

A logging module for oak connected to the Fagacées model

*Simulation du billonnage de chêne en sortie
du modèle de croissance Fagacées*

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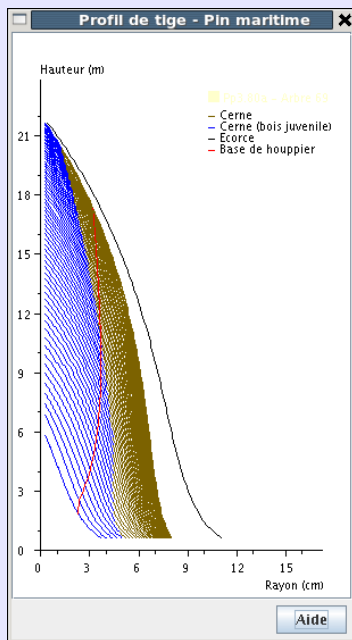
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Objective

Improve the quality assessment of the modelled trees (*stands | scenarios...*) by considering logging strategy and target products

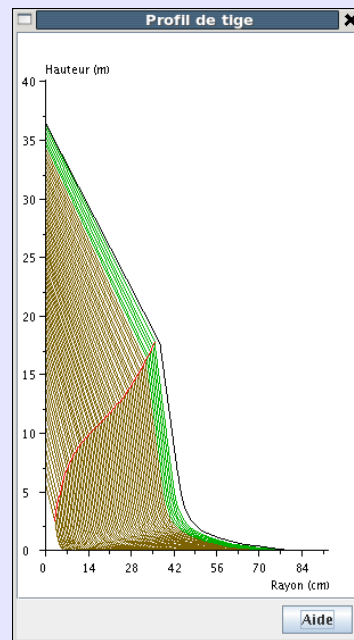
=> simulate the logging process using the stem taper description delivered by the growth models

Pp3



and others...

Fagacées



oak specific logging module

Work initiated in collaboration with Emmanuel Bucket (CTBA)

