

CONDITIONING BASICS

GOOD MOISTURE MANAGEMENT

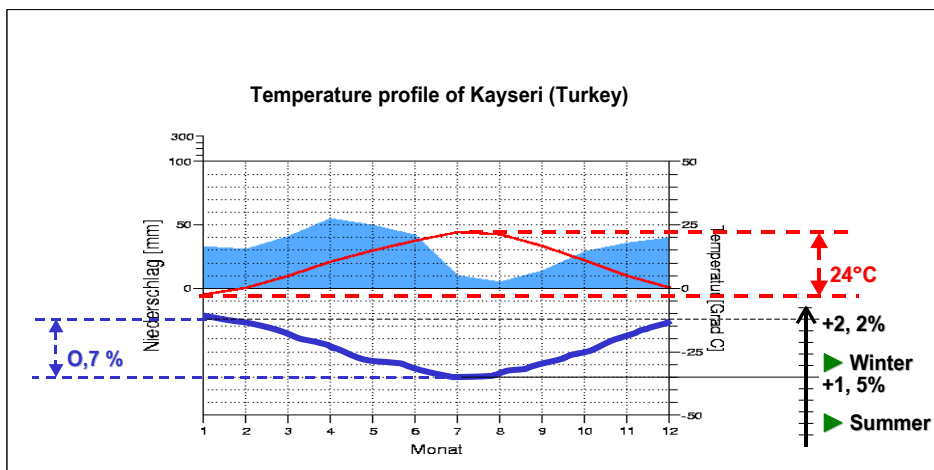
Whilst inside the spinning plants the moisture content of the material in process can be controlled continuously, the moisture content evolution often remains totally out of control during the stocking and transporting period.

Therefore, it is an imperative for a good quality management to ensure that the yarn leaves the spinning plant with an appropriate degree of moisture. The better the moisture level, the better will be the workability of the yarn in weaving or knitting. Often, the moisture level is the "forgotten quality criteria".

The charts show the evolution of the moisture content in the spinning process and the influence of climate variation on moisture.

Therefore, moisture management becomes essential in the textile industry. High speed spinning machines generate more friction thus giving additional heat to the yarn. As a result of such heat transfer the yarn moisture content is vaporised and disappears.

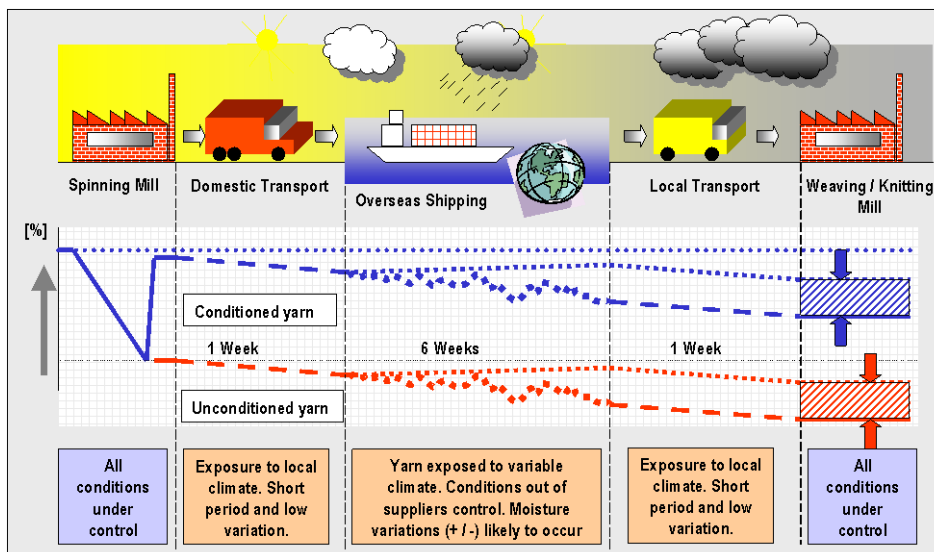
Machine type	Cotton Ne 30 Ring Low speed	Cotton Ne 30 Ring High speed	Cotton Ne 12 OE Low speed	Cotton Ne 12 OE High speed
Opener	6,8	7,1	6,6	6,8
Cards	6,7	6,9	6,5	6,6
Combers	6,4	6,5	-	-
Drawing frames	6,1	6,2	6,3	6,3
Roving frames	5,6	5,7	-	-
Spinning frames	5,0	5,0	5,8	5,5
Winders	4,7	4,4	-	-
Total loss	2,1%	2,7%	1,8%	2,3%



