

Resilience property of RD68 front line spinning cot and its impact on contact area, nip length, and fibre control in drafting zone.

B. Sujai
Manager – Application Technology
Inarco Ltd

Email: products@inarco.com

Abstract:

Resilience property of a rubber cot can be explained in terms of “ability of a rubber cot to recover or regain its original geometry without any permanent deformation”. The curvature of a rubber cot at the arc of contact point will be always at high stress. In this article re-resilience property of RD68 rubber cot had been studied and how this property along with low compression set values enables the rubber cot to resume its original shape after being compressed elasticity, so that better contact area, nip length and good fibre control is achieved in spinning drafting zone.

Keywords:

Resilience, rebound-resilience, elasticity, low compression set, nipping length, contact area, fibre control, anti-lapping properties, drafting zone, tensile strength, wear resistance, abrasion resistance, elongation, tear strength, adhesion strength, bondability.

Introduction:

Cots & aprons in the drafting system along with other components play a vital role in deciding the overall spinning performance and yarn quality. Increased in output of ring spinning machines over the years is phenomenal. High speed drafting, high draft ratio increased top arm loading, increased spindle speed & productivity, yet extended buffing cycle is a common practice. To achieve better yarn quality like low IPI values, less CV% and good mass uniformity, re-silience property along with other important properties like low compression set value, anti-lapping characteristic plays a crucial role in deciding the yarn quality and also to afford good spinning performance. The idea is to have RD68 as front line cots for ring spinning application.

RD 68 Frontline Cots - The power of 3 – truly universal

- 1) Excellent resilience properties even at very high surface velocity of spinning front roll
- 2) Robust design & formulation for consistency – Spindle to Spindle, machine to machine.
- 3) Very good anti-lapping properties to handle variety of fibres

Key features:

- ✓ Very excellent Resilience property enables the cot to recover or regain its original geometry without any permanent deformation” even with increased surface speed & higher draft ratio.
- ✓ Excellent Wear resistance of the rubber compound in order to provide longer buffing cycles even with less or nil traverse.

- ✓ Excellent anti lapping properties gives improved working performance under any condition suitable to handle variety of fibre.
- ✓ Ideal for Multi spinning application – Suitable for cotton ring spinning, for compact spinning which includes SUSSEN ELITE, ZINSER, ROCOS, RIFA & COM4 spinning system.
- ✓ Ideal for Multi Fibre application for processing 100% cotton, Poly cotton blends, Coarse cotton including ring denim and tyre cord yarns

Resilience property of a RD68 cot:

In general re-silence may be defined as the property of a material that enables it to resume its original shape or position after being bent, stretched, or compressed; elasticity. In physics and engineering, resilience is defined as the capacity of a material to absorb energy when it is deformed elastically and then, upon unloading to have this energy recovered. In other words, it is the maximum energy per volume that can be elastically stored. It is represented by the area under the curve in the elastic region in the Stress-Strain diagram for normal materials. In rubber, resiliency may be defined as the ratio of the returned to the impressed energy i.e., and resilience is a measure of the ability of the rubber vulcaunizates to return the energy used to deform it.

Re-silence property of a rubber cot can also be explained in terms of “ability of a rubber cot to recover or regain its original geometry without any permanent deformation”. The curvature of a rubber cot at the arc of contact point will be always at high stress.

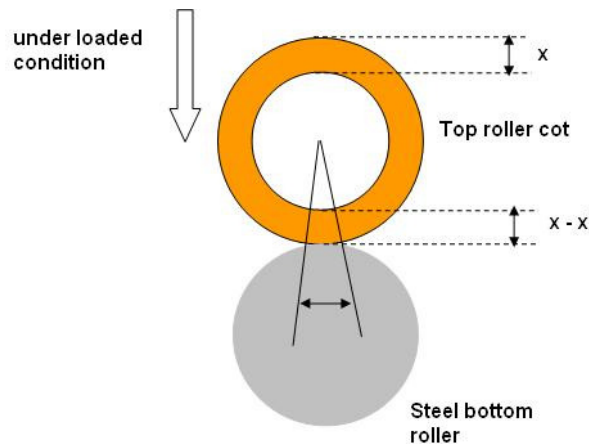
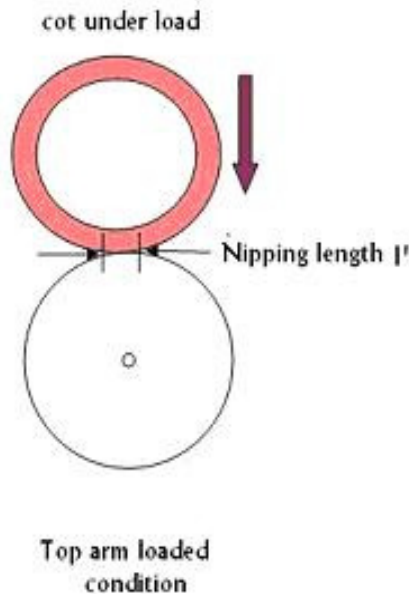


