Title:
Using alternative hardwood pulps to meet the short fibre demand in specialty papers

Background/Problem
Chemical pulps can be produced cost-effectively in ever larger manufacturing capacities as long as their quality levels are more or less the same. To achieve the desired paper properties, papermakers must adjust the paper-technological properties by mixing suitable components in the formulation and applying targeted refining. In many cases, it is also necessary to use functional additives.

In the future, cost-effective pulps obtained from fast-growing wood species must be used for the production of paper grades requiring maple or birch fibres today. Conventional eucalyptus pulps are known to meet these demands only to some extent, but new pulp types are expected to bridge the gap between desired paper properties and those currently achievable: cultivated acacia (acacia magnium) and aspen (populus tremula) pulps, eucalyptus nitens (another eucalyptus species) and BCTMP (bleached chemo-thermo-mechanical pulp) will increasingly be available on global markets in the years to come. However, too little is known about their paper-technological properties in order to achieve the product qualities obtained with maple and birch pulps. Since their price levels are approaching those of current eucalyptus pulps, the new pulps are attractive alternatives to maple and birch pulps. In particular small and medium sized companies will be forced to seize this opportunity to remain competitive - as it will ensure the cost-effective production of these papers on smaller and slower paper machines.

Objective/Research results
The research project aims to substitute eucalyptus nitens-, acacia-, aspen or BCTMP fibres for maple and birch pulps especially in the production of specialty and high-quality graphic papers. Comparative studies are to be performed to make sure the substitution does not lead to product quality losses. Each pulp type will be studied and compared in terms of fibre morphology, composition (contents of cellulose, hemicellulose and lignin), charge distributions, the development of these properties in stock preparation and especially during refining, including the effects on paper properties.

The effects of different compositions and charge distributions on refining are to be identified, as are the consequences of interactions with functional additives for the papermaking process and resulting paper quality. This will be done with the help of CAPD (Computer Assisted Paper Design) tools previously developed by the research institute. The findings will be entered in the pulp data base currently in preparation.

The respective pulps were procured and characterised. The characterisation revealed significant differences in chemical and morphological properties. Refining tests were performed by means of fillings available at the institute and suitable for refining at low specific edge loads. The latter was necessary for the low beating hardness levels of these pulps. The following parameters were varied in the tests:
- cutting length per second (number and width of refiner bars)
- cutting angle

Material and basic design of the fillings were the same for all tests.

By using different fillings and specific edge loads, it was possible to study the development of pulp characteristics and achievable paper properties.

Application/Economic benefits
The main economic effect of this project is cost savings in the production of specialty and high-quality printing papers owed to the use of cost-effective hardwood pulps obtained from fast growing tropical hardwoods. Prices of the latter are about 40 – 130 € below those of maple and birch pulps. Due to the decreasing availability of hardwood pulps in temperate climes, paper mills will no longer be able to obtain these pulps in sufficient quantities in the long run. Prices must be expected to increase further due to the opposing trends in supply and demand. In the future, maple and birch pulps will only be used in applications where high added value is guaranteed and the specific properties of these pulps cannot be dispensed with. By substituting new pulp types such as acacia, eucalyptus nitens or BCTMP for conventional hardwood pulps, paper producers can achieve savings in the range of 5 000 - 14 000 €/d (based on a pulp consumption of around 120 t/d for papermaking and 100 % substitution of the conventional pulps).

Project period: 01.07.2006 – 30.06.2008

Remarks
The research project IGF 14811 is being funded by the German Federal Ministry of Economics and Technology BMWi.