RETRENCHING HOLLOW TREES, an international practice

What is retrenching, what's it got to do with tree care, and why should I care?
I'm glad you asked! Dictionary definitions of 'retrench' include: To live at less expenses; To confine, limit or restrict; To cut off, pare away; To reinforce. The term has been used in literature and in relation to trees and their care in Great Britain since the 1700's.

What do European standards say? They've been at this longer than we have.
England's standard: "Retrenchment pruning is a phased form of crown reduction, which is intended to emulate the natural process whereby the crown of a declining tree retains its overall biomechanical integrity by becoming smaller through the progressive shedding of small branches and the development of the lower crown (retrenchment). This natural loss of branches of poor vitality improves the ratio between dynamic (biologically active) and static (inactive) mass, thus helping the tree as a whole to retain **good physiological function**… The pruning should be implemented by shortening heavy, long or weakened branches throughout the crown, while retaining as much leaf area as possible and encouraging the development of new secondary branches from epicormic shoots or from dormant or adventitious buds."

How about Germany's standard?
They call retrenchment " Regenerative Pruning" Trees showing significant signs of aging in the outer parts of the crown and the development of a secondary crown are to be cut back as far as necessary (crown reduction). The focus is on growth habit and physiological requirements.
Crown part reduction: Individual branches are reduced for safety or to fit the environment. If necessary, areas surrounding the sections that have been reduced may require thinning to establish symmetry (and light penetration to inner foliage).
Crown reduction: The entire crown is reduced in height and/or spread. The extent of crown reduction depends on the species and growth habit, and **shall** be <20%....Vigorous sprouts are thinned and/or reduced. Cuts are made beyond the old pruning wounds, avoiding damage to woundwood. As a rule, repeat every 3-5 years. Form a secondary (reiterative) crown over time.

Is retrenching A Best Management Practice?
"Tree risk assessors should resist the ultimate security of risk elimination based on tree removal and consider possibilities for retaining trees when practicable… Over-mature trees in natural settings may reconfigure as they age and deteriorate, a process sometimes called '**natural retrenchment**'. They may continue to grow trunk diameter while branches die and fail—reducing overall height of the tree and **increasing stability**. Where tree risk is a concern, tree risk assessors can imitate this process by recommending crown reduction."

Is retrenching or crown reduction the same as 'topping'?

RETRENCHMENT BY CROWN REDUCTION		TOPPING
Retains enough foliage to maintain tree health	↔	Removes too much foliage, starving the tree
Releases gradual sprouting from interior nodes	↔	Forces panic sprouting internodally or near wounds

Endocormic growth from dormant (pre-formed) buds is well attached, with buttressing at base of sprouts	↔	Epicormic growth from adventitious (newly formed) buds is weakly attached, with no buttressing
Smaller wounds where tree can compartmentalize	↔	Large wounds at poor locations, causing rapid decay

Won't heading cuts make it a severe, imminent risk?

'Heading' cuts to small laterals or buds on young trees are typically confined to temporary branches. Growing larger is the objective, so reduction of permanent branches leaves a lateral large enough (~1/3 diameter or greater) to assume apical dominance and spur outward growth.
On mature trees, growing outward is **not** the objective. Maintaining health and value while lowering risk is. So, other rules of thumb apply: "Size can be maintained most effectively if the plant is pruned as it starts to reach the acceptable size" and when reducing a branch,
"(If the lateral remaining is <1/3), the lateral should be fairly **upright** (>60% from the horizontal)."(Harris, *Arboriculture)*

What if the tree is in a mortality spiral, on its last legs, ready to go?
Dieback in a once-beautiful tree can be ugly and depressing. Inflicting 'death with dignity' is simpler than the uncertain task of revitalizing health, stability, and value, but "Old trees that are of low vigor and have failing branches can often be kept healthy and attractive by removing the weak-growing and dying limbs in their extremities, particularly their tops." (Harris) Old trees, unlike old people, can be **simultaneously senile and embryonic**. Mindful of the long-term processes involved, arborists think in 'tree time', and choose conservation over condemnation.