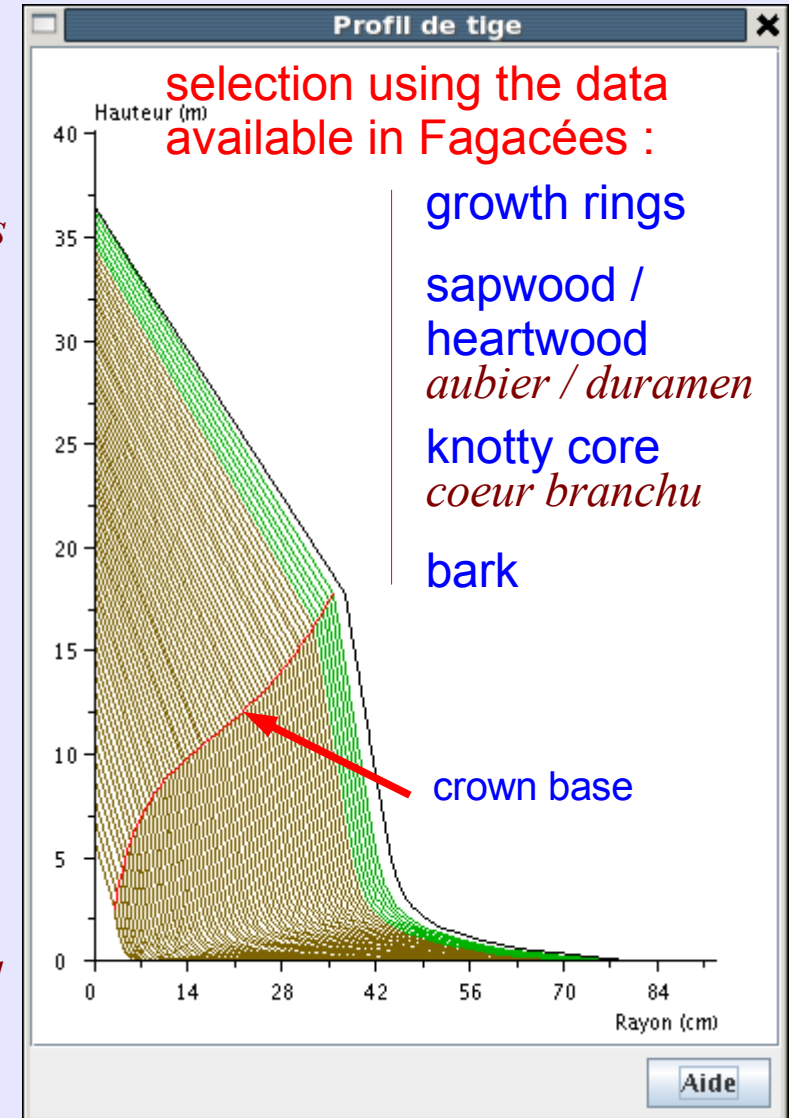
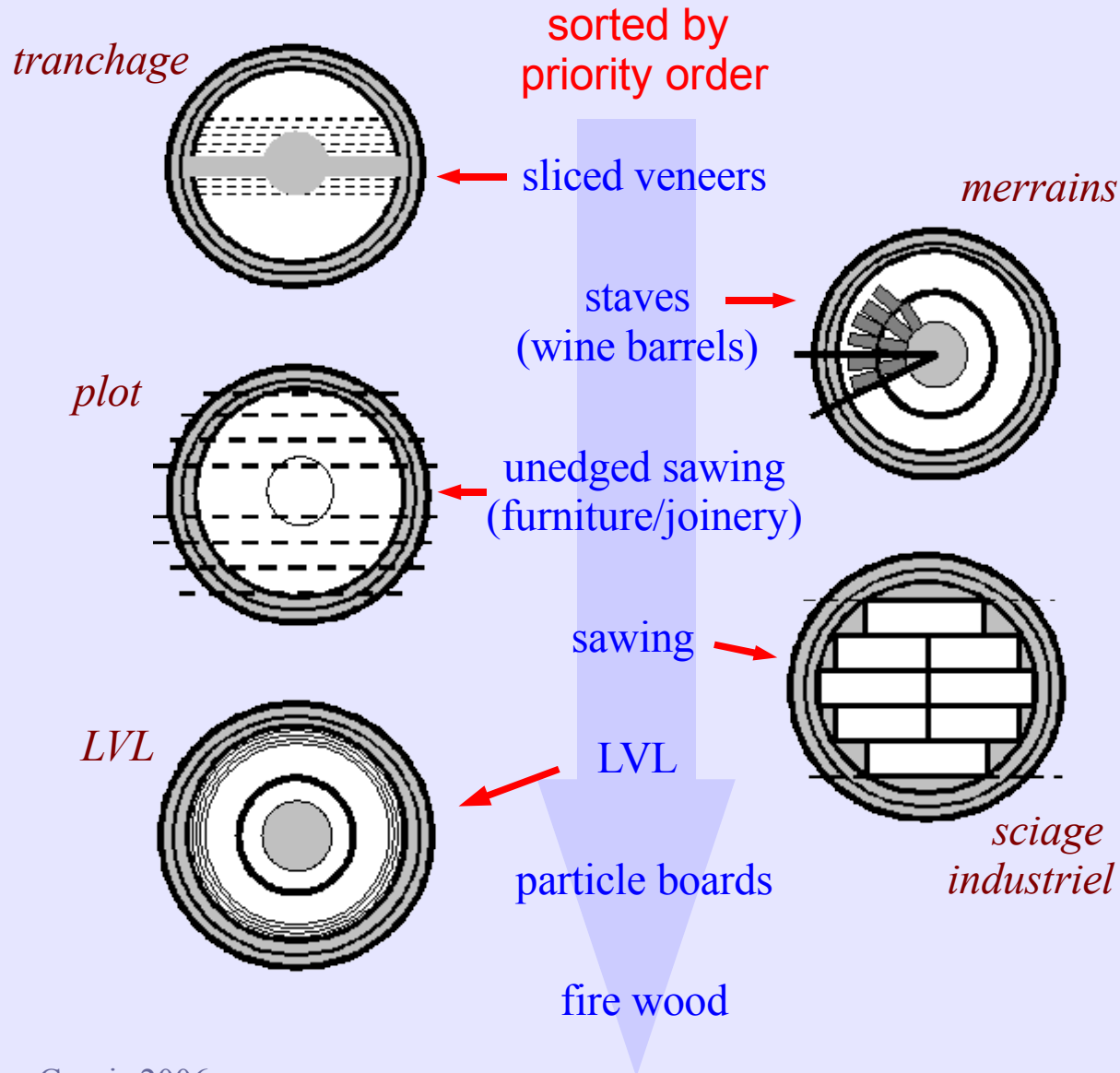
"Modélisation des bilans "environnement" et "produits" de sylvicultures contrastées de chêne sessile"