Fig - 1

Where 'X' is the wall thickness of the rubber cot measured diametrically opposite to arc of contact point with steel bottom roller

X – X' is the wall thickness of the rubber cot measured at the contact point with steel bottom roller .Under loaded condition $X - X' < X$ this is due to the fact that rubber being an elastic material is compressed elastically by doing so, it absorbs the energy when it is deformed elastically and then upon relaxation it returns the energy back and original geometry is maintained. So, the relaxation time is a very important factor that determines the ultimate recovery of rubber surface upon unloading.



Even though RD68 cot measures 68° Shore A hardness due to its increased resilience property and low compression set values the contact area or nipping length maintained with steel bottom roller will be higher as like any 63° or 65° cot. Due to these unique properties even at high front roller speeds better fibre control takes places in drafting zone with improved yarn evenness and low IPI values.

Fig -2

Comparison trial test reports Table - 1

Parameter	Rieter Com4 Spinning system			
	50/1 DX Com4		80/1 DX Com4	
Front Cot	GR266/AF	Competition	GR266/AF	Competition
Nip Cot	RD 68/AF	Competition	RD 68/AF	Competition
RF Make / No	K 43 Spl's Position 503 -603			
UT3 Results				
Single thread strength in (g)	301.10	299.60	174.95	176.90
Strength Cv%	80.17	8.47	12.06	9.45
Elongation %	4.56	4.26	3.42	3.83
Elongation Cv%	7.19	8.26	14.86	9.52
RKM	25.49	25.36	23.70	23.96
U%	9.26	9.45	11.17	11.42
Cv m %	11.66	11.91	14.09	14.38
Cv 1 m	3.69	3.84	4.31	4.37
Cv 3.0 m	2.77	2.97	3.09	3.11
Thin - 50%	1	3	21	28
Thick +50%	8	10	43	45
Neps +200%	24	26	65	67
Total IPI/Km	33	39	129	140
Sensitive IPI				
Thin - 30%	705	809	2139	2318
Thick +35%	105	127	402	427
Neps +140%	91	126	239	271
Total IPI/Km	901	1062	2780	3016
Hairiness	2.48	2.43	1.68	1.81

Remarks :

In the above trial result, RD68 Cot gives low IPI values both at normal and increased sensitivity levels and Significant improvement is also seen at yarn elongation and Cv % values.

Comparison trial test reports Table - 2

Parameter	LR6/S Normal ring spinning	
count	40/1 s CHY	
Normal Front Cot	RD 68/AF	Competition
RF Make / No	LR 6 F.No 3 – RHS	
UT3 Results		
Single thread strength in (g)	211.08	229.00
Elongation %	4.38	4.14
RKM	15.65	15.05
U%	9.82	9.86
Cv m %	12.41	12.50
Thin – 50%	1	3
Thick +50%	16	19
Neps +200%	45	48
Total IPI/Km	62	70
Sensitive IPI		
Thin – 30%	921	941
Thick +35%	192	217
Neps +140%	210	230
Total IPI/Km	1322	1388
Hairiness H	4.18	4.21
Hairiness Sh	0.81	0.82
Remarks :		
<i>In the above trial result , RD68 Cot spinning front line cot gives low IPI values both at normal and increased sensitivity levels and Significant improvement is also seen at yarn Cv % values.</i>		

Conclusion:

Due to excellent resilience property and low compression set values, RD68 spinning front line cot (Both in Normal ring spinning and also in compact spinning) provides improved fibre control and better grip on drafted strands of fibres by having good contact area , nipping length with bottom steel fluted roller . As an outcome even by increased front roller speeds with high draft ratio, mass uniformity of drafted strand (yarn) remains superior with low CV% and IPI values.