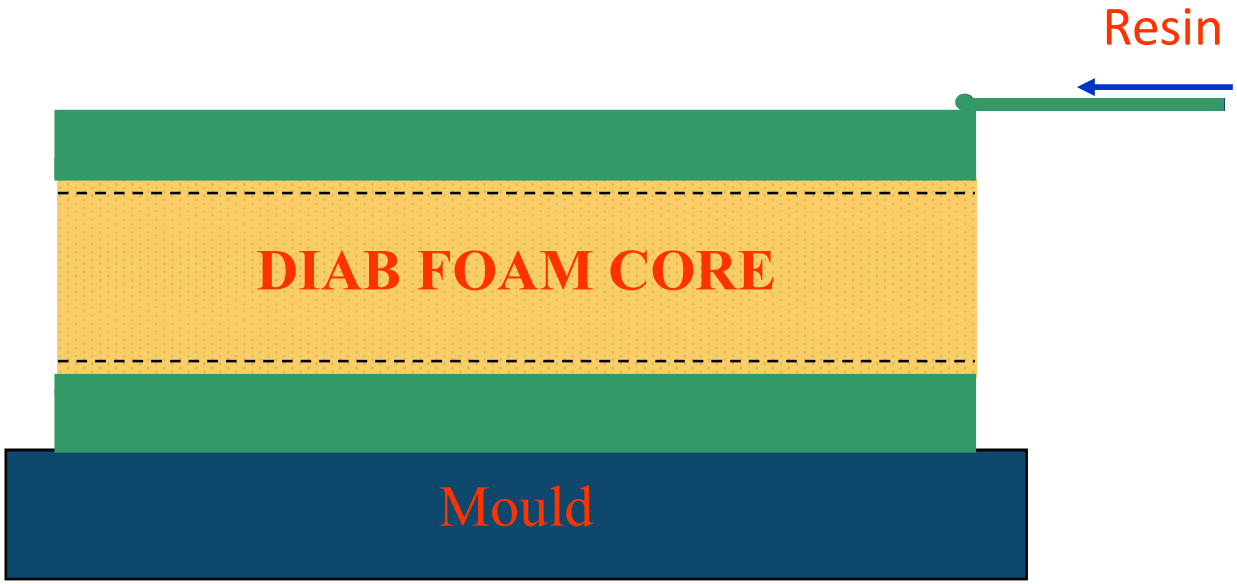
Possible flow paths

- **Above structural laminate:**
  Distribution net
  Vacuum bag with structure

- **In structural laminate:**
  Reinforcement with flow media (Rovicore)