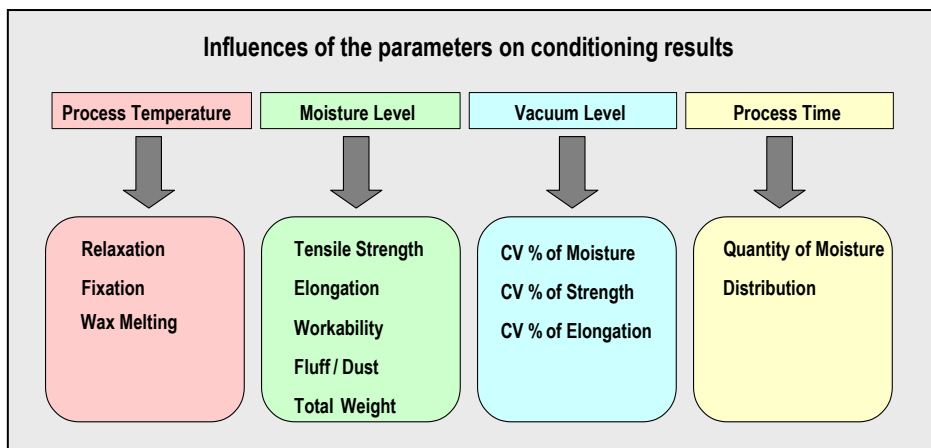
BETTER QUALITY

Dry yarns have worse properties in subsequent processing. Rising speeds in spinning result in decreased yarn quality for other processes. For quality reasons, it is absolutely important to have an even distribution of recuperated moisture throughout the entire yarn package.

The conditioning process elevates the overall moisture level of the yarn bobbins and compensates the gains and losses of moisture during the transporting actions. Of course these variations will be higher the longer the distance between the producer and the respective customers.



CONDITIONING BASICS



MOISTURE ROOMS ARE OBSOLETE

Conditioning rooms are obsolete for both economic and quality management. High residual times of up to 24 hours, high energy consumption and space requirements with high investment costs in line with a bad moisture distribution are their main disadvantages.

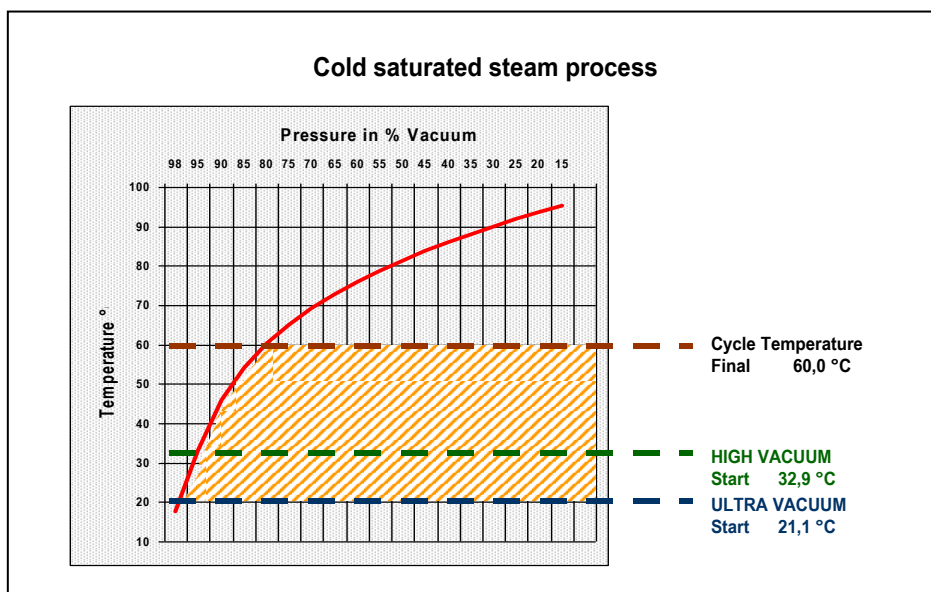
Fibres	Temperatures	Conditioning	Fixation
Cotton	55 –65°C	+2,0%	-
Cotton/Polyester	60 –65°C	+1,3%	-
Viscose	55 –65°C	+2,8%	-
Polyester	-	+0,3%	110°C
Acrylics	-	+0,5 %	110°C
Flax, Ramie, Linen, Wool	65°C	+2,5%	80 - 110°C

