Natural Fracture Pruning Techniques and Coronet Cuts

by Neville Fay

Natural fracture techniques involve pruning methods that are used to mimic the way that tears and fractured ends naturally occur on trunks and branches. A coronet cut is a type of natural fracture technique that is particularly intended to mimic jagged edges characteristically seen on broken branches following storm damage or static limb failure.

In the eyes of environmental arborists, chainsaw cuts result in an unnatural flat plane-surface (i.e. such surfaces are literally not found in nature) and apart from the concern to replicate 'naturalness of form', there are further ecological considerations that have promoted work to develop natural fracture pruning methods.

Branch breakage from mechanical weakness or storm damage results in an array of effects on wood tissue at branch and trunk ends, including fibre separation (along the grain) and splintering in various planes (linear, radial and circumferential). This occurrence creates microhabitats that are colonised by microorganisms and succession species.

Natural and artificial breakage in an oak tree: both show high levels of growth response (Melbury Park, Dorset)

Among environmental arborists there is a growing interest in the interaction between tree colonising species and possible co-evolutionary relationships (Fay 2000). Interactions between trees and the species that live on them may have developed over exceptionally long periods of time, and as some trees may be several thousands old, speculation therefore may extend to the relationships between tree longevity and the continuity of the continuity of the organisms living on and inside the tree, and those living underground that are associated with the rhyzosphere. Over recent decades there has been a prejudice against dead wood in arboriculture, forestry and agriculture. This is now being redressed with a developing new trend to value biodiversity and to promote arboricultural practices that retain and even create variations in dead wood

habitat niches in crown management. It is recognised that it is important to record veteran tree features to identify biodiversity values. Such features include stubs, snags, tears, scars, dead wood volumes, hollowing, small holes, the extent and quality of rot as well as various colonising organisms.

Early attempts at replicating what was observed in nature had varying results. Roy Finch (Finch 1996) and Ted Green undertook a number of trials at Windsor Great Park in the early nineties. Roy even resorted to using explosives to see what type of fragmented ends would result. The use of explosives is *not* now advocated in the UK for both the obvious reason of safety but also because it resulted in uncontrollable outcomes. It is interesting however to note that at a recent Ancient Tree Forum visit to Sweden, the Swedish army had been recruited at one of the nature reserves to attempt to promote and recreate the type of habitat that would favour a European target endangered invertebrate species (*Osmoderma eremeta*). This was carried out mainly on old birch and produced interesting shattered ends.

Other experiments that were carried out at Windsor involved winching off partially cut branches to produce rip or tear-cuts. This was in some measure successful, it proved impossible to predict the appropriate winch tension necessary to effect breakage and many trees failed at their roots before the attached branch broke off. As a result such practice has for the most part been stopped as it is deemed to have a harmful effect on the root system.

Where trees are scheduled for felling coronet cutting is typically carried out as an alternative in order that a part of the trunk may be safely retained, in reduced-scale as dead wood habitat, following the removal of the scaffold branches. It is also carried out following branch reduction – (usually of second or third-order limbs).

Coronet Cuts

Coronet cuts and dead wood management

A coronet cuts is a technique for producing a natural fracture effect in cut stubs ends. It is carried out as a pruning treatment to a stub or reduced limb to mimic natural breakage. The form of the coronet cut is designed to shape the branch or trunk end-surface to resemble the fracture that might be imagined following a storm, such as Beaufort storm force 9/10 and is cut to resemble a broken or shattered appearance.

Early work carried out at Ashtead Common National Nature Reserve Surrey led to the current application of coronet cuts where it was first trialed for various reasons. This work was recorded in an article in Enact magazine. (Adam Curtis, James Green and Bob Warnock. 2000) and was initiated as a result of a catastrophic fire, which seriously scorched, damaged or killed several hundred veteran trees on the Common, affecting a significant proportion of the population of over 2000 veteran oaks at that site. The presence of so many dead trees in an area frequented by the public initially prompted a requirement to remove the trees for public safety. After consideration of the conservation values of the dead wood habitat, it was decided to retain as many standing dead trees as possible, while carrying out varying degrees of crown or trunk reduction to manage trees at an acceptable level of risk. Dead wood (over 150mm) that has been identified for removal or reduction to prevent breakage was deemed potentially suitable for carrying out coronet cutting.

Trials took place between 1997 and 1999 to retain as much of dead oak as standing hulks with a reduced branch framework. Many of the truncated trees were experimented upon to promote a natural breakage effect through skilful chainsaw use. This resulted in the first attempts at coronet cutting and practice was so called because of the crownlike appearance of the branch ends. It is noteworthy that this was well received by the public.

Retained standing trunks have been termed ‘Monoliths’ (Alexander, Green & Key 1993) and are defined as those trees where tree removal would normally be required but are retained as standing trunks in reduced and stabilised form (usually at some 4m to 6m height) as dead wood habitat. It is necessary to re-inspect monoliths to assess its stability and any the risks posed, as with any standing tree.

