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Upgrading of TMP to an SC/LWC quality

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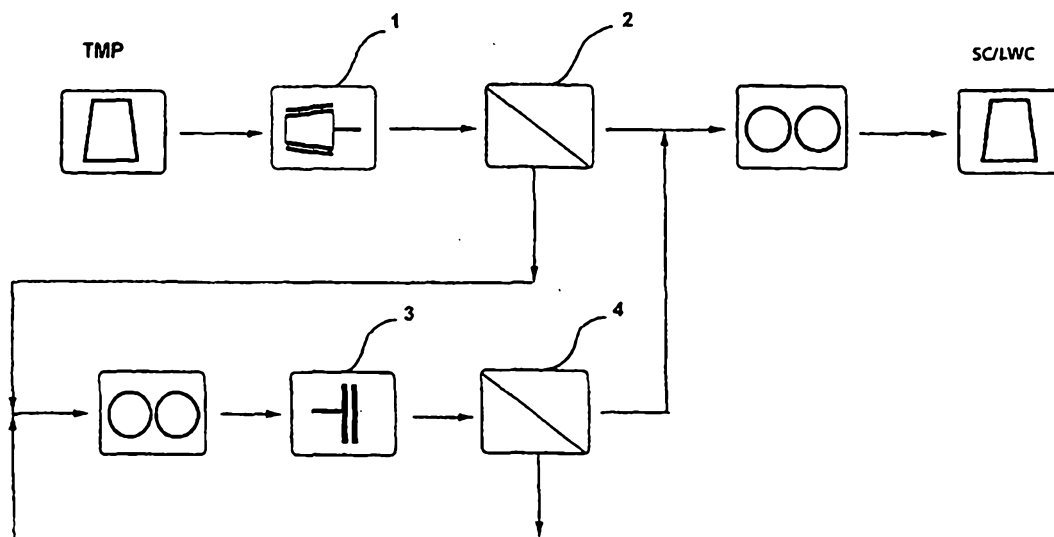


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(21) International Application Number: PCT/SE99/02128 (22) International Filing Date: 19 November 1999 (19.11.99) (30) Priority Data: 9803963-9 19 November 1998 (19.11.98) SE (71) Applicant (for all designated States except US): VALMET FIBERTECH AB [SE/SE]; S-851 94 Sundsvall (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): DANIELSSON, Ove [SE/SE]; Nybergsgatan 8, S-114 45 Stockholm (SE). FALK, Bo [SE/SE]; Avstyckningsvägen 46, S-175 50 Järfälla (SE). KARLSSON, Ulf [SE/SE]; Johan Höckerts väg 8, S-554 48 Jönköping (SE). KJELLSTRÖM, Kenneth [SE/SE]; Kila, Drängsered, S-314 98 Torup (SE). (74) Agents: JOHANSSON WEBJÖRN, Ingmari et al.; L.A. Groth & Co. KB, P.O. Box 6107, S-102 32 Stockholm (SE).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: UPGRADING OF TMP TO AN SC/LWC QUALITY**(57) Abstract**

The present invention relates to a process for production of upgraded TMP to SC/LWC qualities. The newsprint pulp is pumped to an LC-refiner (1) in which the average fibre length is reduced, and is then transferred to a primary screen (2) in which the pulp is divided into a primary accept and a primary reject with the aid of a slotted screen basket which has a narrow slot width. The primary accept is transferred to the main line, where the primary reject is dewatered and then refined in an HC-refiner (3). The refined primary reject is then transferred to a secondary screen (4) in which the reject is divided into a secondary accept and a secondary reject with the aid of a slotted screen basket which has a narrow slot width. The secondary accept is returned to the main line and mixed with the primary accept from the primary screen.

UPGRADING OF TMP TO AN SC/LWC QUALITY

The present invention relates to a process for producing SC/LWC qualities, by upgrading TMP intended for newsprint.

