Developments in cooperage techniques

Geoff Schahinger
C.A. Schahinger Pty Ltd

This paper is presented as a practical tradesman’s view of the attempts that most coopers around the world are making to satisfy the ever-increasing expectations and demands of the wine industry. It summarises observations made of many cooper in various parts of the world, and of discussions with them.

Need for improvement
A ll coopers are conscious of the need to improve their production techniques and methods for three reasons:

• To improve their productive efficiency and contain costs.
• To meet their legal and ethical obligations to provide safe and comfortable working conditions for their staff.
• To apply, practically, the results of the wide range of research on oak and its influence on wine which has been carried out during recent years, and to provide a product which consistently meets their clients’ specification and expectation.

The points at which the coopers contribution begins and ends are not clear, but this paper will assume commencement from the time an oak log arrives at a stave mill, and conclude with care and maintenance in the wine cellar.

Efficient production influences the price of a cask, and the use of thin-bladed saws is now common in most mills. These reduce the amount of an oak tree converted to sawdust, and improve the yield of useable oak. Computers are being introduced to stave mills to calculate the best way to cut a log to obtain the greatest yield.

Seasoning techniques
A wide variety of techniques are being investigated to reduce the seasoning time needed in the interval between when the rough staves are cut and when the oak is ready to use. Such methods as spraying the seasoning oak with water, or soaking the freshly-cut staves in water, for several weeks before stacking in the open air to season are two common methods. Pre-dryers—basically a large shed with fan-driven, dry air slowly circulating through it—are being used, and often a mist of water is introduced at some time during this drying process. These reduce the amount of an oak tree converted to sawdust, and improve the yield of useable oak. Computers are being introduced to stave mills to calculate the best way to cut a log to obtain the greatest yield.

Cooperage machinery
Improvements in cooperage machinery are ongoing. Automated and computer-controlled machines are being used to increase efficiency and accuracy. Some of this machinery is made by the few manufacturers of cooperage machinery in the world, while some standard woodworking machinery is being adapted. However, much equipment has to be designed and manufactured to the individual cooper’s specification. More efficient machinery helps reduce costs, and eliminates much of the noisy, heavy and uncomfortable work traditionally associated with the making of casks. This deals with the second point mentioned above, which is important to the cooper, but not necessarily to his client.

Influence of research
It is the third point that is most important to the winemaker. In recent years, research on the influence of oak origin has helped to identify the differences between the many oak species and the influence on oak of the same species grown in different environments.

Research has also identified many of the oak constituents, particularly those that provide the complex flavours sought by winemakers. It has identified many of the changes that occur to a number of them during the seasoning process, and during the heating of the oak, usually referred to as ‘toasting’, that is a normal part of the coopering process.

Toasting
Many of these changes occur during seasoning and before manufacture. Toasting is now acknowledged as an important contributor to desirable oak characteristics, but so far is not a precise process. The traditional method is to carry out this process over open fires, burning the small blocks of waste and off-cuts of oak. This is inexact, as maintaining a consistent fire is not easy, and relies on the skill and judgement of the cooper. Temperature controls to monitor the fire have been introduced. Weighing the amount of firewood and adding it to the fire at timed intervals is being tried. One cooper reduces all of his waste to chips that are then compressed into small standard-sized briquettes to be used in the fires in regulated quantities. None of these processes have so far gained widespread acceptance, but are indicative of the efforts being made to eliminate variables and achieve consistency.

Experiments with infra-red electric toasting have so far been less successful, at least commercially, but have the potential to reduce costs, control the result, and provide more consistency, apart from making the task more physically comfortable for the cooper. Gas firing could be quite efficient, but winemakers prefer not to have gas being burnt inside their casks. There is also a counter opinion to both
electric and gas toasting that the smoke from the open fire provides some of the smoky characteristics sought in some wines.