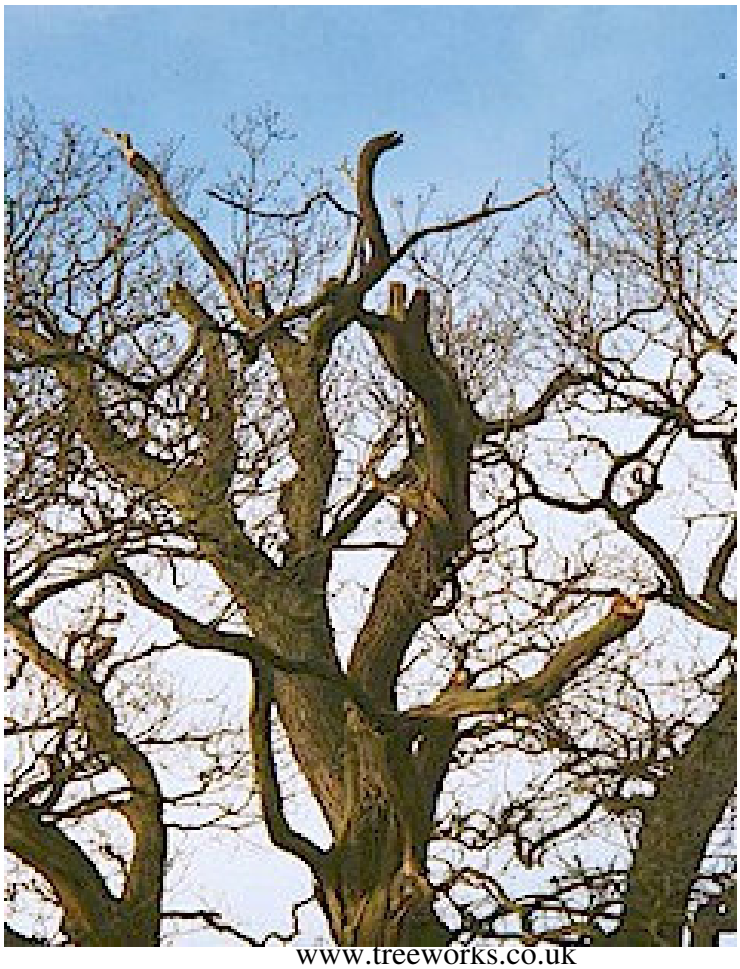
As aerial deadwood is valuable habitat, its removal is only specified where its presence about the tree is considered a threat to tree stability or public safety. In such cases, the removal of dead wood should apply only to the material that is considered unstable and prone to failure. Where dead wood removal is proposed it should be restricted to those aspects of the crown where dead wood failure may cause damage or harm. Elsewhere, dead wood may be retained and reduced in extent to stable proportions.

It is noted that with oak, hardened dead aerial branches can often be retained without undue risk, however where risks may be present from dead wood breakage, this should be assessed and managed as with any part of the tree. As a result of this and current guidelines for risk management aerial dead wood is now frequently required to be assessed for potential retention in a stable form with reduced lever arm and end-weight. Currently the techniques involved in dead wood management are now also considered in the pruning of live amenity trees.

Coronet cuts and live wood management

Since the work at Ashtead, Treework Environmental Practice and others involved in environmental arboriculture have extended this form of dead wood management to the management of living trees to promote dead wood habitat. This practice is termed 'veteranisation'. The principles implied by the term 'veteranisation' has recently been explored in an article *Recycling within arboreal systems* (Cowan 2003).

The general guideline for this technique is to select stubs for retention and cut these at approx. 5 x the diameter of the branch (where branch diameter is over 150mm in diameter with stub length being estimated from the point of attachment with the parent higher order member). Stubs are cut into a coronet appearance through skilful chainsaw use. Live branches may be selected for this treatment where crown reduction is being carried out. A proportion of suitable live limbs (up to 15%) may be selected with coronet cutting applied to non-crucial structural members only. This usually involves cutting to maximum depth and acuteness of angle. Where occasional major stems require heavy reduction truncation, the final cuts are varied to promote a jagged finish.



Retrenchment pruning

Retrenchment pruning is term coined by Paul Muir of Treework Environmental Practice to describe the technique that has been developed in the field of environmental arboriculture to imitate the natural process of ageing. Crown retrenchment is used to describe the way in which peripheral dieback occurs as the tree redirects energy and growth to the formation of a consolidated lower region of the crown.

Crown retrenchment pruning is used to extend tree viability, both in terms of vitality and stability, whilst retaining habitat features associated with ageing. Retrenchment pruning is a technique that can be used to reduce the potential for a fully mature, late-mature or ancient tree to collapse or 'fall apart' under its own weight due to excessive end weight on long or weakly attached limbs. It is also applicable in trees where incipient decline appears to result from excessive transportation distances from the root system to the crown periphery. While this technique may have a general value, it is especially useful for managing formerly pollarded trees (lapsed pollards) and mature trees showing signs of dieback. Retrenchment pruning gives best results for suitable tree species and growth conditions.

The practice of retrenchment pruning involves the reduction of the tree height and the extent of crown growth over a protracted period of time. This usually involves at least three return treatments allowing re-growth to occur in the interim. This process is intended to promote early crown stabilisation and reduce the risk of traumatic structural failure by reducing the lever arm while at the same time increasing light penetration to the inner crown framework.

The process is intended to promote internal and lower crown rejuvenation through reducing apical dominance provides the means to redirect hormonal growth regulation (resulting in epicormic and re-iterative stimulation). Eventually retrenchment pruning will create a reduced crown framework over a period of time.

For trees with moderate to high vitality, the first stage of retrenchment pruning should avoid overall reduction by more than 20%. For trees with low vitality the first stage of retrenchment pruning is typically less than 10%. Where tree stability is already heavily compromised reduction levels should be sufficient to reduce the lever arm to an acceptable level.

Crown retrenchment pruning on *Quercus robur* at Hatfield Forest, Sussex.

References

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