5 The general technique, which is presently used, for the production of high quality TMP (thermomechanical pulp) for SC/LWC (super calendared/lightweight coated) qualities is to subject the pulp to a two-stage refining process in the main line. These refining processes require a relatively high-energy input level and subsequent screening in two stages for selective separation of a long fibre fraction.

10 This fraction is processed at a high specific energy input level in two high consistency-refining stages, with renewed screening between the stages. The fibre length of the high consistency refined reject fraction is controlled optionally with a finishing refining stage with low pulp consistency.

15 One of the problems, which exist with the use of TMP newsprint qualities as SC/LWC qualities, is that the fibre distribution is unfavourable with too high average fibre length and too high proportion of coarse rigid fibres of low binding strength.

20 At the present, the upgrading of TMP is often effected in plants in which only a part-quantity of the TMP-production shall be upgraded to SC/LWC. The upgrading is effected by high consistency refining of the finished newsprint pulp or, after screening, of its long fibre fraction in one or more stages. The result is often that the pulp gets an unfavourable fibre distribution, with a too high average fibre length and too high proportion of rigid fibres, with accompanying impaired surface properties of the end product, because the screening has not been sufficient selective at prevailing screening conditions, particularly at consistencies of more
25 than 2%.

The above mentioned problems have been solved in accordance with the present inventive process, by placing a low consistency refiner (LC-refiner) as a first upgrading stage in direct connection to a fractionating screen room, that includes equipment for slot screening with a narrow slot width of the stiff long fibre
30 fraction. This upgrading stage, due to its position, regulates the fibre length, the fibre flexibility and the shive content of the pulp, in a particularly favourable manner

for the screening process. Thus, the inventive process for producing upgraded TMP to an SC/LWC quality, means that the newsprint pulp with a consistency of less than 5% is pumped to a LC-refiner, where the average fibre length is reduced by 10 - 25%, and subsequent transferring of the pulp with a consistency of more than 2% to a primary screen, which has a slotted screen basket with a slot width of 0.05 - 0.15 mm. The pulp is divided into primary accept and primary reject, whereby the reject withdrawal exceeds 50%. The primary accept is transferred to the main line for further processing. The primary reject is dewatered prior to once more being refined in at least one high consistency refiner (HC refiner). The refined primary reject is then transferred to a secondary screen which has a slotted screening basket with a slot width of 0.05-0.15 mm, and is divided into a secondary accept and a secondary reject. The secondary accept is returned to the main line and mixed with the primary accept from the primary screen.

Above mentioned process and other preferred processes according to the invention is defined in the subclaims.

The invention will now be described in more detail with reference to the various accompanying figures and drawings.

Figure 1 illustrates a method according to the present invention.

Figure 2 illustrates an exemplifying embodiment.

Newsprint pulp is pumped according to Figure 1 to a LC-refiner 1, preferably a conical refiner, for refining at low pulp consistencies $\leq 5\%$, preferably 2 - 5%. The average fibre length of the pulp is reduced in the refiner 1 by 10 - 25%, at the same time the network strength is reduced. The specific energy input level is 50 - 200 kWh/t, preferably 100 - 150 kWh/t. The pulp is then immediately screened at a consistency of more than 2%, preferably more than 2.5%, in a primary screen 2 in a slotted screen basket with a slot width of 0.05 - 0.15 mm, preferably less than 0.12 mm, with a 40 - 60% reject withdrawal or with a reject withdrawal of more than 50%, preferably more than 55%, subsequently the coarse fraction (the reject) is dewatered and further refined once more in an HC-refiner 3 at high pulp consistency of 20 - 40% and with a high specific energy input level of 600 - 1400 kWh/t. The refined reject is screened in a secondary screen 4 with a slotted screen basket with a slot width less than or equal to 0.15 mm, whereby the

reject withdrawal exceeds 50%. The secondary screen 4 accept is returned to the main line and mixed with the primary screen 2 accept. The reject pulp from the secondary screen 4 may be re-processed in the HC-refiner 3 together with the reject from the primary screen 2. Alternatively, the reject from the secondary screen 4 may be transferred from the line and be used for some other purpose. The pulp from the combined accepts from the primary screen and the secondary screen is transferred to the main line. The average fibre length of the pulp has now been reduced by 15 - 25% and at the same time, the freeness level has been lowered by 40 - 70 ml CSF. The density-dependent properties of the pulp have been greatly improved, with only a slight drop in tear resistance. The nature of the pulp is comparable with that which is produced in accordance with the earlier mentioned general technique, this implies that the pulp is suitable for the manufacture of high-quality SC/LWC paper.

