

Rigging Research

Over the next few editions of essentialARB, Treevolution, in conjunction with Brudi & Partner TreeConsult (Germany), will produce a series of four articles promoting the findings of the recent research project: An evaluation of current rigging and dismantling practices used in arboriculture. The research was published in 2008 and is available on the HSE website (www.hse.gov.uk/research/rrhtm/RR668.htm).



Managing a Rigging Operation:

Introduction:

In 1998 when the Lifting Operations and Lifting Equipment Regulations (LOLER) and the Provision and Use of Work Equipment Regulations (PUWER) appeared, the arboricultural industry in the UK began to realise there were some new regulations to contend with. At about that time, I thought I had better make some enquiries, on behalf of my own business, as to what this Thorough Examination and Competent Persons terminology was all about...

I subsequently telephoned a company in Manchester that appeared to offer a service inspecting climbing and rigging equipment, and the conversation went something like this:

"How many cranes have you got?"
was the first question from the voice in Manchester.

"Uh, sorry, none," was my reply.

"Platforms?"

"No."

"Other lifting gear?"

"Yes!"

I thought I was getting warmer...

"We have tree climbing and rigging equipment. Is that what you mean?"

"Mmm..."

I was beginning to realise that this wasn't going very well, so I enquired what was required of a 'Competent Person' (amongst other things) and what was the voice in Manchester going to do when he inspected our gear?

"Don't worry; we won't spike your ropes."

I assumed that he was planning on opening up the braid in our climbing lines with a Marlin Spike!

"Uh no it's ok," said I.

Then the million dollar question followed, after a few moments' silence:

"What do you arboreal types do then?"

That was it! I rapidly realised that I was contemplating employing someone from a construction safety company, who basically knew nothing about the tree industry and even less on what kind of equipment we used.

So, my reaction was to contact Ted Radford (who was the Technical Secretary for the Forestry and Arboriculture Safety Council (FASTCo) at the time), to enquire

what Ted felt the arboricultural industry could do about this.

A few months down the line, a stakeholders' meeting was held at Myerscough College, and the plan was hatched to develop training and assessment of 'competent persons' from the tree industry, to carry out 'thorough examinations' of our 'tree' equipment. And that formed the basis of what we have today.

However, bearing in mind that LOLER and PUWER appeared in '98, we have only (as an industry) really dealt with Thorough Examination under LOLER. Certificates of Competence for Chainsaw Operators (a requirement under Regulation 9 of PUWER '98) have been around for a long time, and the arboricultural industry has developed Risk Assessment packages to meet the requirements of the Management of Health and Safety at Work Regulations 1999 (MHSWR), which I'll come back to later.

There are still a few holes, which the industry hasn't really come to grips with, so my intention is to try and help fill those gaps, using some of the information in Chapters 1, 3 and 4, from the Rigging Research.

Have a think...

Over the years, some of my work has

involved me investigating personal injury claims, as what is commonly referred to as an 'Expert Witness'. One in particular sticks in my memory. A few years ago on a bright sunny day, two people were involved with taking down an old ash tree by a building. The climber had about 10 years' worth of experience, and the groundman had three weeks'!

The tree was being dismantled in sections, with a rigging pulley set high in the tree and a lowering rope wrapped around a friction device at the base of the tree.

The climber cut out one half of a Y-section of tree stem, hoping that the cut section would swing away from him and be lowered down to the ground. Unfortunately the climber (or groundman) didn't notice that the climber's rope had not been pulled through its anchor point prior to the 'rigged' section being severed with a chainsaw.

The groundman was watching, but unfortunately he was looking into the sun. (All he had to do was walk around the tree to see what was happening!)

The large section was cut and when the piece fell it took the climber's line with it. The section of timber was held on the lowering device (which was rigged incorrectly and was, as a result, 'locked off') and the cut section was held, inverted.

Fig.1 Cover Page - Site Specific

Fig.2 Reverse side - Site Specific

The climber's line slid down part of the inverted stem and was held by a small lump of bark, thus stopping him hitting the ground.

Unfortunately the 'locked off' section was swinging level with the climber, and it impacted with him (more than once) causing him spinal injuries.

