

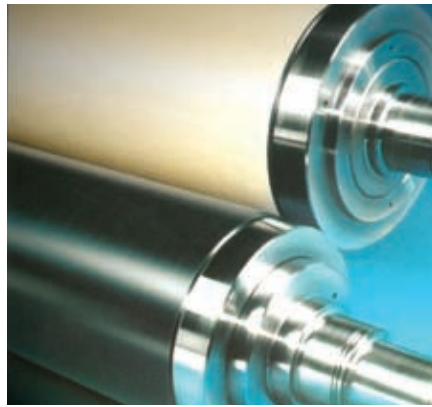
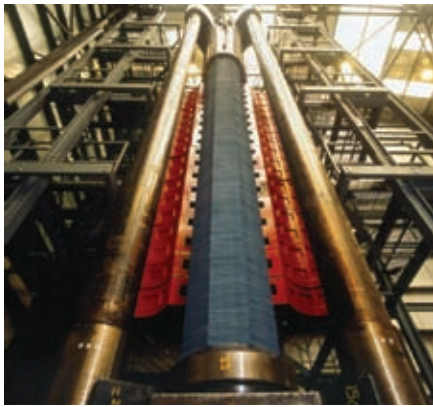


World Leaders in Calender Roll Manufacture

Richard Hough Limited manufacture a specialist range of fibre filled calender rolls for the paper industry. High quality fibre filled rolls represent the most cost effective and safest cover material alternative for the majority of supercalendering applications today.

Richard Hough Limited's industry leading manufacturing facilities and over 200 years experience ensure optimum roll quality and reliability. The highest manufacturing standards are maintained in compliance with a fully documented quality system covering every stage of roll production.

Richard Hough Limited regularly supply new and re-filled calender rolls to paper mills in over 30 countries worldwide and offer a high level of technical support on all aspects of calender roll use.



Typical Supercalendering Applications

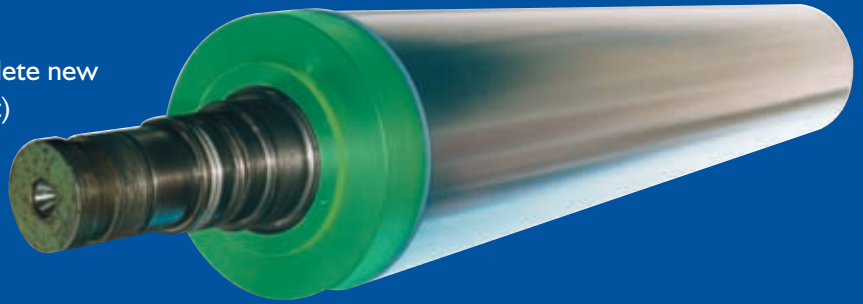
- Magazine / SC
- Woodfree Coated
- Woodcontaining Coated
- Lightweight Coated
- Art Coated
- Fine Paper
- Matt Calendering
- Label Paper
- Release Paper
- Glassine
- Condensor Tissue

New Supercalender Rolls

- RHL are specialists in the manufacture of complete new Supercalender Rolls (including steel centre shaft)

Refilled Supercalender Rolls

- The RHL refilling system ensures the optimum performance from your Supercalender Rolls



Filling Materials

Supercalendering

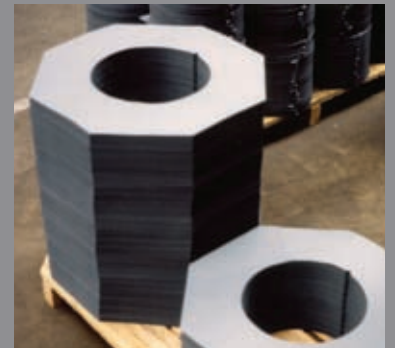
- Endurance 2
- Blue Denim Paper
- White Cotton Paper
- Woollen Paper
- Unbleached White Cotton Paper
- Raw Cotton

Matt Calendering

- SP Cotton

High Temperature Calendering

- Composite
- HHR (Hough Heat Resistant)
- HHD (Hough High Density)



Calender Roll Properties related to Paper finishing Characteristics

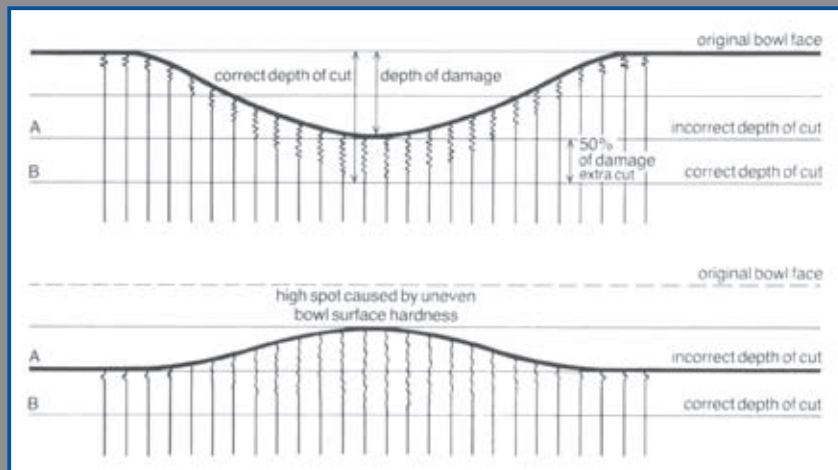
Filling Material	Typical Hardness ° Shore D	Max Temp* ° C	Roll Properties						Finishing Characteristics		
			Density	Hardness	Heat Resistance	Internal Heat Development	Resilience	Resistance To Marking	Gloss	Smoothness	Bulk
Composite	90	140	MORE	MORE	MORE	LESS	LESS	LESS	LESS	MORE	LESS
HHR	90	130	↑	↑	↑	↓	↓	↓	↓	↑	↓
HHD	89	120									
Endurance 2	89	100									
Blue Denim Paper	88	100									
White Cotton Paper	88	95									
10% Woollen Paper	87	85									
18% Woollen Paper	86	80									
25% Woollen Paper	85	60									
30% Woollen Paper	84	50									
Raw Cotton/ SP Cotton	80	50	LESS	LESS	LESS	MORE	MORE	MORE	MORE	LESS	MORE

* The maximum temperatures are for guidance purposes only. Operating rolls at high temperatures, speeds and line pressures may reduce roll cover life and risk premature failure.

Best Practice Guidelines

- Rolls should be rotated to fully remove any shaft deflection prior to machining or use
- It is advisable to store rolls in a continuously rotating rack to prevent shaft deflection. Alternatively the rolls should be regularly, manually rotated during storage.
- New or newly refilled rolls should be initially run in the top position for a running in period, after which the roll should be removed from the calender and re-machined
- Vary the position of a roll in the calender stack to give a longer lifetime.
- After removal from the calender, allow the rolls to cool to ambient temperature prior to re-machining.
- Machine rolls regularly to maintain a smooth resilient surface, free from damage.
- During machining, remove all surface damage (marks, burns or hot spots).
- Ensure that the newly machined surface is at least 50% below the total depth of the worst damage. Insufficient material removal can lead to hot spots and burnings.
- Regular surface inspection and surface temperature checks are recommended.

Guidelines for material removal during re-machining



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