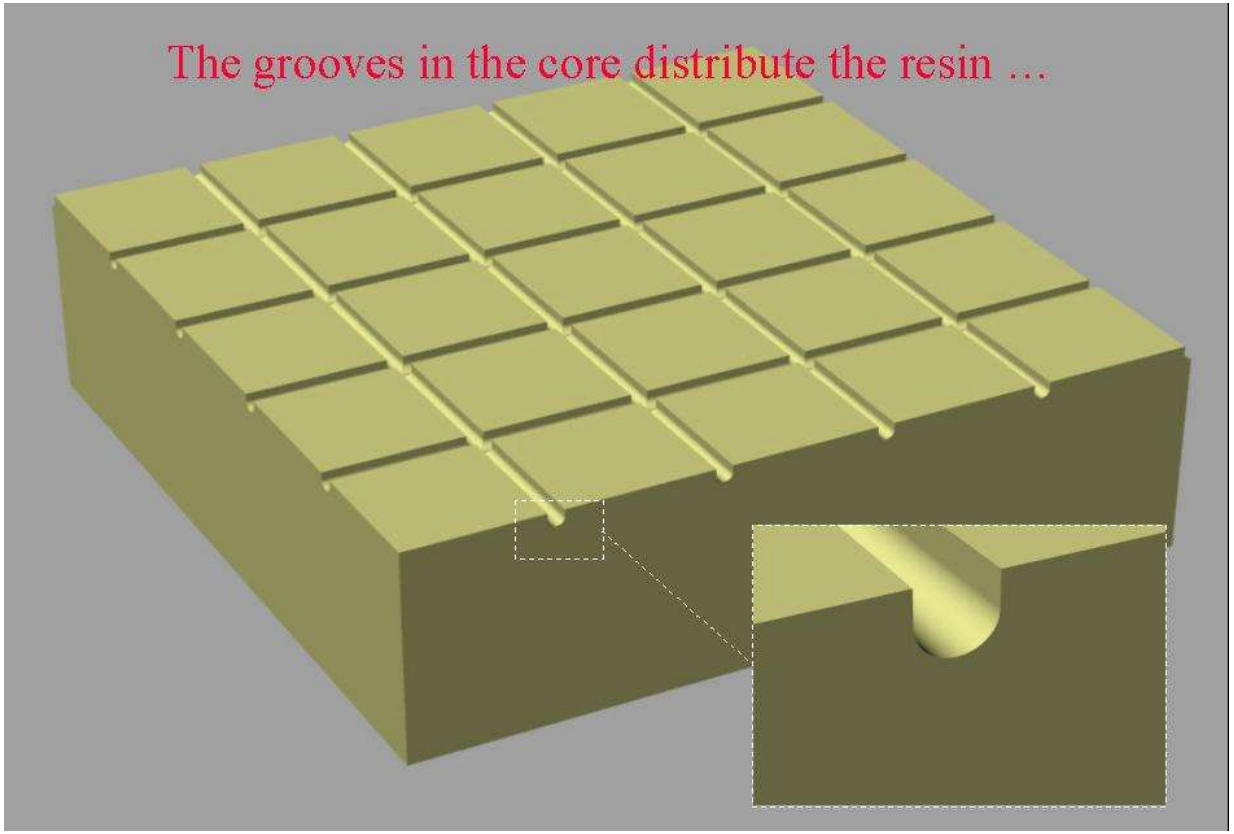
- **Under structural laminate:**
  DIAB Foam grooved core

Flow by the core

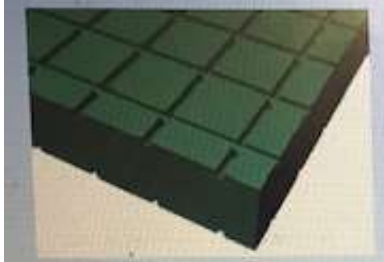


Using the core as the distribution medium

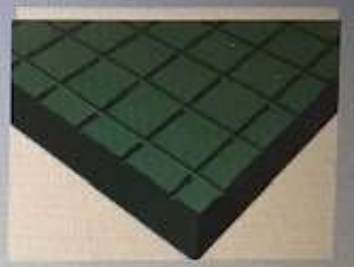
How does the core do it?