The groundman tried to release the lowering device and when he realised he couldn't, he then tried to reach the injured climber with a ladder with little or no effect. He had called the emergency services with his mobile phone, but he didn't know the location of where he was working. So they couldn't find him. He ran to the nearest road and stopped a farmer (who was driving his tractor), who then helped him call an ambulance...

When the incident was investigated the following issues (amongst others) were raised:

- No risk assessment had been carried out.
- There was little or no communication between the climber and the groundman.
- Training was inadequate.
- Equipment was not appropriate and was rigged incorrectly.
- There were no emergency contingencies in place.
- There was no prior planning.
- There were insufficient people on site.

Now I would like to have a look at the highlighted items listed above.

Risk assessment:

The only worthwhile risk assessment package for arboriculture in the UK (in my opinion) is the existing Risk Assessment for Commercial Arboriculture, which is delivered by the Arboricultural Association (www.trees.org.uk). The package utilises a site specific risk assessment which is supported by a generic risk assessment, amongst other things.

By all means it is not perfect, but it does work (for us anyhow), and it saves us having to reinvent the wheel!

However, when planning and carrying out rigging operations the following may assist us.

Imagine this:

A 65' Scots pine has been identified for removal. You've been asked to quote for the work and you have been successful. The tree is located in a residential area and is dying back due to root damage about five years ago (sound familiar?). There is an access drive, but it is very narrow. The tree is growing in the middle of a soft well maintained lawn. There are two 80' pines alongside the tree to be removed, and there are two manhole inspection covers near the base of the tree. You've decided to have the tree 'rigged' in sections.

Now, you use your risk assessment pro-

4:0 OPERATIONS							Completed by: I Boddart Position: Director Date: 1 st August 2008			
Ref.	Hazard	Risk	Persons involved	Industry best practice/guidance	Date issued	Control measures	Assess Type	Action Required	By (date)	Completed (date)
4.4	Branch removal	Cuts, impact crush injuries.	Climber, ground crew, client/generals/public	HSE IND0317 (Rev1) 'Chainsaws at work'; APAG Safety Guide 301, 401, 403, 308; 'A Guide to Good Climbing Practice' NFPC CS30, 38, 39, 40, 41	1/8/08	All operators trained and certified. Consult climber position. Accurate severing cuts. Team communication. Work equipment, plant and machinery stored securely at suitable distance from tree. PPE. Client / Generals/public excluded from work area.	Yes	None	n/a	
4.6	Use of lowering equipment.	System failure, impact/crush injuries. Rope friction burns	Climber/ground crew	APAG Safety Guide 301, 308, 401, 403; 'A Guide to Good Climbing Practice' NFPC CS38, 39, 40, 41. HSE AS30; 'LOLER: How the Regulations apply to Arboriculture' Rigging Research Evaluation of Current Rigging and Dismantling Practices used in Arboriculture 2008	1/8/08	All operators trained and certified. Equipment inspected regularly by a competent person. Thorough Examination of Lifting Equipment (lowering equipment every 12 months). Correct routing of ropes. Appropriate position and strength of anchor points, pulleys, etc. Working within Safe Working Load. Team communication.	Yes	None	n/a	