In the exemplifying embodiment illustrated in Figure 2, the pulp entering the LC-refiner has a fibre length of 1.20 mm PQM and a freeness of 90 ml CSF. The fibre length of the pulp leaving the LC-refiner 1 has been reduced to 1.00 mm PQM and the freeness is now 65 ml CSF. The energy consumption in the LC-refiner is 80 kWh/t net in respect of the outgoing pulp. In the primary screen 2 the accept obtains a fibre length of 0.90 mm PQM and the reject a fibre length of 1.10 mm PQM. The combined fibre length from the primary reject and the secondary reject is 1.15 mm PQM, which is transferred into the HC-refiner. The combined reject pulp has a freeness of 90 ml CSF. The refining in the HC-refiner requires an energy input level of 900 kWh/t. The combined accepts derived from the primary screen and the secondary screen have a fibre length of 0.95 mm PQM and a freeness of 30 ml CSF. Other examples of changes in fibre length and in freeness of the pulp in the different stages are set forth in the flow sheet of Figure 2. Table 1 shows the pulp properties before and after treating the pulp in accordance with the above exemplifying embodiment of the present invention.

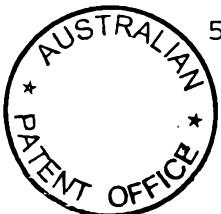
The aforesaid figures and examples have no limiting effect on the scope of the invention.

Table 1

			Newsprint quality	SC/LWC quality
5			Ingoing pulp	Outgoing pulp
	LC-refiner	kWh/t net		80
	Energy consumption			
10	HC refiner	kWh/t		900
	Energy consumption			
15	Freeness CSF	ml	90	30
	Fibre length, PQM	mm	1.20	1.00
	BMcNett +30	%	45	30
	Shive content	%	0.30	0.01
	Tensile index	Nm/g	40	52
20	Tear resistance	mN	1100	1010
	Porosity	ml/min	140	30

CLAIMS

1. A process for production of upgraded newsprint pulp to SC/LWC quality, characterized in that the pulp with a consistency of less than 5% is pumped into a low consistency refiner (1), in which the average fibre length of the pulp is reduced by 10-25%, subsequently the pulp with a consistency of more than 2% is directly transferred to a primary screen (2), in which the pulp is divided into a primary accept and a primary reject with the aid of a slotted screen basket, which has a slot width of 0.05-0.15 mm, whereby the reject withdrawal exceeds 50%, the primary accept is transferred for further processing in the main line, and the primary reject is dewatered prior to refining in at least one high consistency refiner (3), the refined primary reject is transferred to a secondary screen (4), where said reject is divided into a secondary accept and a secondary reject with the aid of a slotted screen basket, which has a slot width of 0.05-0.15 mm, and the secondary accept is returned to the main line and is mixed with the primary accept from the primary screen.
2. The process according to claim 1, characterized in that the pulp consistency in the low consistency refiner (1) is 2-5%, and the specific energy input level in the low consistency refiner is 50-200 kWh/t.
3. The process according to claim 1 or 2, characterized in that the pulp consistency in the high consistency refiner (3) is 20-40% and the specific energy input level is between 600-1400 kWh/t.
4. The process according to any one of claims 1 to 3, characterized in that the screening in the primary screen (2) is performed with a slot width, which is smaller than 0.12 mm and with a pulp consistency of more than 2.5%.
5. The process according to any one of claims 1 to 4, characterized in that the screening in the primary screen (2) is performed with a reject withdrawal of more than 55%.