The grooves in the core distribute the resin …

Standard Grooving options



GPC1

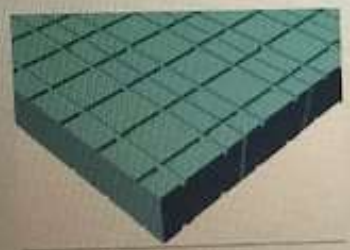


GPC1+GSW30

GPC1+GSW30S

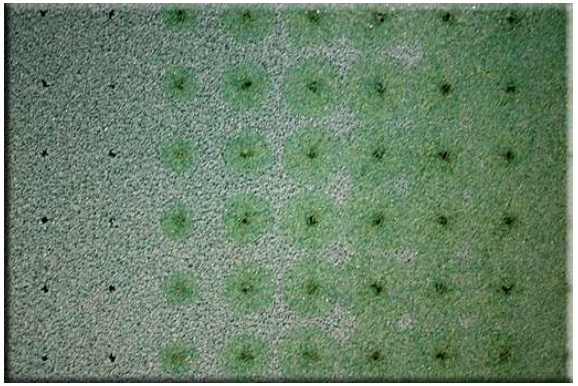
GPC2

GPC2+GSW30



GPC2+GSW30S

Wet-out Examples



Finishing

Rimzath B
to:
Rimzath B

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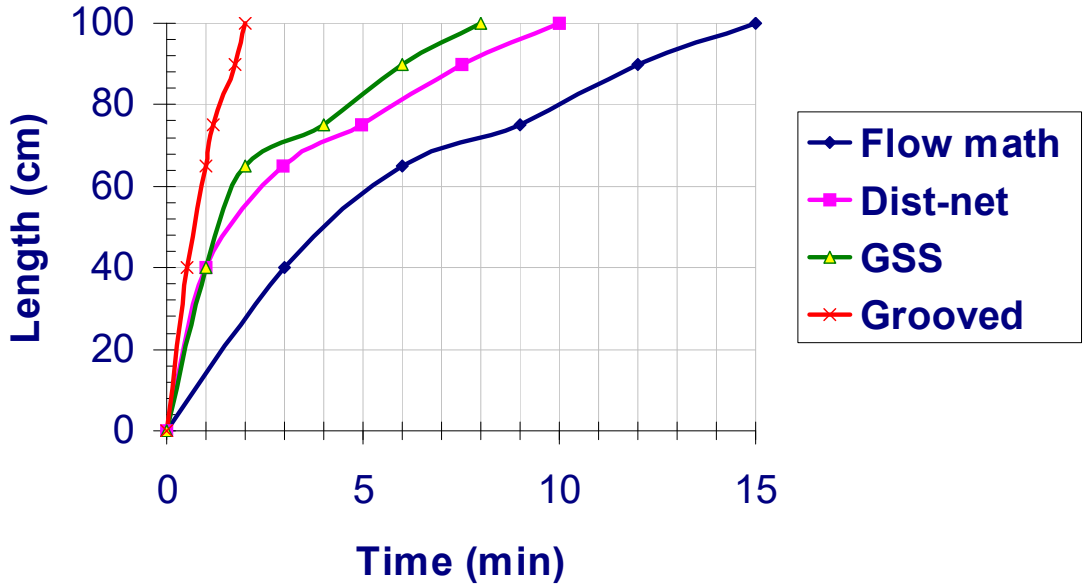
IMG_1263.jpg

Flow rates


100
80
60
40
20
0
Length (cm)
0
5
10
15
Time (min)
Flow math
Dist-net
GSS
Grooved

Advantages of Core Infusion

- A faster and cheaper closed manufacturing process for sandwich constructions with fibre composite skins.
- Grooved core => Faster flow
- Faster flow => Larger panels
- Larger panels => With reduced materials/ waste
- Reduction in materials/wastage=> Cheaper product

Which core groove system?

Distance between grooves:

thickness > 15 mm use 20x20mm squares

thickness < 15 mm use 20x20 or 30x30mm

Perforations

2mm on 20x20mm spacing

2mm on 20x40mm diamond for reduced weight

Size of grooves

2x2mm (normal)

1x2mm (reduce print-thru and weight)

Resin Infusion Equipment

- Essential that the right equipment is used
- Most equipment low cost and readily available
- Equipment needs to be looked after and stored well!

Vacuum system

Off-the-shelf vacuum pump and gauge suitable
Vacuum at 99%
Normally and oil lubricated rotary vein pump

