16 RIGGING

Use of this worksheet

This worksheet is part of a series of interactive worksheets that has been produced in association with Husqvarna to support the delivery of training for the City & Guilds (NPTC) suite of chainsaw qualifications.

Content

This worksheet covers the following outcomes:

Be able to carry out aerial tree rigging

Understand how to carry out aerial tree rigging

When tree rigging may be required and its limitations

There are a number of circumstances when rigging may be required; these include **(fill in the missing words)**:

- _ _ _ _ _ _ _ _ _ _ **are located beneath the tree**

- _ _ _ _ _ _ _ _ **techniques are not possible**

- _ _ _ _ _ _ **damage must be minimised.**

There are ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ **three limitations in the box below)**:

1.

2.

3.

How to lay out a work site to safeguard the groundcrew, aid workflow and deal with arisings during rigging operations

There are a number of factors that needs to be considered; these include:

- **tree size**
- **tree position**
- **access and egress**
- **utilities**
- **targets**
- **number of personnel**
- **methods of managing the arisings**

For the site identified to you by your trainer, consider how to lay out the site to safeguard the ground crew, aid workflow and deal with the arisings.
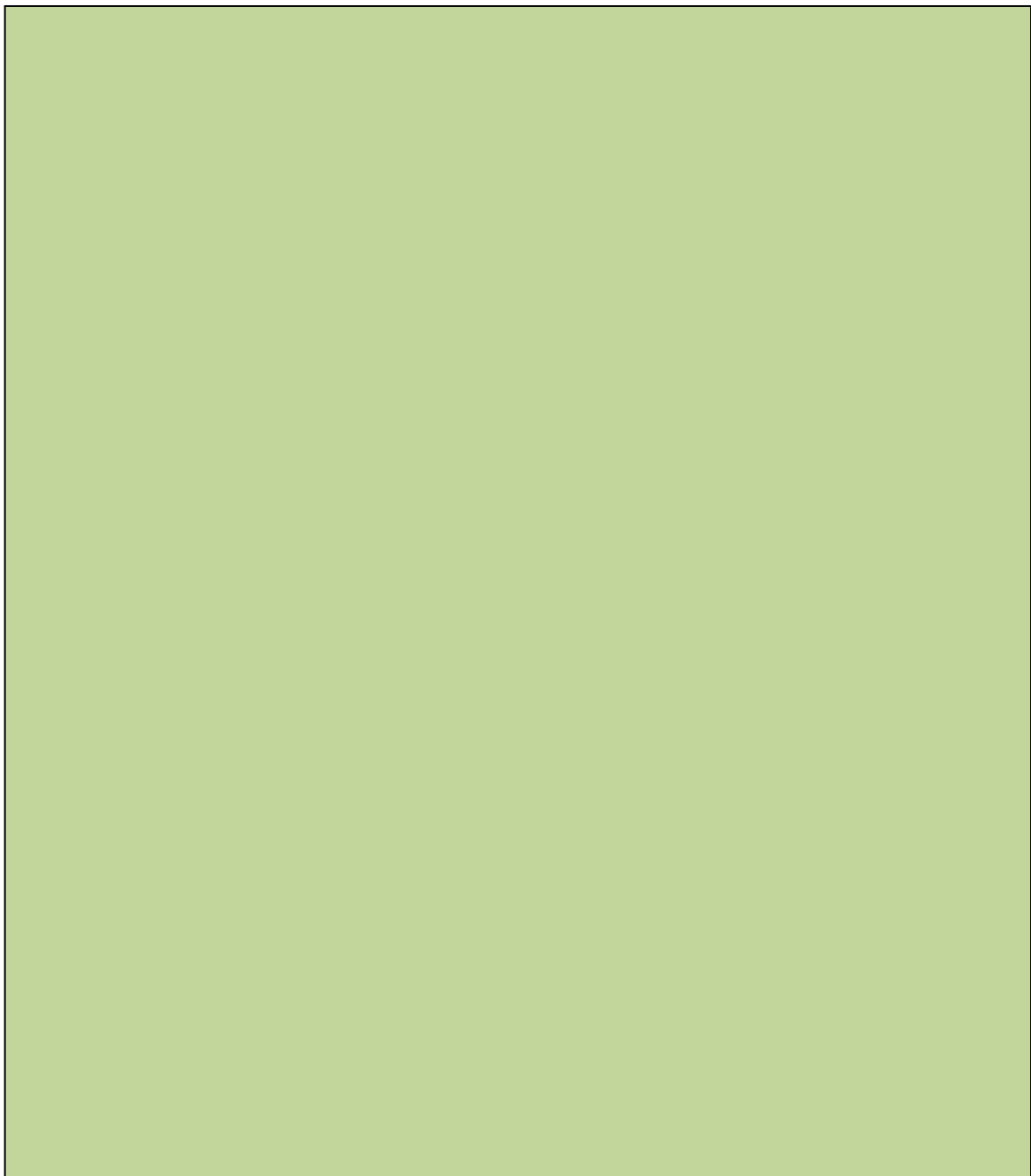
How to select compatible components to make up a rigging system appropriate for the anticipated load