Fig.3 Generic – Dismantling

Job ref _____ Date _____

All ticks to be validated when satisfied
RP CP

Checklist prior to rigging operations

Off-site checks Complete Part A before proceeding to Part B	A	Has a Responsible Person (RP) been appropriately identified? (NAME _____)	✓	
		Has the work been clearly identified by the Responsible Person?	✓	
		Has a Competent Person (CP) been appointed and notified? (NAME _____)	✓	
		Has the work been identified and assessed by the Competent Person?	✓	
	B	Risk assessments		
		Has the appropriate generic risk assessment been referred to?	✓	✓
		Has a site-specific risk assessment been initiated?	✓	✓
		Does the site-specific risk assessment contain an emergency contingency plan?	✓	✓
		Has the need for any additional technical support (personnel or equipment) been considered?	✓	✓
		Manpower and supervision		
	Is there appropriate supervision for managing the rigging operation?	✓	✓	
	Are there sufficient competent operatives for the emergency contingency plan to be actioned?	✓	✓	
	Are all operatives competent to carry out their anticipated duties?	✓	✓	
	Equipment & other resources			
	Has appropriate equipment for the operation(s) been provided/selected?	✓	✓	
	Is there sufficient equipment for an aerial rescue to be performed if necessary?	✓	✓	
	Has any requirement for additional technical support been satisfied?	✓	✓	
	Communications			
	Are there feedback systems in place for both during and after the work?	✓	✓	
	Do all operatives understand the importance of the feedback systems, and how they work?	✓	✓	
On-site checks Complete Part C before proceeding to Part D	C	Prior to starting the work		
		Do all operatives understand and agree with the risk assessment(s)?	✓	✓
		Have all the controls specified in the risk assessment been implemented?	✓	✓
		Has a safe strategy and system for the rigging operation(s) been identified?	✓	✓
		Do all operatives understand the strategy and system for the operation(s)?	✓	✓
		Can the work be done without the Responsible Person being on site or if not, is the RP present?	✓	✓
		Do all operatives understand the procedures for pre-use checks, set-up and operation of the equipment they will be working with?	✓	✓
	D	Prior to removing the first section		
		Has due consideration been given to the nature (weight, size, shape etc) of the section to be removed?	✓	✓
		Has due consideration been given to the risk and/or consequences of anchor and/or equipment failure?	✓	✓
	Have suitable aerial, landing and processing work zones been determined?	✓	✓	
	Does the risk assessment cover the transport corridors between all working zones?	✓	✓	
	Is each component of the rigging system correctly configured?	✓	✓	
	Is each component of the rigging system compatible with its neighbouring components?	✓	✓	
	Is appropriate supervision in place for the operation?	✓	✓	
	Do all operatives understand their assigned duties?	✓	✓	
	Has a communication system been agreed and understood by all operatives?	✓	✓	
	Can all operatives communicate clearly with one another?	✓	✓	
	Do all operatives understand their responsibility to STOP the operation if they believe that it could or has become unsafe, or if there is a change from the agreed plan, or if they are unsure about any aspect of the operation?	✓	✓	
	NB All checks in Part D must be applied before the removal of each subsequent section			

Fig.4 Checklist prior to rigging operations (p. 16)

forma for the proposed work, but is it enough?

Thinking back to the requirements of LOLER (beyond inspecting climbing gear), think about what else you need to consider.

You've priced the work, you've won the contract, but your job (mainly) is pricing other work and keeping your business

going. This job will be fine for your 'tree gang' to do, without you, so you arrange a day with your customer to have the pine felled.

What is your role now?

In the Rigging Research two roles were identified: one as the Responsible Person, and the other as the Competent Person.

The Responsible Person:

The Responsible Person (RP) would normally be the person that has plenty of experience in work like this. They've kept up-to-date with 'modern lowering methods' by attending refresher training courses and workshops, they keep up-to-date with current legislation, they may actually own the business and in this case, it's decided that the foreman can take charge of the work.

We'll now refer to your foreman as the Site Safety Co-ordinator or as the Competent Person.

The Competent Person

The Competent Person (CP) is now key to the whole operation. He or she must be charged with total responsibility for carrying out the work. Like the RP, they must have the necessary knowledge, training and experience to effectively manage and control the work as it's carried out.

There is now no need for the RP to be on site whilst the work is carried out, however he or she must be contactable if required.

Note: If you are self-employed, you may fulfil the roles of both RP and CP!

Now that the Responsible and Competent Persons have been identified a line of communication must be established.

If you refer to Figure 4, a draft checklist has been suggested. You will see that Section A will be completed by the RP, Section B involves both the RP and CP and Sections C and D will be the domain of the CP.