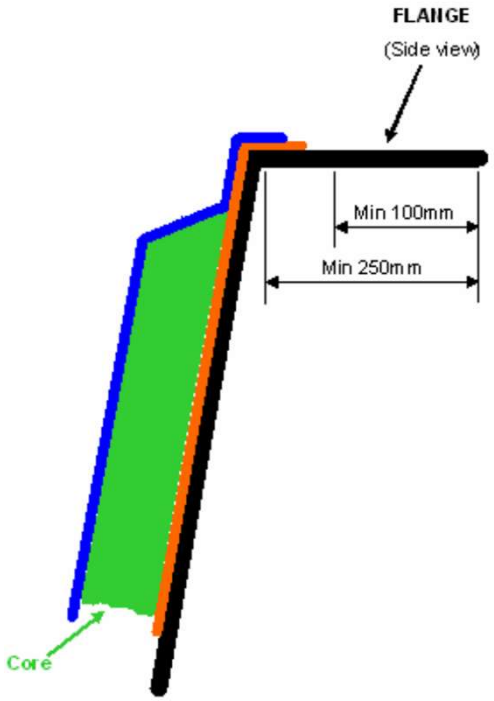
Vacuum Pump

Leak Deductor

Catch pot

Hose
Cutter

Mould Flange



Consumables

"*All off-the-shelf items*"

A. Tacky tape

B. Vacuum bag (use cast not blown plastic)

C. Inlet/outlet hose (spiral hose)

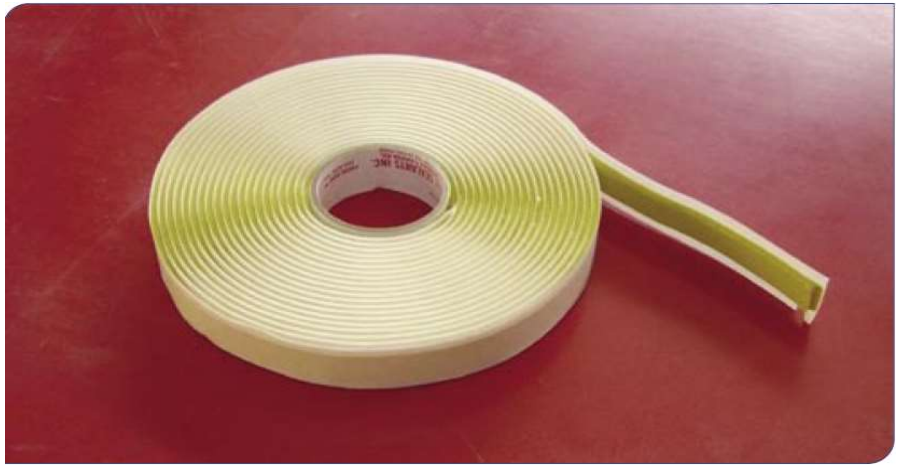
D. Resin trap

E. Tacky spray

Vacuum Bag

- *Critical to the process*
- *Temp resistance 100degC*
- *Width of the bag to be 20% larger than girth*
- *Wider the better, reduces the risk of bridging*
- *50-75um*
- *Must be treated extremely carefully, very hard to track down holes in the bag once on the job.*