(convention de coopération INRA-CTBA 2003-2004)

generic logging module in progress

Operating principle of the oak logging module

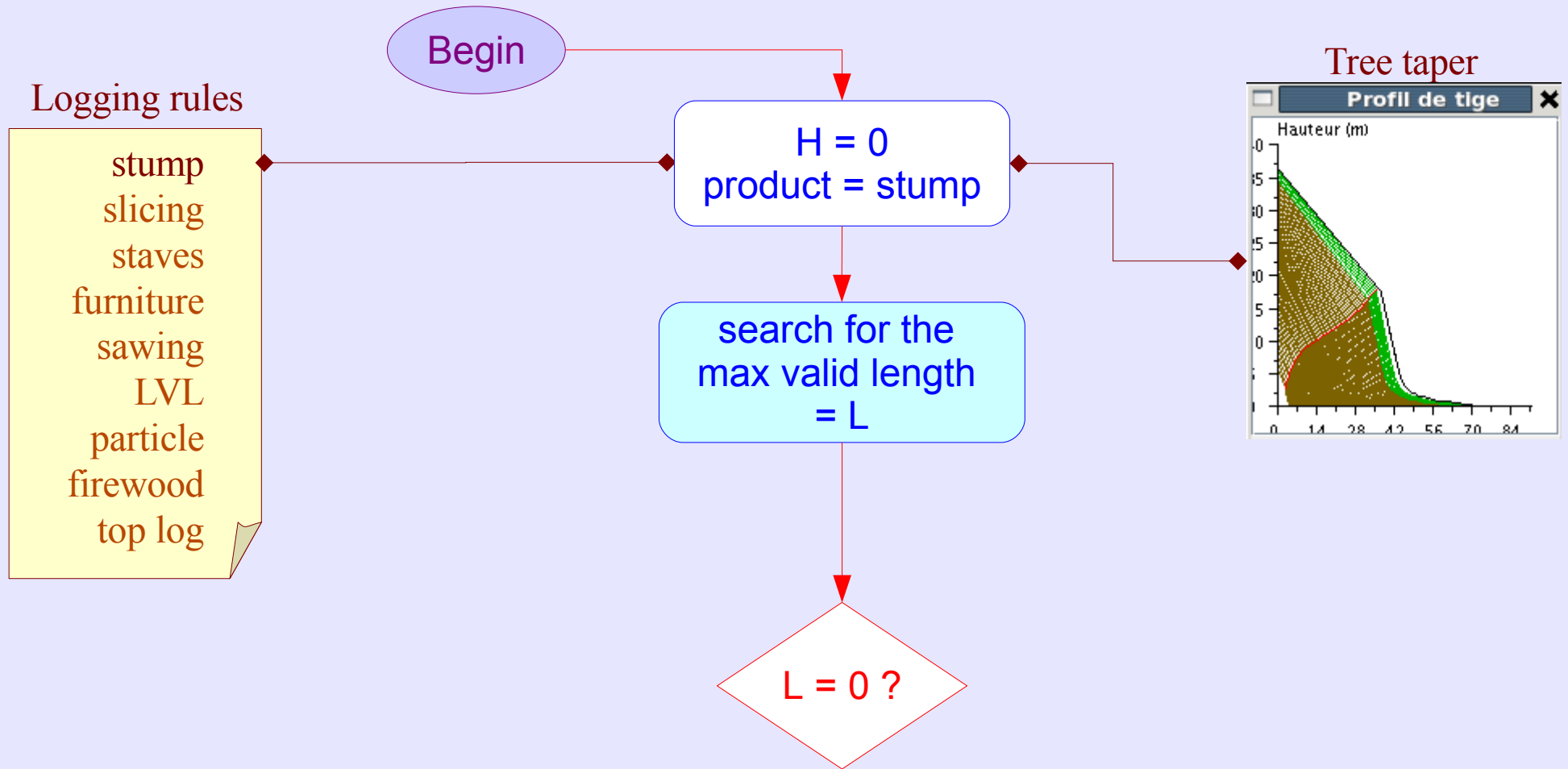
Logging oriented toward a list of products :



