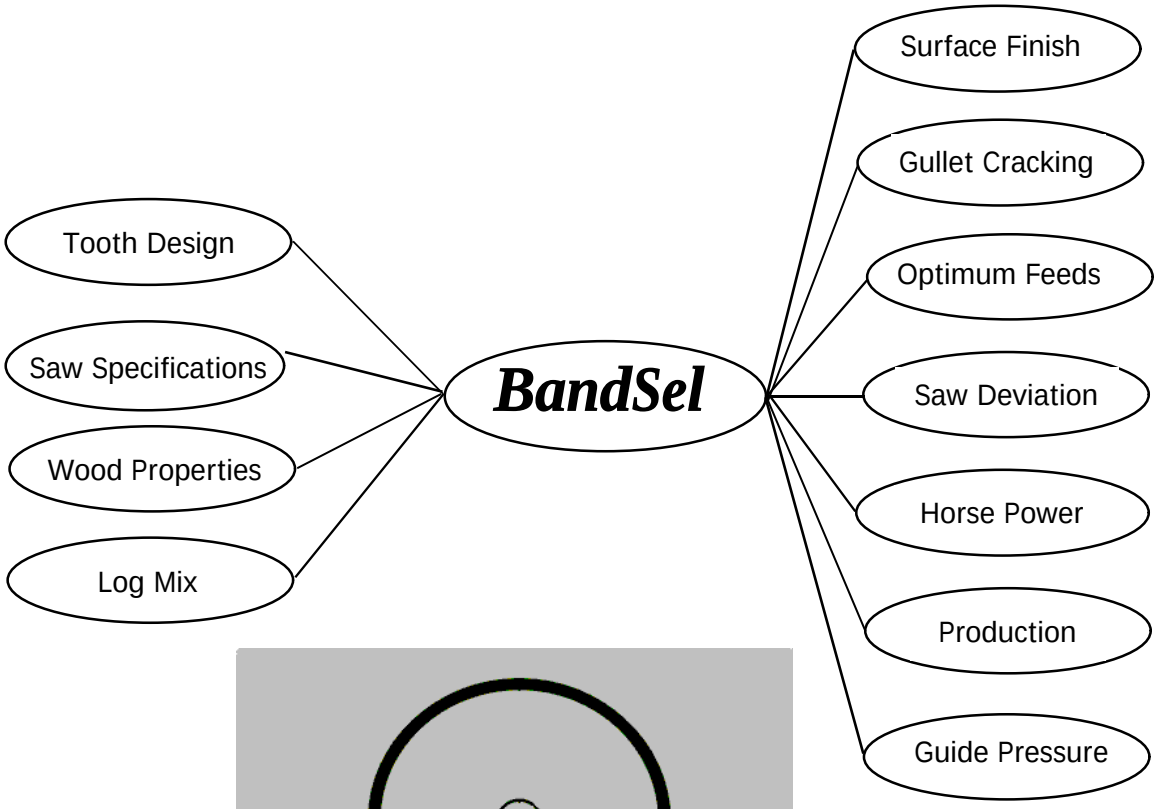
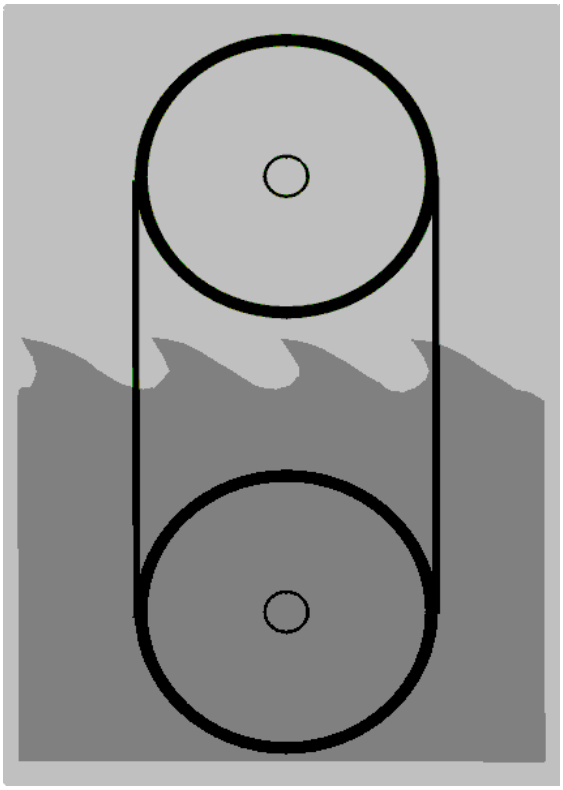
BandSel