Careful selection of components is essential if the rigging system is going to be appropriate for the anticipated load. The considerations include **(fill in the missing words)**:

- **knowledge of the _ _ _ _ _ _ _ that the equipment may be subjected to**

- **consideration of the loss of _ _ _ _ _ _ _ _ due to configuration, age and condition**

- **_ _ _ _ _ _ _ _ _ _ _ _ with other components**

- **it being fit for purpose.**

How to select suitable work positions and planned drop zones

There are a number of factors to consider when selecting a work position and an appropriate drop zone **(describe them in the boxes provided below)**:

Factors to consider when selecting a work position:

Factors to consider when selecting an appropriate drop zone:

How to select appropriate anchor points for the anticipated load, without compromising the workers' access position

All anchor points must be carefully selected and assessed for suitability before they are used.

The selection of suitable anchor points will take into account:

- **sufficient size and strength**

- **tree form and condition**

- **anticipated load**

- **obstacles beneath**

- **climber's position and anchor points**

- **planned drop zone**

How to calculate log weight

First, the weight of the section to be removed is calculated using one of the following methods:

- **Length of timber x diameter = log mass**

   log mass x species correction factor * = log weight

- **or by experience.**

* Each individual tree species will have its own 'correction factor' for mass, depending on the relative 'density' of the timber.

How to estimate the anticipated loads

Estimating the anticipated loads for the rigging point when lowering timber:

1. **Above the load**

   Log mass (weight of the section to be removed) x 2 = load

2. **Below the load**
   Log mass (weight of the section to be removed) x safety factor (1.3) x anchor force (11) = anchor point load

Your trainer will go through examples with you.

For detailed information, tables of species correction values, and figures to help with estimating log weight please refer to:

HSE Research Report 668 Evaluation of current rigging and dismantling practices used in arboriculture *from* page 138, Estimating log weight. (Downloadable at www.hse.gov.uk/research/rrhtm/rr668.htm)

Figure 6.4 from this publication is reproduced below; The Log Weight Curve will give a quick estimate of log weights where you are dealing with an unidentified tree species, or where a rough calculation of an anticipated load needs to be made.

The graph brings together information on a range of common tree species; it shows a range of values for the log mass of 1m sections of an unspecified green wood at various diameters.

- The **green curve** shows the maximum probable weight,

- the **red curve** the minimum recorded weight, and

- the **blue curve** an average (median) weight

- The **yellow curve** on the graph shows Oak; this has a species correction factor close to 1 and so it can be used by experienced arborists as a basis for quick estimates of load weight.

e.g. from the Log Weight Curve a 1m length of Oak 50cm in diameter is deemed to weigh 200kg.

Log Weight Curve
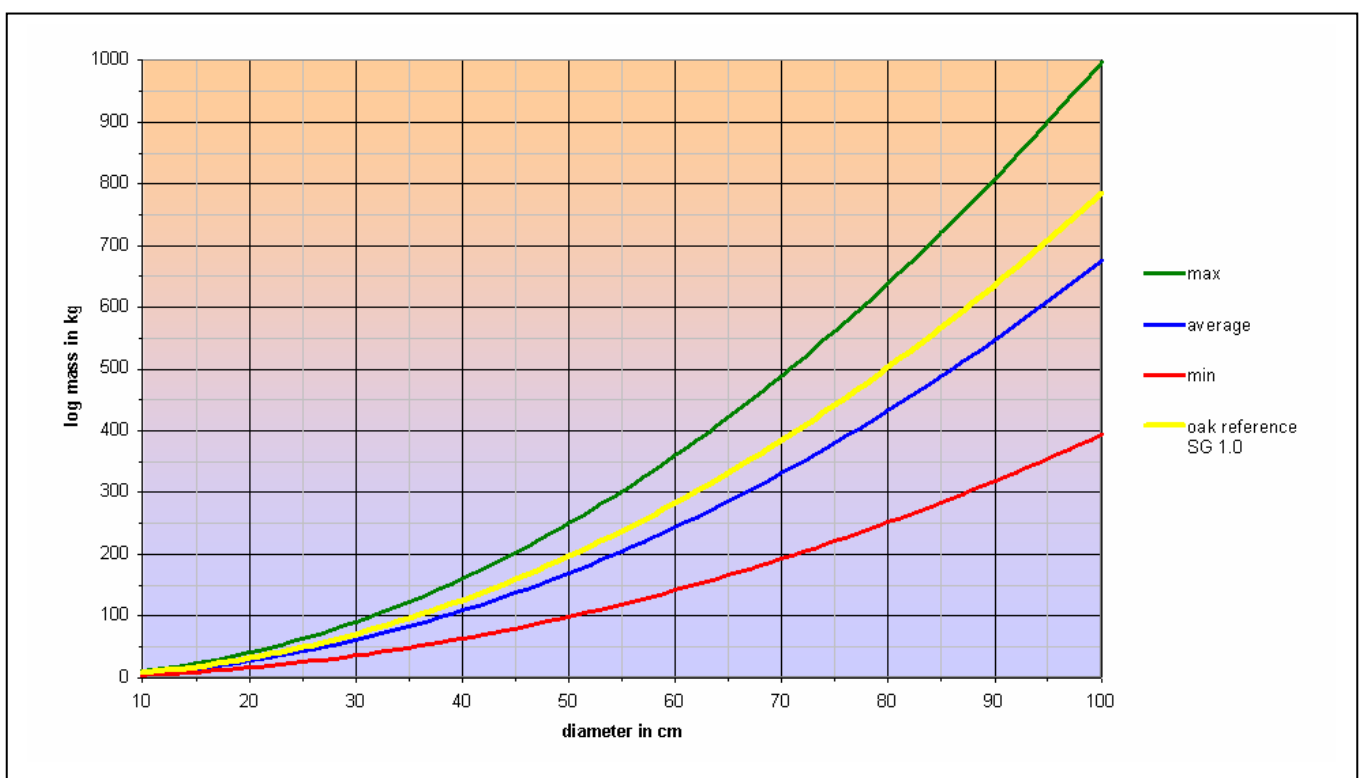
How to minimise shock loadings in the rigging system

