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Perguntas / Questions

Pergunta nº: 1295/Question nº: 1295

Título:/Title: High stiffness eucalyptus pulp fibers for paper cone loudspeakers

Por: / By: Michail Barabasz

E-mail: mbee@internode.on.net

Questão: /Question:

Hello,

We manufacture paper cone loudspeakers in Australia.

I pioneered the introduction of Eucalypt pulp in loudspeaker cone production in Australia but I am an Electrical Engineer that has spent a lot of time testing paper pulps, not an expert.

I wish to know which species of Eucalypt would produce a paper sheet with the highest specific stiffness.

For example the loudspeaker cone is approx 0.6mm thick.

If I form a hand sheet 0.6mm thick and then cut a strip say 25mm wide, which Eucalypt species would yield the highest cantilever

resonance/bending stiffness.

You are the experts so if we know the species then

(a) Can it be purchased?

(b) As we only require a small quantity is there any advantage in making our own pulp ourselves from old age trees? Does tree age matter?

We look forward to your favorable reply

Best Regards

Resposta por Celso Foelkel: / Answer by Celso Foelkel:

Dear Mr. Barabasz, good morning.

I enjoyed very much to learn with you about the way eucalypt pulp fibers are being used, and the technology has been developed by you for this type of manufacture.

Well, after reading your comments and placing my brain to work, I understand that the stiffer papers may be obtained from thick-walled fibers, and this is mainly correlated to *Eucalyptus* wood density. Some *Eucalyptus* species are naturally dense in terms of their woods (*Eucalyptus paniculata*, *Eucalyptus cloeziana*, *Eucalyptus cladocalyx*, *Corymbia citriodora*). Older the trees, stiffer are to be the fibers, since they have thicker walls.

I suggest you to search a laboratory to manufacture some pulp in Australia, using denser woods. The pulp could be tested both in the bleached and unbleached form. Perhaps, the unbleached pulps, for being more hydrophylic, could perform even better.

Considering commercial pulps, those may be better related to your needs are the pulps used to manufacture filter and decorative papers. The species *Eucalyptus globulus* (from Portugal) is very successful to these two manufacturing process. Another possibility is to mercerize a regular eucalyptus pulp, steeping the pulp in a solution of 18% NaOH for a couple of hours, and after that, washing it very well (carefully). Mercerized pulps are very weak with regard to mechanical tests, but very stiff, and suitable for industrial filters. The mercerized pulp could be tried in blends (small percentages) with the regular pulps, to prevent severe reduction on paper strengths.

I hope you may succeed in your developments.
Best regards and I wish enormous successes.
Celso Foelkel

Outros comentários / Other comments:

Por: / By: [Michail Barabasz](#)

Dear Mr. C. Foelkel,

We were pleasantly surprised and grateful to receive your reply. The loudspeaker industry uses a very small quantity of paper pulp as average paper cone typically weighs in at 6 grams, hence we attract no interest from commercial mills.

The paper properties for loudspeaker cones are unique and I have had great success with commercial Eucalypt pulp. I believe that selecting the best species and using old timber and processing it with the aim of maximizing stiffness may give us a significant benefit in performance and a better understanding.

I have approached our local university, they have a digester with the aim of comparing laboratory produced pulp compared with commercial pulp.

Thank you for your informative advice as to where to start. I will begin my experiments with some old local species as suggested.

Yes my experience has been that unbleached commercial grades generally out performs bleached in stiffness, however that needs to be confirmed with laboratory samples. I am sure I will learn a lot about paper in the study, which is very valuable.

Thanks again for your sharing your knowledge.

Best Regards

Resposta por Celso Foelkel: / Answer by Celso Foelkel:

Not for all Mr. Barabasz - it has been a pleasure to talk to you about so interesting issue.

Regards

Celso Foelkel