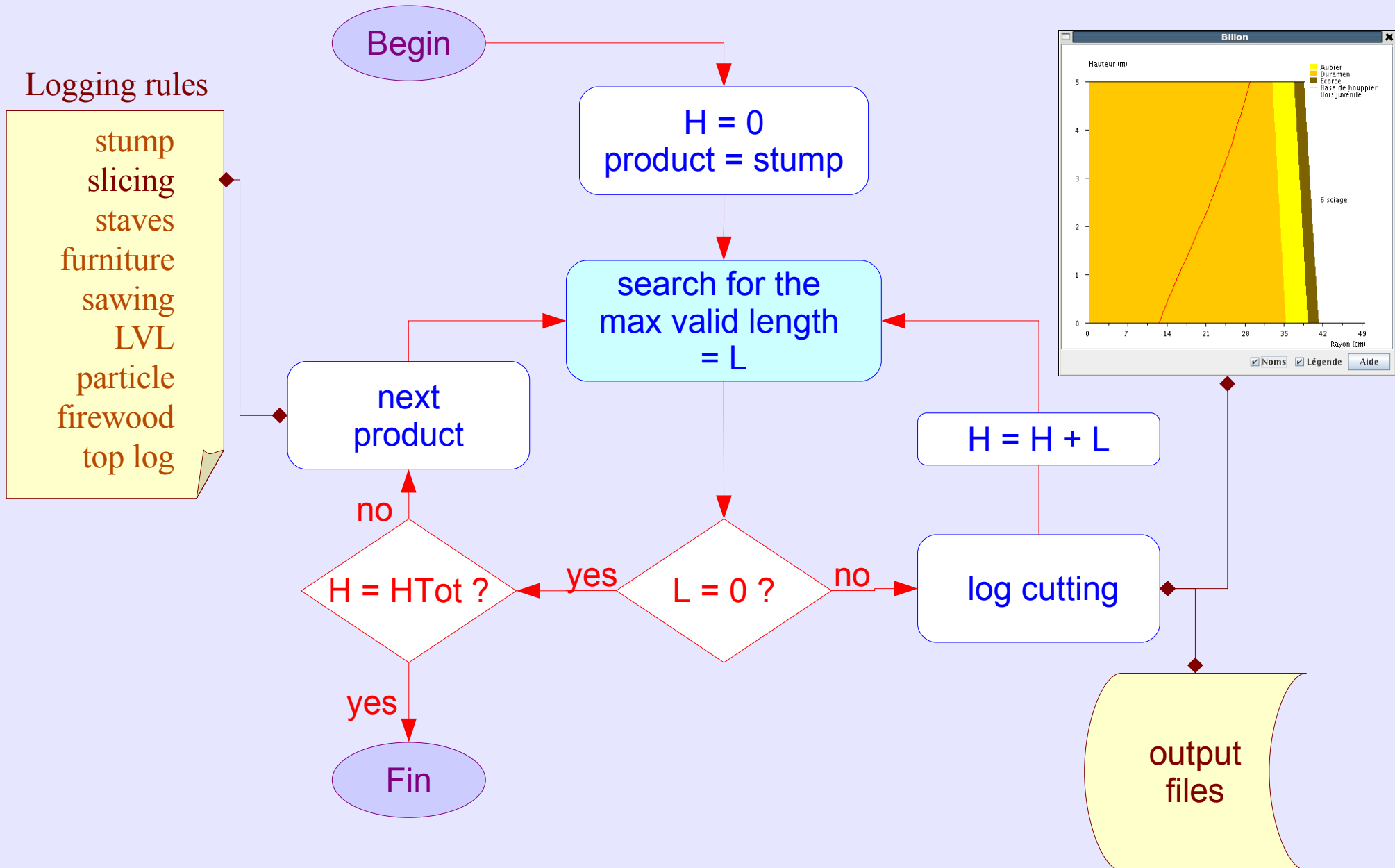
Logging rules for oak

Product	priority	number	length	diameter	wood quality
stump	1	1	0.3 m	-	-
slicing	2	1	1 - 2.2 m	$\varnothing_{\text{MED}} \geq 50 \text{ cm}$ $\varnothing_{\text{MED}} \leq 140 \text{ cm}$	$\varnothing_{\text{CB}} \leq 10 \text{ cm}$
staves	3	2	1.1 m	$\varnothing_{\text{MED}} \geq 45 \text{ cm}$	$(\varnothing_{\text{DUR}} - \varnothing_{\text{CB}}) / 2 \geq 9 \text{ cm}$
furniture	4	-	3 - 5 m	$\varnothing_{\text{FB}} \geq 25 \text{ cm}$	$(\varnothing_{\text{CB}} / \varnothing_{\text{DUR}})^2 \leq 13\%$
sawing	5	-	3 - 5 m	$\varnothing_{\text{FB}} \geq 25 \text{ cm}$	-
LVL	6	-	1.5 m	$\varnothing_{\text{FB}} \geq 18 \text{ cm}$	$\varnothing_{\text{CB}} \leq 12 \text{ cm}$ $\varnothing_{\text{DUR}} \geq 14 \text{ cm}$
particle boards	7	3	2 - 2.2 m	$\varnothing_{\text{FB}} \geq 7 \text{ cm}$	-
firewood	8	-	0.5 - 1 m	$\varnothing_{\text{FB}} \geq 7 \text{ cm}$	-
top log	9	-	-	-	-