**Stave bending**

The bending process is also subject to examination and trial. The most common bending method is to heat the assembled cask over an open fire and to spray water on the outside of the assembly, which makes the timber pliable and easier to bend. There is an increasing interest in an old process in which the whole assembly is submerged in hot water to make it more pliable. Advocates claim that this removes some of the harsher products in the oak, although it could be argued that it may also remove some of the desirable products. On the other hand, some cooperers are now using an opposite technique, a dry bent cask, one that is heated prior to bending, without the use of water.

A clean and efficient method of bending is to heat the cask assembly for a few minutes with low pressure steam, a common practice for making whisky barrels. Winemakers generally object to this practice, claiming that it leaches out much of the desirable flavour products in the oak. This view is confusing as it seems unlikely to do so any more than the hot water bending process.

An experimental process using micro-wave heating to bend the staves has been developed in Scotland for the whisky industry. Each stave is heated separately, then bent separately and the cask then assembled. If developed commercially, this process may have greater application in the wine industry, as it may also be possible to carefully control the toasting process, and achieve deep toast penetration into the oak.

Other variations are being introduced. Casks made from cheap timbers with a thin layer of oak glued to the inside surface are available. At least one maker has casks available that have been grooved internally to provide a much larger surface area. Other cooperers are working on variations of these practices and further alternatives will emerge.

There are, no doubt, many other methods and processes being developed but being kept confidential by the cooperers concerned for commercial reasons.

It is obvious that different wines benefit from the use of different oaks and oak treatments. As cooperers and their clients come to understand and manipulate the various influences of the wide range of raw material and manufacturing options available to them, it will no doubt become possible for the cooper to more accurately and consistently custom design and construct a cask to suit each individual client's needs. It will also become possible for the winemaker to more precisely specify the cask that they require.

**The care of cooperage**

The care of casks may at times be a cooper's responsibility, and some winemakers employ cooperers specifically for this purpose. Extending the useful life of a cask is a significant economic benefit. Shaving up to two millimetres from the inside surface and refiring the cask is a common practice. However, this is not a well-controlled process and provides variable results. Maintaining cask sterility while carrying out this work is not easy. The use of ozone to sterilise a cask is being advocated. This may be a better process than the more common sulfiting.

Sophisticated cleaning processes, used to clean and sterilise casks, are becoming commercially available. Some of these also claim to revitalise the oak character of the cask.

New sources of oak are being developed, principally from the former Eastern bloc countries of Europe, Slovakia, the Baltic States, Bulgaria and Hungary. While suitable oak exists in such countries, reliability of supply and quality are still problems that need to be overcome.

**Need for more precise terminology**

There has been a confusion of terms introduced in association with oak and cooperage over the years. Some of these have been introduced by individual cooperers to suggest that they have something exclusive, whilst some have been created to identify a process. In some cases, different terms may be used which mean the same thing, for example, 'fine grain', 'tight grain', 'slow grown'. Others mean different things to different people, for example, one cooper's medium toast may be different from another's.

Unfortunately, the cooperage industry has made no collective attempt to develop a clarified terminology to give precise definitions to its processes and practices. Nor has it made any attempt to establish common manufacturing standards. To do so would require an enormous amount of work and co-operation, but until it is done, the confusion that exists about oak and cooperage will continue.

**Training of cooperers**

A final aspect is that of the training and education of cooperers, that is, the tradesmen who make the casks. Historically, a tradesman was expected to know how to make a cask that didn't leak, and to do so efficiently. He was expected to know enough about the timber with which he worked to be able to identify faults and blemishes that would make a piece unsuitable.

He is now expected to understand the influences of oak from different sources, to have the skill to precisely toast a cask, and to know about the effects that the variations of oak and manufacturing processes have on the winemaker's product. More sophisticated training, with an increased emphasis on wine and winemaking knowledge, and skill, has been introduced in recent years, and this will no doubt increase in the future.

In conclusion, the oak cask will improve to meet the ever-increasing expectations of its users. This will be the result of a better understanding by the winemaker of oak and cooperage, and how to use them to the best advantage. It will also be the result of the cooperers having a better understanding of their clients' requirements, and continuing to improve and develop processes that enable them to consistently provide products that have been manufactured to meet each client's specification.