Tacky Tape



Peel Ply

LDPE TUBE

Low Density Polyethelene for vacuum and feed line

Transparent preferable

Usual diameter12mm

Good quality and resistant to vacuum pressure

Plyable enough to seal well using welders clamps, but not damaged by them

Infusion Blocks

Fittings

IR Thermometer

Spiral wrap/hose

Electrical spiral wrap – commonly available

Usually Transparent

Recommended 12mm dia min

Check the quality of the spiral hose

- *Resistant to vacuum pressure,*
- *Not too wide gaps or sharp edges*

Manifold Options

How to Fill Your Part With Resin

Key Words

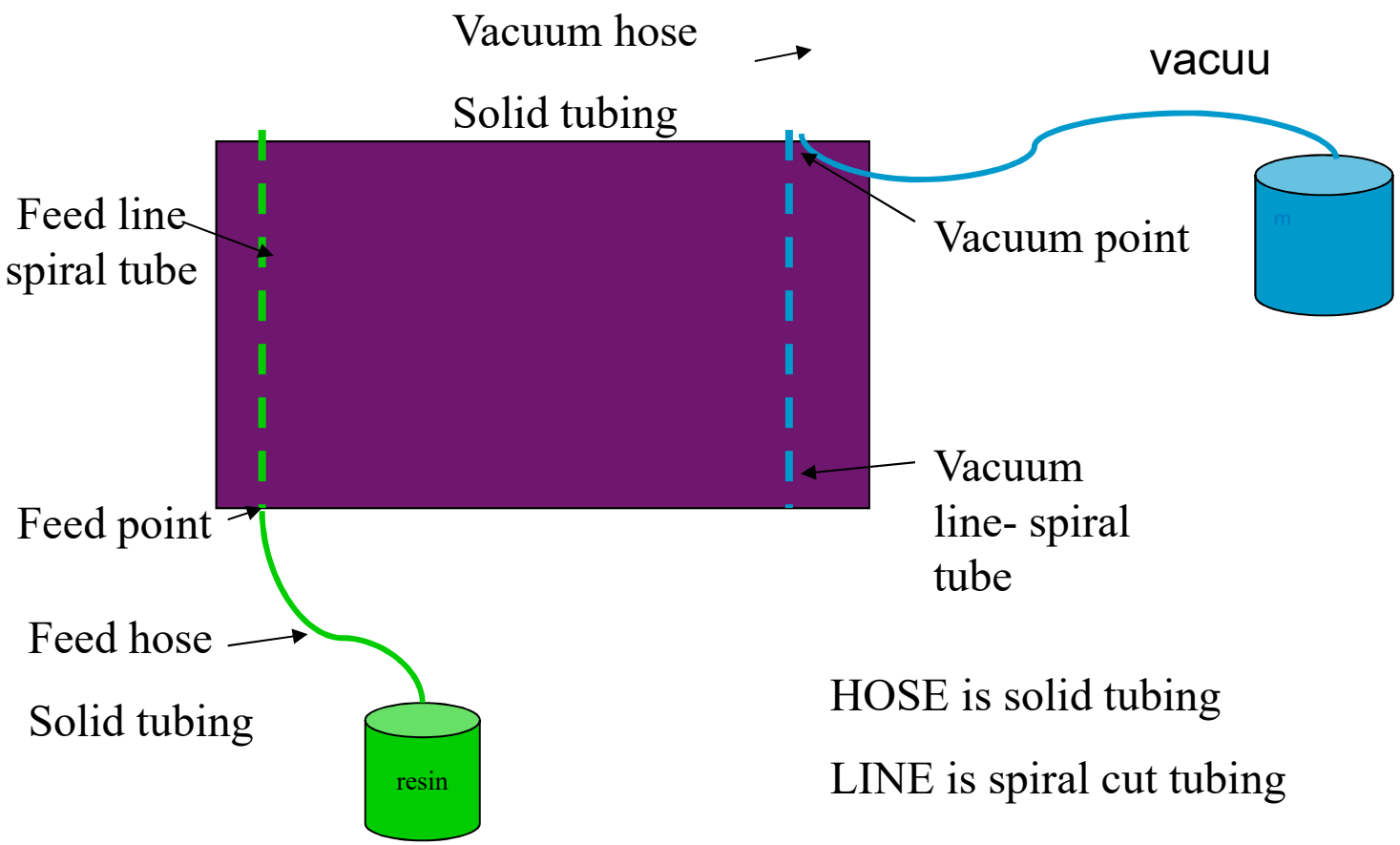
- "Manifold" describes feed and vacuum hose placement, size and spacing that is used to infuse a part
- This includes hoses inside the part as well as outside

Key Words

- “Manifold options” are basic types of manifolds that may be used to infuse a part
- We will discuss the four basic types of manifolds

More Key Words

- Feed point (point that feed enters the bag)
- Feed line (spiral hose to distribute resin INSIDE bag)
- Feed hose (hose connecting part to resin source OUTSIDE bag)
- Vacuum point (Point that vacuum enters bag)
- Vacuum line (spiral hose distributing vacuum INSIDE the bag)
- Vacuum hose (hose connecting part to vacuum source OUTSIDE bag)


Vacuum hose
Solid tubing
vacuu
Feed line
spiral tube
Vacuum point
Vacuum
line- spiral
tube
Feed point
Feed hose
Solid tubing
resin
HOSE is solid tubing
LINE is spiral cut tubing