Communication & Planning

Example: What many contractors may try to achieve when they are pricing tree work is they will carry out a pre-risk assessment of the work site. If the customer is present, they may compare notes on potential site hazards. If the contractor is awarded the work, he or she will complete the site specific risk assessment and draw up a list of what is required on site. They should then endeavour to be on site prior to or when the work starts, and should transfer the information across to whoever will be the Site Safety Co-ordinator (CP). Both the RP and CP compare notes, and other suggestions may be offered by the CP. Once they are both happy with the outcome then the CP will go through the job with the climber(s) and groundstaff and again other suggestions may be offered. Once the whole thing has been agreed, then each operative may sign the risk assessment (RA) document to state that they understand what is required of them. And then they'll get down to carrying out the work.

In a 'rigging' scenario the checklist shown in Figure 4 may be attached to the RA. However, once completed, don't put it down and forget about it. Section D may

need to be referred to on a regular basis.

Remember: The RA is a 'live' document and may require updating due to weather conditions and site constraints (for example).

Training and Certification

As you are most probably aware, we have a range of training and certification schemes/providers in the UK. However, there is very little to choose from when it comes to training and certification in 'rigging'. Training courses appear to range from two to five days in 'Dismantling Operations'. (The UK currently has no set standard for this specific type of training, which I find very worrying!)

Our industry standards for 'competence testing' are the NPTC Certificates of Competence (C of C's). The only C of C that we have specifically for Dismantling Operations is CS 41, which in my opinion is very basic, considering the findings of the research!

In my experience some people look at the pictures in magazines, buy some gear, cobble it together, try and obtain some guidance via e-mail(?), and then start cutting big lumps off! This may seem unrealistic, but have a look at the pictures above right. They are all genuine, and each one tells a story:

Photograph 1 shows a distorted lowering device and Photograph 2 shows a buckled 'rescue' pulley; 'exploded' arborist block and 'popped' stitching on eyesling.

So, back to the pine...

So far, in this scenario, we have dealt with PUWER, LOLER, MHSWR and now we have some more recent ones to contend with...the Work at Height Regulations (WAHR) 2005.

We can now take it that the Responsible Person has completed the initial paperwork for the dismantling of the tree;



Photograph 1



Photograph 2

however, I have not covered how the RP has decided to have the tree felled. Will it be done from the ground, thus avoiding working at height? Will it be dismantled with a crane; a mobile elevating work platform (MEWP); or will it be done from rope and harness?

In Chapter 3 of the Rigging Research a flow chart has been devised to help select a Safe Rigging Strategy and System of Work. (See below, Figure 5)

A safe strategy would normally follow a Visual Tree Inspection, (which will be covered in the next article). What we now need to consider is how will the work be carried out?

With the Work at Height Regulations 2005, most tree workers are now aware of the risk assessment process for working at height. Bearing in mind the pine that is ready for removal, the CP would have considered the best method of work. Could it be felled in one? Not in this case! Could a MEWP be used? No,