VAPOR- VACUUM- SATUSTEAM

The moisturising quality is primarily influenced by the equipment and its resources to provide appropriate results. **The combined vapour-vacuum-saturated steam (satusteam) technology** of WELKER secures the highest possible moisturising results.

Variations in process time and temperature, moisture distribution and moisture level have direct influence on the yarn quality.

The charts indicate temperatures and possible average results when using vacuum. The deeper the pressure, the lower the boiling point of water and therefore, the smoother will be the treatment of yarn. At 95% vacuum (HIGH VACUUM), the process starts at 32,9°C and rises continuously up to the recommended final temperature. Due to this phenomenon, systems with vacuum rates above 90% can provide better results than others with less vacuum.



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CONDITIONING IN FOUR PHASES

FIRST: After spinning, the bobbins should rest a while in order to adapt to the local temperature, basically because high winding speeds heat the bobbins above room temperatures, thus reducing the condensation efficiency.

SECOND: Treatment inside the machine with combined vapour-vacuum-steam process. Due to the transfer of energy, the more water condenses on the surfaces, the higher will be the increase of temperature of the yarns.

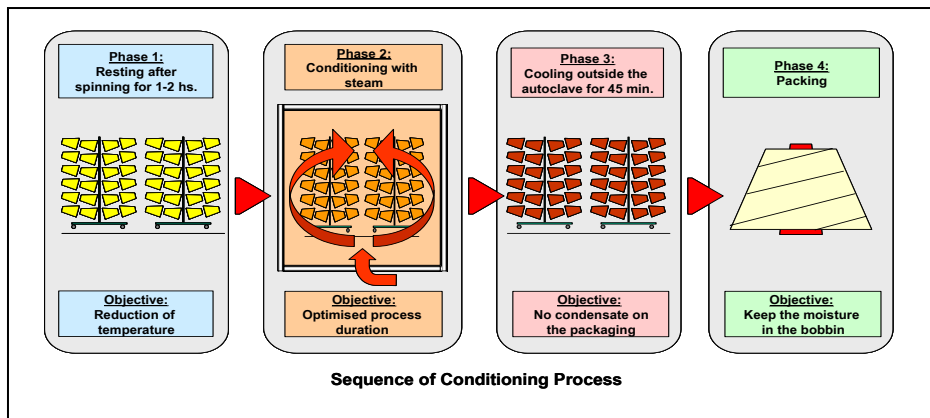
THIRD: After the treatment the yarns have to cool out for some time. If the warmed up bobbins are packed immediately, there is the risk of condensation on the inner side of the plastics, which can induce the proliferation of fungus.

However, of course packing is imperative for the retaining of moisture into the bobbins. For this reason, the cooling period should be as long as needed, and as short as possible, so that water losses due to evaporation can be avoided.