Isn't retrenching the same as restoration?
Not exactly. "Restoration: selective pruning to redevelop structure, form and appearance of severely pruned, vandalized, or damaged trees." But old age isn't really damage, and restoration indicates that the tree will grow back toward its previous dimensions. Retrenchment is a natural process. Retrenchment pruning selectively develops a **new and smaller** structure, form and appearance. Both processes develop over time, but a retrenched tree is not expected to approach its mature dimensions. As Ted Green put it, the tree is **growing downward**.

Does retrenching hollow trees fit in with Basic Tree Risk Assessment?
Yes and yes.
The 2006 CEU article titled *Basic Tree Risk Assessment:* "As a professional arborist, you demonstrate competence and trustworthiness by looking at tree strengths as well as weaknesses…Cavities greater than two-thirds of the diameter are sometimes considered "hazardous" and a reason for removal, but with close monitoring and care, trees with cavities greater than 80 percent of the diameter have been managed for many years… the development of **woundwood can compensate**…decay can be compartmentalized by a tree with adequate resources. Risk from decay may be lowered over time by managing the soil to increase those resources."

The 2012 TRAQ form called *Basic Tree Risk Assessment* guides the user to consider the tree's strength in its response growth, and its adaptations such as corrected leans. (It's the tree's future at stake, so isn't it only fair to listen to and translate its body language?) There are 4 lines where

Mitigation options, and the Residual risk following each, can be listed. For instance, reducing the crown of a moderate-risk tree would leave a low residual risk. A 15% reduction can increase the stability of a branch or a tree by 50%. Improving soil structure, fertility and drainage would result in an even lower residual risk. Comprehensively consider all reasonable options. Lessen liability concerns. Sustain tree assets. **All we are saying:**

Give Trees a Chance!

Does retrenchment pruning go beyond the ANSI A300 Tree Care Standard?
No. Retrenching is 100% within the A300, when the objective is established, the requirements or "shalls" are met, and specifications are communicated. Standard Operating Procedure:

SCOPE: An oak that is 6' wide at the base. ~5' of that is hollow. Extensive root damage.
OBJECTIVE: Reduce the load and the risk by retrenching the crown. Lower maintenance.
SPECIFICATIONS:
1. Remove all dead branches >1" diameter.
2. Reduce downward and horizontal segments of overextended branches, clearing the branches below by 2'-4'. Cuts <3" to upright laterals, <8% total foliage
3. Thin crowded branches back to the collars. <4% total foliage, <3" cuts
4. Reduce declining leaders 3'-6'. Smallest cut possible, near vigorous growth or buds.
5. In an area between 3' and 20'from the trunk, use air/water tool to make holes 18" apart, >2" wide and >12" deep. Force 50% compost/50% soil conditioner under pressure into the holes, in effect brewing compost tea on site. Mulch with 2" woodchips.

How serious a defect is interior decay? This thing's rotten to the core, and look at the bugs!
When interior decay is noticed, non-arborists who never took Biology 101 react with shock and horror. Arborists understand that **taproots naturally shrivel up and decay**, as the buttress roots deny them air and water while taking over the support function. The dead taproots are shed, and decay moves up to digest the metabolic waste that was dumped in the heartwood. This affects the value of the log as timber, but the landscape value of the living tree remains. Whether and when and how much this interior decay affects stability is anybody's guess.

What about the 1/3 Rule for trunks? If 2/3 of the trunk area has decay, isn't it a high risk?
In 1996, Lothar Wessolly assessed 2096 trees and reviewed the data behind that rule, concluding "The size of the actual cavity (alone) provides no information on the safety of the tree. The transfer or generalization of this diagram to street trees is **scientifically inadmissible**." (*How Hollow may a Tree be?)*
In 2006, Jerry Bond took a good look at the research data on trees that seemed to support this Rule. First, he found no data for applying this rule to trees >36"dbh. **None**.
Second, **the Rule ignores height, wind exposure, species** and other factors. Bond's conclusions: "The ratio *t/R* <.3 can no longer be used by itself as an index of trunk failure potential. Trees can tolerate extremely large amounts of internal decay without necessarily incurring adverse effects on their stability." (*Foundations of Tree Risk Analysis)*
Physicist Frank Rinn, developer of the resistograph, calls overreliance on this 1/3 Rule "**Voodoo**".