Shock loading is defined as a stress created by a sudden force, for example when a falling piece of timber is brought to a halt by the rope restraining it.

There are a number of ways to minimise shock loading; these include:

- **allowing sections to run**

- **removing smaller sections**

- **placing more rope in the system**

- **re-configuring the rigging system.**

Rigging

How, when and where to use different types of rigging systems

For each of the types of rigging system, you are required to state when and where this is used.

Diagram / Illustration	When and where used
Driftload Transfer Line:	

Diagram / Illustration	When and where used
A Balance Cradle:	

Diagram / Illustration	When and where used
A Spider Leg:	

Diagram / Illustration	When and where used
A Speedline:	

Diagram / Illustration	When and where used
A False Anchor Point:	

Diagram / Illustration	When and where used
Craning and Lifting:	

Diagram / Illustration	When and where used
Crane Removal: 	

Diagram / Illustration	When and where used
Pull or Tag Line:	

Rigging

How to remove tree sections by specific techniques

For each of the techniques, you are required to draw a diagram to illustrate the 'rigging' and explain how the technique is used to remove tree sections.

Diagram / Illustration	When and where used
Tip Tie Technique:	

Diagram / Illustration	When and where used
Butt Tie Technique:	

Rigging

Diagram / Illustration	When and where used
Balance Cradle Technique:	

Diagram / Illustration	When and where used
Snatching:	

Diagram / Illustration	When and where used
Speed line:	

Diagram / Illustration	When and where used
Lifting Technique:	

Table 6.1   Reference log mass chart (green Oaks logs, SG 1.0) in kg units

Diameter of section in cm

length in cm	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20	3.5	6	10	14	19	25	30	40	50	55	65	75	90	100	115	125	140	155
30	5	9	15	20	30	40	50	60	70	85	100	115	135	150	170	190	215	235
40	7	13	20	30	40	50	65	80	95	115	135	155	175	200	225	255	285	315
50	8.8	16	25	35	50	65	80	100	120	140	165	190	220	250	285	320	355	395
60	11	19	30	40	60	75	95	120	145	170	200	230	265	300	340	380	425	470
70	12	22	35	50	65	90	110	135	165	200	230	270	310	350	395	445	495	550
80	14	25	40	55	75	100	125	155	190	225	265	310	355	400	455	510	565	630
90	16	30	45	65	85	115	145	175	215	255	300	345	400	450	510	575	640	705
100	18	30	50	70	95	125	160	195	240	285	330	385	440	505	565	635	710	785
125	22	40	60	90	120	155	200	245	295	355	415	480	550	630	710	795	885	980
150	25	45	75	105	145	190	240	295	355	425	500	575	665	755	850	955	1065	1180
175	30	55	85	125	170	220	280	345	415	495	580	675	775	880	995	1115	1240	1375
200	35	65	100	140	190	250	320	395	475	565	665	770	885	1005	1135	1270	1420	1570
225	40	70	110	160	215	285	360	440	535	635	745	865	995	1130	1275	1430	1595	1765
250	45	80	125	175	240	315	400	490	595	705	830	960	1105	1255	1420	1590	1770	1965
275	50	85	135	195	265	345	435	540	655	780	915	1060	1215	1380	1560	1750	1950	2160
300	55	95	145	210	290	375	475	590	715	850	995	1155	1325	1510	1700	1910	2125	2355
350	60	110	170	245	335	440	555	685	830	990	1160	1345	1545	1760	1985	2225	2480	2750
400	70	125	195	285	385	505	635	785	950	1130	1325	1540	1765	2010	2270	2545	2835	3140
450	80	140	220	320	435	565	715	885	1070	1270	1495	1730	1990	2260	2555	2865	3190	3535
500	90	155	245	355	480	630	795	980	1190	1415	1660	1925	2210	2515	2835	3180	3545	3925

Rigging

Notes

City & Guilds is a registered charity established to promote education and training

Rigging