FOURTH: Packing is the final phase of the conditioning process, as the condensed water needs to be retained inside the packages.

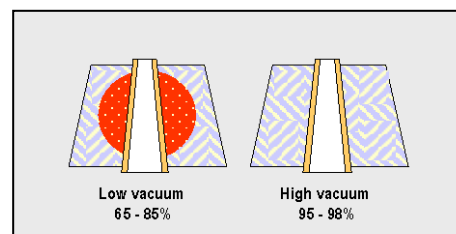
In order to overcome the loss of moisture in this period and ensure better conditions for a fast packing, WELKER has recently developed the COOLVAP cooling system, which will be explained in a separate chapter.

Conclusively, conditioning is a combination of various functions, namely the right temperatures, the right timings – and the right machine to achieve highest possible efficiency.



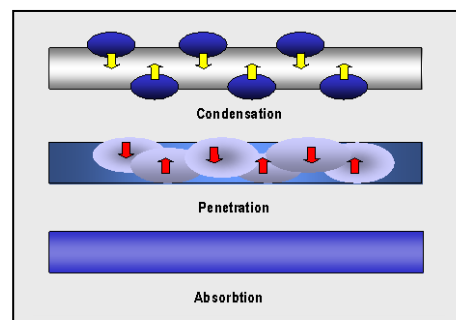
HIGH VACUUM, BEST YARN

There is an obvious connection between the vacuum and the penetration of saturated steam. The higher the vacuum, the better the conditioning results. WELKER machines can be equipped with ULTRA VACUUM (97,7%).



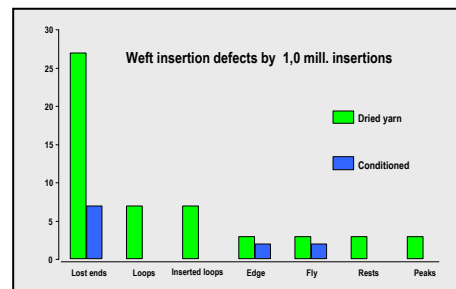
ABSORPTION NEEDS TIME

Using air conditioning in the spinning plant means there is not much time for the fibres to absorb the humidity in the air, and it will be superficial. With vacuum the amount of moisture is much higher and the moisture penetrates in all layers of the bobbins.




BEST IN WEAVING AND KNITTING

The chart shows drastic reduction of weft inserting defects on a air-jet weaving machine. Apart from improvements in the weft, also in the warpers the working performance is improved.



RECUPERATE THE LOSS

Moisture means weight- almost all spinning plants deliver yarns with much less than the 8,5% Regain. Therefore, the moisture loss needs to be recuperated after the spinning and is a significant contribution for the financial success of the plant.







Example of Weight Increase

Initial weight	1,894 Kg
Final weight	1,937 Kg
Weight increase	2,27 %
Yarn moisture	5,2 %
Yarn weight	1,89 Kg
Dry weight	1,800 Kg
Conditioned weight	1,94 Kg
Final moisture	7,59 %
Increase of water content	2,39 %

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LAYOUTS FOR BEST PERFORMANCE