Look at the decay in the sinuses of this train wreck? How bad is it?
Sinuses are concave areas between supporting tissue, such as buttress roots. Sinuses are wounded as the bark of the spreading buttress roots folds inward, just as bark in codominant branch unions gets 'included'. Sinuses degraded by microbial or insect activity should be cleaned and treated. Since the buttresses support the tree, sinus problems are typically not structural problems. Decline over time can divide the buttresses, which then function as independent vascular streams. Many trees in Europe aged 600 years and more have room inside for a dozen people to dance, and a good poker game, too.

What about target rating? Kids walk under this hollow tree. It's a ticking time bomb!
Children are generally kept inside during storms, dropping the occupancy rate of the target near zero at those times when trees are prone to fail. From the BMP:
"The following items should be included in a detailed written report…**occupancy rates**… In considering risk and mitigation measures, **tree risk assessors should communicate the benefits of trees** as well as the consequences of losing them.
Guidelines should be considered a starting point and should be modified as needed so that they are appropriate for the tree and site. While 'likelihood of failure' guidelines are presented for individual defects and in several cases, multiple defects; it is essential to consider all of the aggravating factors as well as any **mitigating factors such as adaptive growth** in the tree."

Where's your data on retrenching decrepit hulks? What research can you cite?
Formal research on crown reduction of mature trees is nonexistent. Their unique nature and the many variables involved make controlled replication impossible. When asked "How can this tree be pruned so it is safer?" we used to say what we would NOT do: top the tree, or make "heading cuts". To small laterals or buds. We can instead remove big limbs to the collar. Assessors commonly measure the hollows at big pruning wounds, apply faulty formulas, and condemn the trees. Let's not kill more trees with pseudoscience and 1/3 rules. Published guidance on pruning older trees is scarce in the US, so one must look abroad. 11, 12 Respect your elder trees. Send positive messages about tree care, and the tree care industry!

Ummmmm…I'm still not sure that retrenching hollow trees is a good idea!
That's ok; thanks for listening anyway. Pictures of hollow trees sent to bettertreecare@gmail.com, will earn a no-obligation, free consultation. There's nothing to lose, except more good trees

REFERENCES
11. *Ancient and other Veteran Trees: further guidance on management* Lonsdale, ed.
12. *Veteran Trees: A Guide to Good Management* Read, H. 2000

REDVERS SYSTEM OF CROWN REDUCTION

On brittle Zone 4 species (Poplar, boxelder, willow), 50' wide Norway maple, 21" dbh: Reduce crown 30% by volume to improve stability and appearance of stability, maintaining health and value.
.
Select the most central leader to dominate, and retain its full length.
Reduce adjacent leaders to clear the central leader and reduce codominance

4 Codominant stems get the 6-10 largest cuts.

Annex C (normative) Crown management – specialized practices

NOTE Detailed guidance can be found in Veteran trees: a guide to good management *[1]. Further guidance will be available in* Ancient and other veteran trees: Further guidance on management *[36], which is in preparation at the time of publication of this British Standard.*

C.1 Reduction of crown size and subsequent management

If, owing to decay or structural weakness, there is a need to prevent failure in a veteran tree, lapsed pollard or lapsed coppice stool, some kind of crown reduction (see **7.7**) should normally be adopted as the main solution. Conventional reduction techniques may be employed if the tree shows good vitality and an abundance of branches or potential branches in its lower crown but poor vitality in its upper crown, combined with a sparse branch structure that could lead to major break-up or dieback, rather than natural retrenchment.

C.2 Retrenchment pruning of veteran trees and lapsed pollards

*COMMENTARY ON **C.2***

Retrenchment pruning is a phased form of crown reduction, which is intended to emulate the natural process whereby the crown of a declining tree retains its overall biomechanical integrity by becoming smaller through the progressive shedding of small branches and the development of the lower crown (retrenchment). This natural loss of branches of poor vitality improves the ratio between dynamic (biologically active) and static (inactive) mass, thus helping the tree as a whole to retain good physiological function. This natural process is not, however, always sufficient to prevent trees from falling apart or from posing unacceptable risks to fixed targets (e.g. roads, pavements etc.).