Algorithm used for processing one tree



Algorithm used for processing one tree



Simulation outputs

- Tree data file
- Log data file
- DBH x product data file

volumes

weights

dbh	prod	prio	nb	v_m3	vb_m	vk_c_n	vchw	vcsw	vjw_n	m_kg	mb_k	mkc_l	mchw	mcsw	mjw_l
80	souche	0	1	0.34	0.04	0.00	0.23	0.06	0.00	187	18	0	135	34	0
80	trancha	1	1	1.38	0.15	0.00	0.97	0.26	0.00	744	68	1	546	130	0
80	merrain	2	2	0.96	0.10	0.01	0.68	0.17	0.00	513	46	4	380	83	0
80	plot	3	1	1.71	0.17	0.06	1.16	0.31	0.00	918	80	36	650	152	0
80	sciage	4	1	1.67	0.17	0.60	0.59	0.32	0.00	915	77	350	328	160	0
80	particu	6	3	1.49	0.15	1.32	0.00	0.02	0.00	823	68	744	0	11	0
80	feu	7	10	0.53	0.05	0.48	0.00	0.00	0.00	298	24	274	0	0	0
80	sommet	8	1	0.00	0.00	0.00	0.00	0.00	0.00	1	0	1	0	0	0
100	souche	0	7	3.48	0.38	0.00	2.47	0.64	0.00	1904	172	0	1415	317	0
100	trancha	1	7	14.09	1.38	0.01	10.16	2.54	0.00	7487	631	7	5636	1212	0
100	merrain	2	14	9.57	0.91	0.05	6.97	1.63	0.00	5018	416	31	3812	759	0
100	plot	3	7	18.94	1.77	0.60	13.29	3.28	0.00	10009	810	372	7291	1535	0
100	sciage	4	11	22.59	2.08	9.28	7.37	3.87	0.00	12175	948	5363	4006	1857	0
100	particu	6	21	14.70	1.34	12.87	0.07	0.41	0.00	8095	614	7241	36	203	0
100	feu	7	76	6.22	0.57	5.65	0.00	0.00	0.00	3490	258	3232	0	0	0
100	sommet	8	7	0.03	0.00	0.02	0.00	0.00	0.00	15	1	14	0	0	0

to be completed (prices...)

Generic logging module GeoLog (experimental)

Products anonymous (P1, P2...)

custom products => derived product & panel class (e.g. Fagacées)

Logging rules

using basic stem geometry
(min diameter, min length...)

=> TreeRadius_cmProvider ()

max diameter of branched core

=> TreeCrownBaseHeightProvider ()

min diameter of heartwood

max diameter of juvenile wood

} => adapt GeoLog class (e.g. Pp3)
(TreeXXProvider ?)

custom rules

=> derived product & panel class (e.g. Fagacées)

Outputs volumes by compartments

weights

=> wood density model (TreeWoodDensityProvider ?)
adapt GeoLog class

other

=> derived export class

Minimal requirements for using GeoLog

```
// ----- TreeRadius_cm -----  
/** Returns the radius of the tree at the given height according  
 * to the overBark parameter.  
 * The given tree must be in a stand.  
 */  
public double getTreeRadius_cm (GTree t, double height_m, boolean overBark) {  
    try {  
        FgTree f = (FgTree) t;  
        String species = ((FgStand) f.getStand ().getSettings ().species;  
        if (species.equals ("oak")) {  
            return FgOakAnnex.getRadius_cm (f, height_m, overBark);  
        } else {  
            return FgBeechAnnex.getRadius_cm (f, height_m, overBark);  
        }  
    } catch (Exception e) {  
        Log.println (Log.ERROR, "FgMethodProvider.getTreeRadius_cm ()",  
            "Error while getting TreeRadius_cm", e);  
        return -1;  
    }  
}
```

<= TreeRadius_cmProvider ()
(required)

```
// ----- TreeCrownBaseHeight -----  
/** Crown base height ("Hauteur de houppier") (m) for individual tree.  
 */  
public double getTreeCrownBaseHeight (GTree tree) {  
    try {  
        FgTree t = (FgTree) tree;  
        return t.getCrownBaseHeight();  
    } catch (Exception e) {  
        Log.println (Log.ERROR, "FgMethodProvider.getCrownBaseHeight ()",  
            "Error while computing individual crown base height", e);  
        return -1d;  
    }  
}
```

<= TreeCrownBaseHeightProvider ()
(optional)