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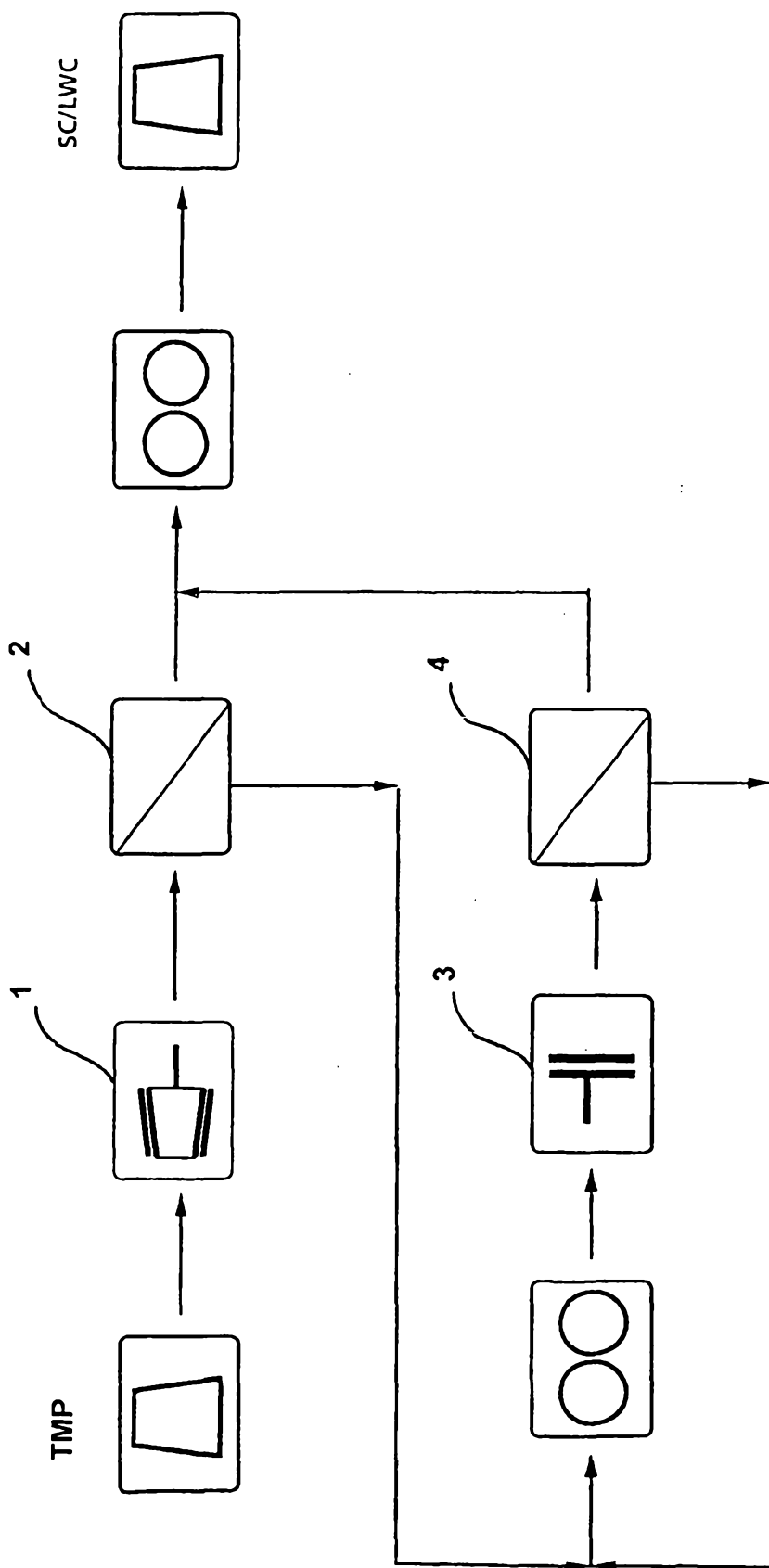