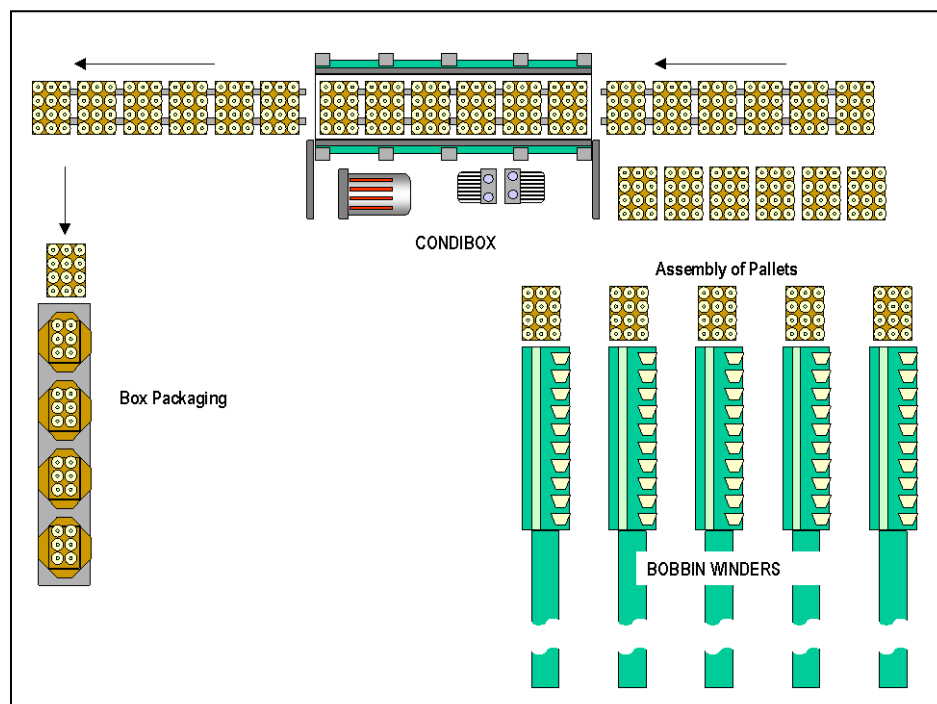
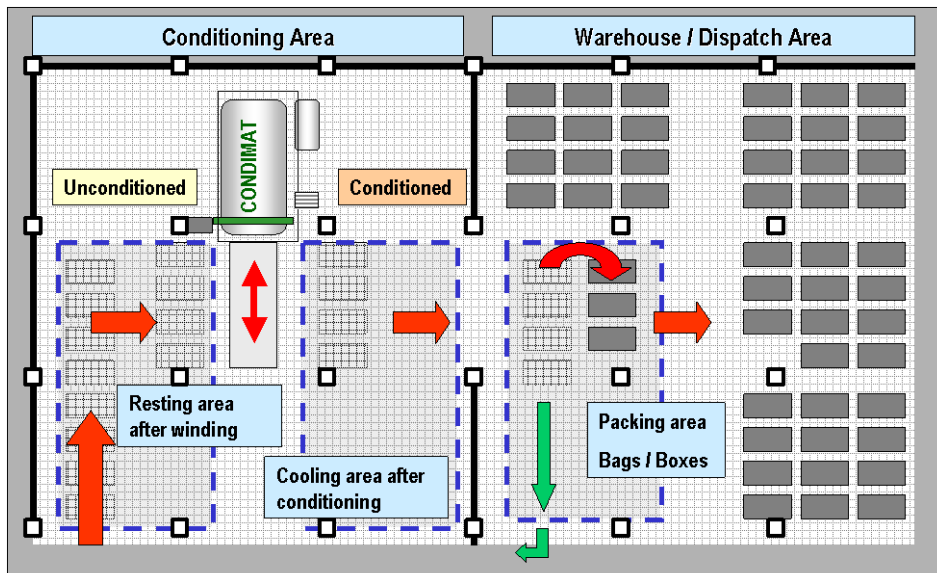
The conditioning process needs some handling and, subsequently, appropriate space for the various batches in the four process statuses, namely:

-  Batch preparation
-  Conditioning process
-  Cooling time
-  Packing

Planning, therefore, is an important activity prior to the decision of which type of conditioner to buy.

Every plant has different situations and therefore, in the majority of the cases, every machine has to be planned individually.

With our modular CONDIBOX, we are able to build ANY MACHINE SIZE with ANY AUTOMATION.



WELKER engineers are specialists in automation. We plan and supply transporting systems and make the corresponding software, so that customer have their plant supplied **“from one hand”**.

PACKTRACK systems are becoming popular especially for export on pallets of any kind. We are specialised to transport any size and type of pallet in and outwards of the conditioning machine.