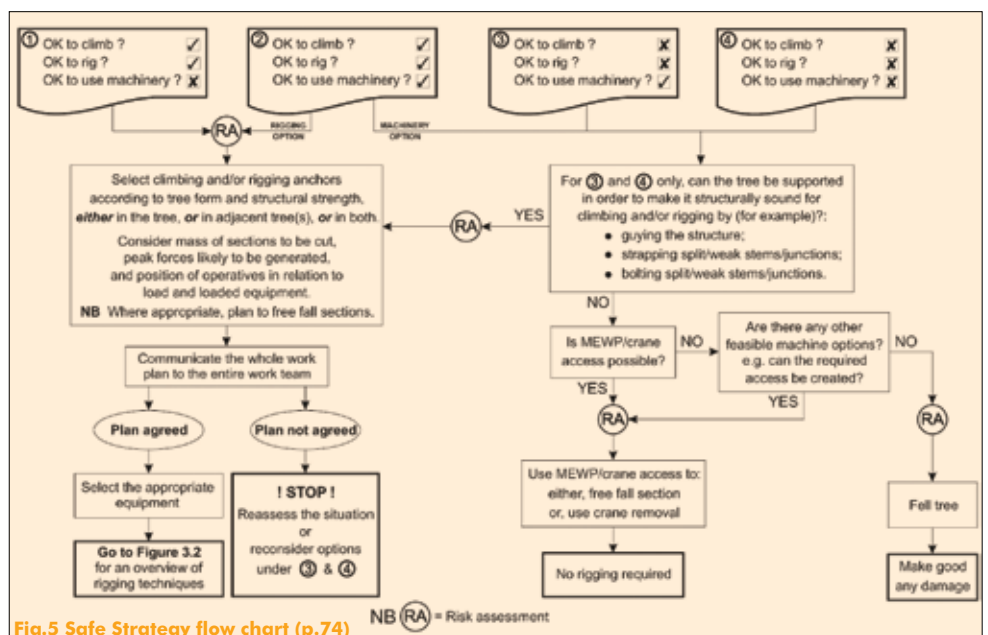


Fig.5 Safe Strategy flow chart (p.74)

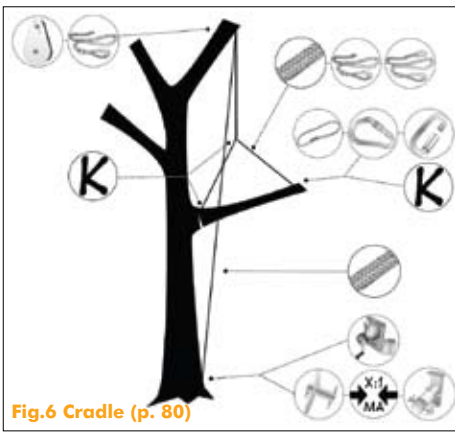


Fig.6 Cradle (p. 80)



Fig.7 GRCS winch (p. 78)

considering the soft ground, lawn and underground services. Could a crane be used? No, due to the restricted access, and soft ground etc.

So the decision is made to bring the tree down in sections, with a climber in the tree.

Selection of equipment

Unfortunately one of the most common tools for controlling friction when dismantling trees is the port-a-wrap style device. In my experience many contractors rely on these for all take-downs, no matter how big the cut sections are!

When I look at friction devices that have been so distorted; ropes that have been severely glazed due to heat build up; eye slings with 'popped' stitching; pulleys with bent pins and/or missing sheaves; and broken karabiners, it makes you wonder what severe loads were encountered on the tree, where the rigging pulley was installed!

If you carry out large take-downs, invest in a lowering bollard, at least. If you can afford it, buy one with a winching system that can enable you to pre-tension the lowering line and even lift timber. However, remember: if you don't need to 'rig' the tree, don't. That way we will minimise loading on our tree, thus minimising any risk to our climber, but we may have a bit more lawn damage to contend with!

In order to help our CP decide on the right equipment for the job in hand, Chapter 3 of the research has an extensive range of icons that support ten different tree dismantling scenarios. For example:

In Figure 6, I have selected a common scenario; that of a branch being cradled. In the five prompts listed alongside the diagram, terms such as "... centre of gravity of section to be removed"..."pre-load line

to estimated mass of section"...and "minimise swing and impact loads" are used. These will be explored in future articles, but in the meantime cross-reference to Figure 8 will help the CP decide on whether the cut section should be rigged at all or what technique should be used.

The flowchart in Figure 9 will assist the CP in assessing issues such as "...peak forces...suitable anchors of sufficient strength...targets...communication" amongst other issues, whilst also emphasising the review of each operation before continuing.

So for the pine mentioned earlier, we've decided to go for a speedline, whilst working from a rope and harness. Factors that helped us make the decision were the obvious reluctance to damage the lawn, and the close proximity of the other pines, where we could secure the speedline from. We considered a 'floating lift' but we would have still damaged the lawn! Not sure what a 'floating lift' is? Have a delve into the research project!

Emergency contingencies

Think back to my story about the small team working in the ash tree, and the lack of provision for aerial rescue. In the UK we have had basic techniques for aerial rescue documented since 1997. Since then training courses, Arboriculture and Forestry Advisory Group (AFAG) Safety Guides and Certificates of Competence have again been developed, but how often is rescue seriously considered, planned or even practised?

On one occasion I visited a contractor who was working in some big trees. They had an emergency access line in place, as per 'good practice' in tall trees, unfortunately it was secured in the same place as the rigging pulley anchor point, and when the climber was working up the main stem with a flip line, he inadvertently trapped the pre-installed rescue line, rendering it useless. Great in theory, but not so good in practice! Still, it was resolved in minutes.