Requirements for customising products and rules

```
package capsis.extension.modeltool.woodqualityworkshop.geolog.products;

import capsis.extension.modeltool.woodqualityworkshop.geolog.util.*;
import capsis.extension.modeltool.woodqualityworkshop.geolog.productpanels.*;

public class FgOakStaveProduct extends GeoLogProduct {
    public double staveWidth_cm;

    public FgOakStaveProduct (int id) {
        super (id, "FgOakStaveProduct.name", 2, false, 1.1, 1.1, 45, 0.5, true);
        this.staveWidth_cm = 9.0;
    }

    public class StaveTester extends Tester {
        public StaveTester (TreeData td, double botHeight_m) {
            super (td, botHeight_m);
        }
        public boolean isValid (double length_m) {
            double knotDiam_cm =
                td.getKnottyCoreRadius_mm (topHeight) / 10.0 * 2;
            double heartDiam_cm =
                td.getHeartWoodRadius_mm (topHeight) / 10.0 * 2;
            return heartDiam_cm - knotDiam_cm >= 2. * staveWidth_cm;
        }
    }

    public boolean testLogValid (TreeData td, LoggingContext lc) {
        return testGeometry (td, lc) &&
            testMaxLength (new StaveTester (td, lc.getHeight ()), lc);
    }

    public GeoLogProductPanel createPanel () {
        return new FgOakStavePanel (this);
    }
}
```

<= derived product class

<= custom parameter

<= default settings

custom rules

<= derived panel class

Merci !



Atelier Qualité du Bois - Fag40.projet.201a

Arbres | Billons

Arbres de l'étape Fag40.projet.201a

 Groupe Not

- Id	Age	Dbh	Hauteur (...)	Nombre	Marque
125751	201	108.2218...	36.49744...		
125750	201	108.0749...	36.49685...		
125749	201	108.0551...	36.49678...		
125748	192	102.3116...	35.40094...		
125747	192	102.2282...	35.40059...		
125746	201	107.6045...	36.49496...		
125745	192	102.1097...	35.40008...		
125744	192	102.0872...	35.39999...		
125743	201	107.4252...	36.49423...		
125742	201	107.3797...	36.49405...		
125741	201	107.3351...	36.49387...		
125740	192	101.6598...	35.39814...		
125739	201	107.0649...	36.49277...		
125738	168	87.17183...	32.47764...		
125737	192	101.5439...	35.39764...		

Inspecteur d'arbres

125738 | 125741 | 125745 | 12574

 FgTree

Champ	Valeur
Age	168
Cell	null
CrownBaseHeight	14.99599075317...
Dbh	87.17183685302...
Height	32.47764205932...
Id	125738
Marked	<input type="checkbox"/>
PlotRegistered	<input type="checkbox"/>
Stand	FgStand (2068) n...
Status	Vivant

Lancer des calculs sur la sélection

NZ1LogMaker

Billonner (2)

GeoLog

Billonnage PP3

 Ajout des arbres éclaircis

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Fermer

Aide

Rdi / Temps

Ouverture de Rdi / Temps...



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Arbres | Billons

Arbres de l'étape Fag40.projet.201a

 Groupe Not

- Id	Age
125751	20
125750	20
125749	20
125748	19
125747	19
125746	20
125745	19
125744	19
125743	20
125742	20
125741	20
125740	19
125739	20
125738	16
125737	19

Lancer des calculs sur

NZ1LogMaker

Atelier Qualité du Bois -

Billonnage de Chêne pour Fagacées

Liste des produits :
(priorité décroissante)souche
tranchage
merrain
plot
sciage
lvl
particule
feu
sommet enregistre exporte

intervalle (m) : 0.25

precision (m) : 0.0010

Règles de billonnage

merrain

nombre maximal / arbre :

2

houppier accepté :

longueur minimale (m) :

1.1

longueur maximale (m) :

1.1

diamètre minimal (cm) :

45.0

position relative du diamètre :

0.5

(0=gros bout à 1=fin bout)

diamètre sur écorce :

largeur de merrain (cm) :

9.0

OK

Annuler

Réinitialiser

Aide

Fermer

Aide

Rdi / Temps

Ouverture de Rdi / Temps...