The only complete bandsaw selection program.
A major upgrade of a proven winner





Thin Kerf Technologies Inc.

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Are you facing any of these challenges ?

- Increase feed speeds
- A change in log sizes
- A change in wood species
- Improve surface finish
- Reduce target sizes
- Reduce saw failures

This brochure shows you how ***BandSel*** will help you improve the performance of your bandsaws.

For the first time you can select the best bandsaw to suit your application.

BandSel is the only program which contains all the information needed to optimize your sawing performance

Bandsaw design factors included in *BandSel*

Blade
- Thickness
- Width
- Tension

Tooth
- Pitch
- Side clearance
- Gullet area
- Gullet condition (grinding)

Bandmill
- Strain
- Wheel size
- Wheel speed
- Wheel condition
- Guide span
- Guide Pressure

Wood
- Species
- Density
- Depth of cut
- Percentages of each depth of cut

Calculations

- Within-board sawing deviation
- Gullet Feed Index (GFI)
- Bite per tooth
- Recommended feed speeds
- Power requirements
- Guide Pressure
- Gullet area
- Bandsaw cracking
- Cutting time

New Features since Version 1.0

- Input and worksheets are combined on one screen
- Template quick start
- Expanded summary reports
- Machine files are independant. They can be shared with other users.
- Direct calculation of within-board sawing deviation. This replaces the use of "Load Index", although the technology is still in the program.
- Improved horsepower calculation based on the density of the wood. Also includes the effect of bite per tooth on power consumption.
- Several variations can be opened at once
- Log mix (diameter distribution) cutting time studies can now be done

Members of Forintek Canada Corporation can access the Forintek power calculation data.

Forintek Canada Corp.

Example: Find the best feed speeds and tooth pitch for two log mixes.

The Bandmill and Cutting Conditions

This example is based on a 5 foot high strain bandmill using a 0.065" saw plate, 0.115" kerf, cutting Western Red Cedar, with an average 60% full gullet, and a required within-board sawing standard deviation of 0.020" or less.

The Problem

The log size distribution is going to change so that the average depth of cut will decrease. You want to know how this will affect feed speeds, tooth pitch and production.

Step 1

For each depth of cut and a range of tooth pitches, use ***BandSel*** to calculate the optimum feed speed. You can base the feed speed on required cutting accuracy, gullet loading, bite per tooth, or your own judgment.

Step 2

Use the Cutting Time calculator in ***BandSel*** to calculate how long it will take to cut 10000 lineal feet of logs based on the feed speeds you found in Step 1, and the percentage of each depth of cut. (Note: the cutting time calculation assumes butt-to-butt feeding.)

Step 3

Examine the results to find the tooth pitch, and related feed speeds that produces the shortest cutting time. A table of sample calculations is shown in the table below.

BandSel can be used to develop similar tables for any sawing problem

Depth of cut	Log Mix		Best Feed Speed for each Depth and Tooth Pitch			
	Existing	New	1.5"	1.75"	2.00"	2.25"
8”	25%	30%	246 fpm	298 fpm	295 fpm	262 fpm
10”	35%	40%	197 fpm	238 fpm	237 fpm	241 fpm
12”	20%	17%	164 fpm	198 fpm	198 fpm	201 fpm
14”	15%	8%	141 fpm	160 fpm	170 fpm	164 fpm
16”	5%	5%	123 fpm	149 fpm	158 fpm	151 fpm
Cutting Times for 10,000 Lineal ft.		**Existing**	62.44 min.	45.94 min.	43.51 min.	52.22 min.
		New	59.39 min.	43.83 min.	45.62 min.	49.85 min.