So finally back to the pine. A rescue line will be placed in one of the trees located next to our 'target' tree, thus providing our 'designated rescuer' rapid access to our casualty. Just in case!

Summary

If you consider the scenarios I have mentioned in this article, I hope that more tree workers will think through each rigging job more thoroughly. By simple communication, use of appropriate risk assessments, obtaining decent training, selecting and using the right equipment, and proper planning (without cutting corners) we should avoid potential disasters and injuries. In my book, no piece of wood is worth being injured over, let alone killed!

Sadly, one more serious incident has come to my attention in the last two weeks, so it's still going on.

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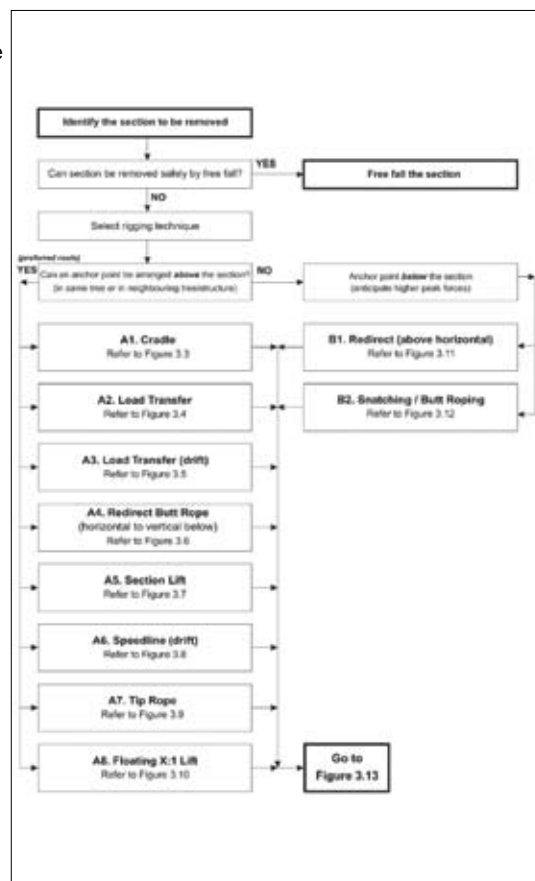


Fig.8 Selecting an appropriate rigging technique (p. 76)

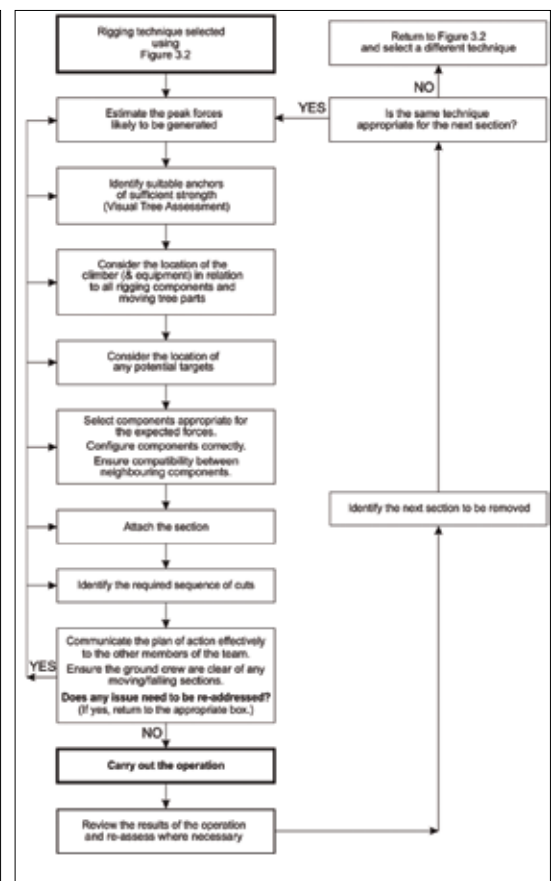


Fig.9 Carrying out an operation and reviewing the outcome (p. 85)