Atelier Qualité du Bois - Fag40.projet.201a

Arbres Billons

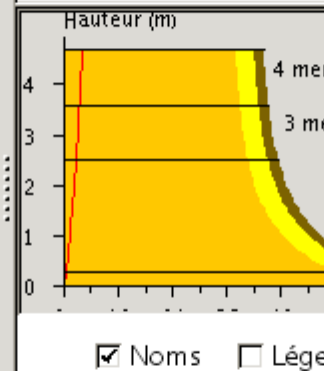
Résultats des calculs de billonnages

- Id job	Type	Statut	Resultat	Lancement
294	GeoLog	Finished	170 billons	20/06/06 09:58:17 20/06/06 10:00:00

Billons du calcul sélectionné

Id pièce	- Id arbre	Rang dan...	Effectif	Nb disques	Nb branc...	Nb
1	125750	1	1.0	4	0	
2	125750	2	1.0	23	0	
3	125750	3	1.0	12	0	
4	125750	4	1.0	12	0	
5	125750	5	1.0	51	0	
6	125750	6	1.0	51	0	
7	125750	7	1.0	33	0	
8	125750	8	1.0	23	0	
9	125750	9	1.0	23	0	
10	125750	10	1.0	23	0	
11	125750	11	1.0	11	0	

Visu billons 2D

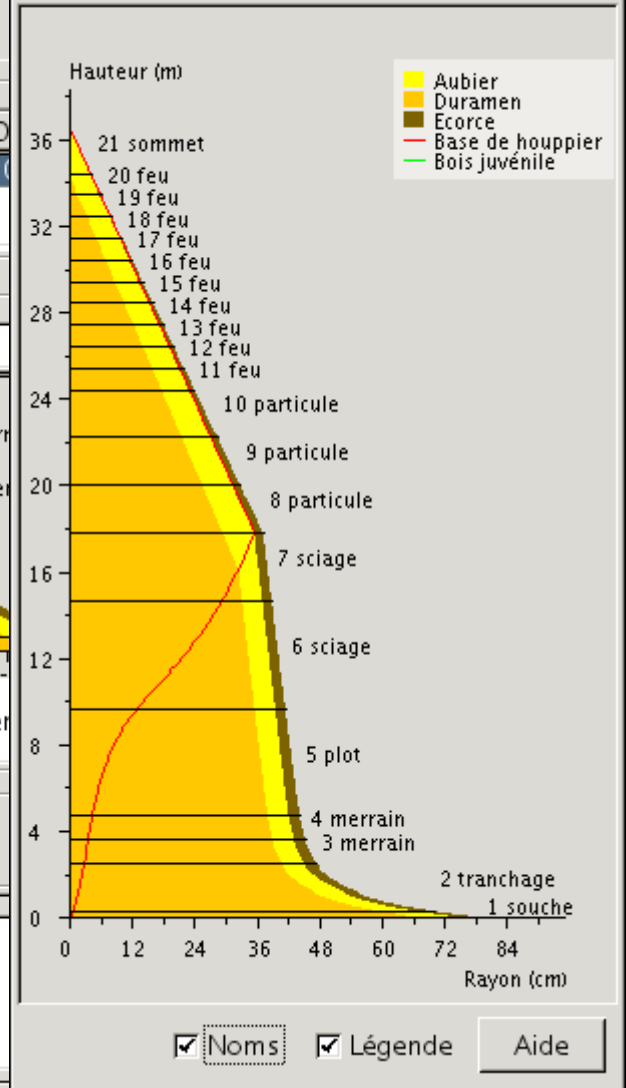


Lancer des calculs sur les billons sélectionnés

Scier les billons sélectionnés

Atelier Qualité du Bois - Fag40.projet.201a
 Job 294 starting for 8 trees: 125750 125749 125748 125747 125746 125745 125741 125738 ...
 Job 294 finished

Billon



Fermer Aide

Rdi / Temps

Duverture de Rdi / Temps...

the end