Fig. 1

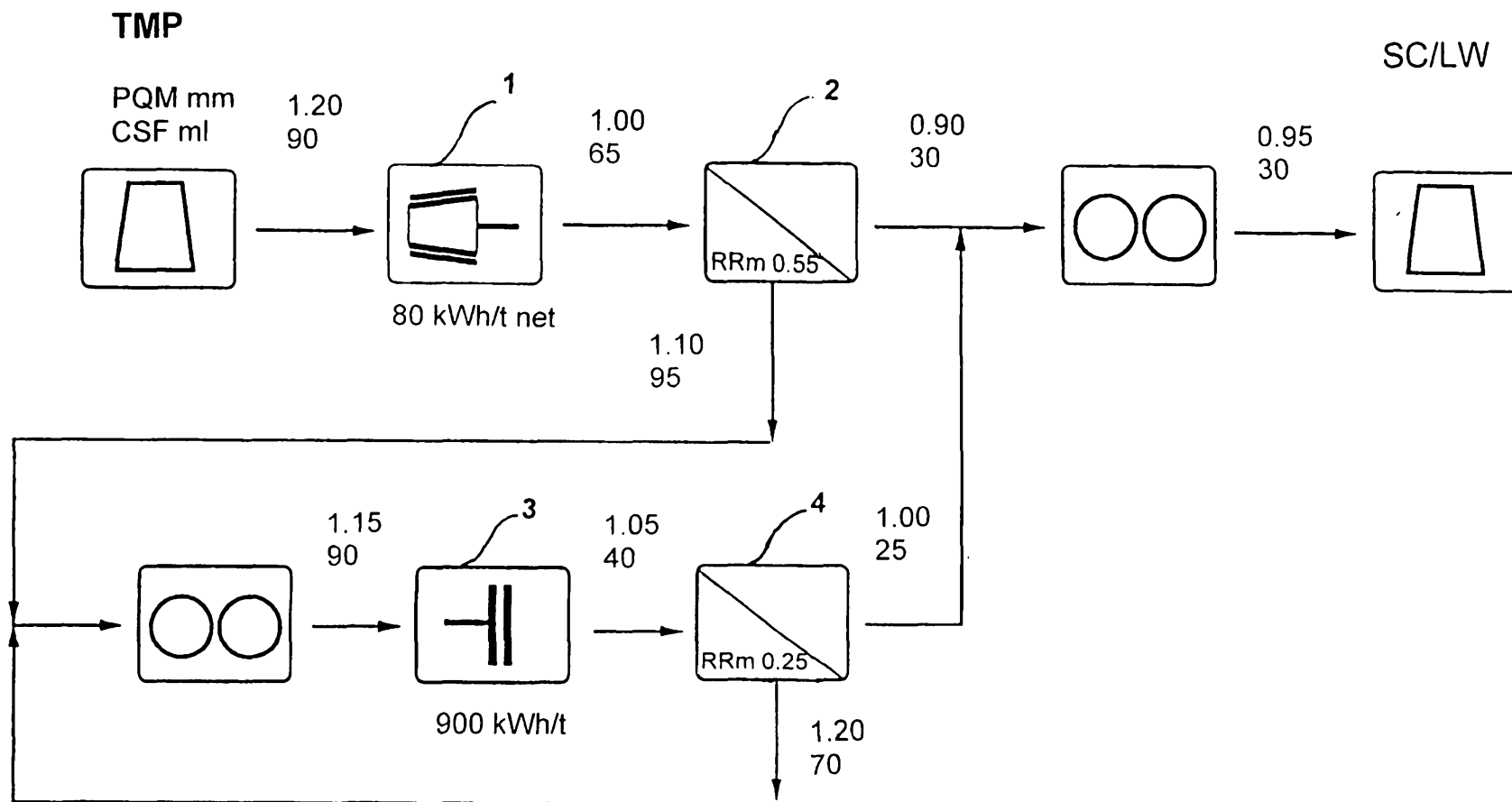


Fig.2