

# Motorettes and Impregnation Methods

## Insulation Systems and Materials

- Various insulation components consist of several insulation materials forming an insulation system in interaction:

### 1. Primary insulation:

The varnish on the wire is applied in a so-called thermal coating process in several different coating processes concentrically to the metal wire in a baking process (enameling process).

### 2. Secondary insulation:

The secondary insulation is placed after the winding procedure between enameled wires in order to increase the insulation resistance. Simultaneously the mechanical stability and thermal conductivity gets improved. This procedure is called impregnation.

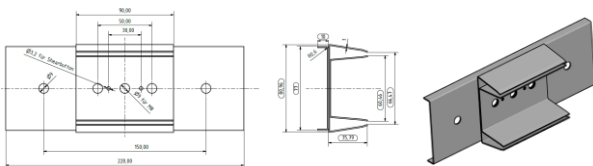
### 3. Tertiary insulation:

All other insulation materials such as the insulating paper or the insulation tape belong to the tertiary insulation. They insulate phases in multilayer winding systems and the windings to the lamination stack. Here usually a compromise between the maximum field strength and thermal conductivity must be found.



## Motorettes Design

- Motorettes are specimens representing models of winding systems. The geometry should correspond to the geometry of the machine under test as much as possible.



### Impregnating or dipping



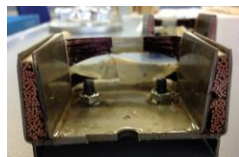
### Coating thickness



### Vacuum experiments



### Sectional view of a motorette



## Impregnation Methods

- Impregnation should bring the secondary insulation to the desired location and harden this. Several impregnation methods are possible:

Method	Advantage
Impregnating or dipping	Simple
Dribble	Low resin losses
Vacuum-pressure (VPI)	Low air inclusions
Current-UV-process	Fast

### Hot dipping (prewarmed)



### Draining



### Vacuum-process (VPI)



### Hardening