Retrenchment pruning should be chosen as the main option for managing lapsed pollards that would otherwise tend to break up and that, because of an inadequate lower crown, might not have enough leaf area to survive (see **7.1**) if reduced to the ultimately intended height and spread in a single operation. It may also be used for managing coppiced trees that have remained uncut for so long that they are unlikely to survive re-coppicing.

NOTE 1 Pollarding is a traditional form of sustainable tree management that originally provided a product (fodder, timber pole or firewood) as part of a silvopastoral system of land management (typified by wood-pasture). It is also a system for managing trees in formal situations, either so as to control their size or for cultural reasons.

The tolerance of the tree to loss of leaf area and wounding should be assessed before retrenchment pruning is started. If, because of its species and condition, it is unlikely to respond by producing new branches, any pruning should be kept to the absolute minimum required in order to gain any biomechanical benefit at this initial phase. The pruning should be implemented by shortening heavy, long or weakened branches throughout the crown, while retaining as much leaf area as possible and encouraging the development of new secondary branches from epicormic shoots or from dormant or adventitious buds.

The second and any subsequent pruning treatments should take place only when newly developed branches suitable for retention have become strongly established. After the final phase of progressive reduction, a cyclic pruning of new growth should continue, so as to avoid the excessive loading of extensively decayed branches.

If there is a need to encourage the production of a dense lower crown, the development of shoots from dormant and/or epicormic

buds should be stimulated by retaining stubs when branches are pruned. The length of the stubs should be about three to five times their basal diameter. Since epicormic branches tend to be weakly attached, any such branches that subsequently develop should if necessary be pruned (subject to inspection) in order to help prevent biomechanical failure.

NOTE 2 A long stub is likely to bear a number of dormant buds or (in some species) potential sites for adventitious bud formation. Also, adventitious shoots sometimes form near natural fractures in which bark has been torn, leaving jagged edges. This is a natural survival mechanism after storm damage. In order to encourage the formation of such shoots for the purpose of crown retrenchment, pruning may be undertaken by means of partial cutting followed by controlled fracture. Also, the bark may be scored, with the intention of stimulating such growth.

NOTE 3 The technique of "coronet cutting" produces a stub-end that consists of an irregular series of acute axial V-cuts, rather than a flat surface. This technique is mainly suited to the creation of natural-looking fractures on trees that have been reduced to tall stumps ("monoliths"). Since there are particular hazards associated with this type of pruning, it requires specialist training.

To specify the details and timing of retrenchment pruning, an individual tree management plan may be drawn up and later modified as appropriate over the duration of the programme. If possible, the details of the work and of the condition of the tree should be recorded throughout the duration of any such plan, to improve knowledge for future application. The plan should be based on the following decisions:

a) the objectives of retrenchment pruning for the tree concerned (with respect to its structural integrity, desired crown shape and size, vitality etc.);

b) the suitability of pruning as a means of improving or safeguarding the biomechanical integrity of the tree, taking account of its predicted tolerance to pruning, by virtue of its species, age and the current vitality and expected response to the pruning;

c) the number of phases of work, the predicted details and timing of each phase and overall duration of the programme;

d) the time for starting the work (assessment of priority for different trees).

(Part 2 continues next issue) Yes, this is a dislike of mine too, but a short-term concern. Shigo talked of thinking in 'tree time', and the need to 'see the future' in a way; how the tree will respond and fill out again.

Getting some clients (muni) to think long-term can be a challenge. If the objective includes short-term aesthetics, I guess that means less off now, and repeat sooner.

re the site with those diagrams, i understand that they are behind with revisions, so look for much of that to change.

Re %, in 2010 the UK standard got totally away from % and called for cut size, branch length, and location to be specified. % is like the 4th consideration now, optional. The US standard (currently under revision) seems to be going in that direction.

25% was always a 'should' not a 'shall', but will likely be deemphasized further. The 1/3 guideline was weakened in 2001, and again in 2008, but it's still often the first (and too often the major) consideration. Tests may have these 'rules of thumb', but they are not

meant to be cast in stone. HOW TO PRUNE 1. Make all cuts clean with sharp tools. 2. Never leave any stubs. A short stub may never heal over and is always a source for infection. Make all cuts back to a bud, branch or main trunk." Wyman arnoldia vol 14, 9-10, 1954