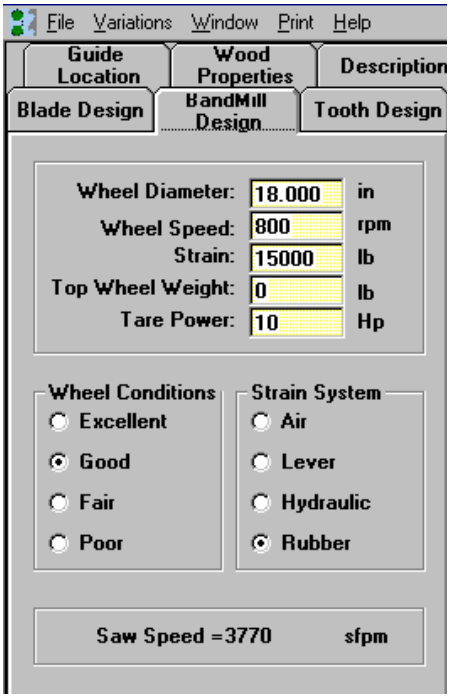
The existing log mix should be using a 2.00" tooth pitch which will result in a best cutting time of 43.51 min. using the feed speeds shown in the table.

For the new log mix, cutting time is minimized with the 1.75" tooth.

Using ***BandSel***

Easy to use. With the dual worksheets incorporated into one screen, it is easy to flip from one calculation to another and immediately see the results of your changes. This method ensures that you have left no important factor out of your design process. ***BandSel*** has an extensive technology base and presents it in an easy to use format. This program can easily be used by Filers, Quality Control, Maintenance, Production, and Mill Managers.

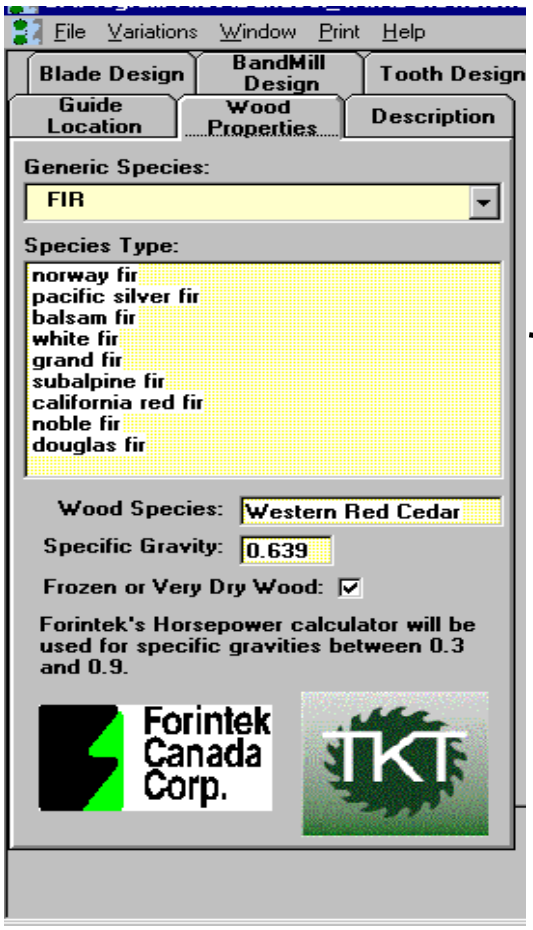
All the important bandmill design factors are included on this screen. Easily change critical design features of your bandmill including wheel condition to see the effect on gullet cracking.



Reports
All the information shown on the screen can be directly printed. Another option is to send it to file that can be imported into any word processor. This allows you to create permanent records, write feasibility reports, or include the file in an email.

Manual
The manual is more than an instruction book for BandSel. It is also a reference on bandsaw technology and trouble-shooting. The combination of the program and the manual is an excellent resource for solving your sawing problems.

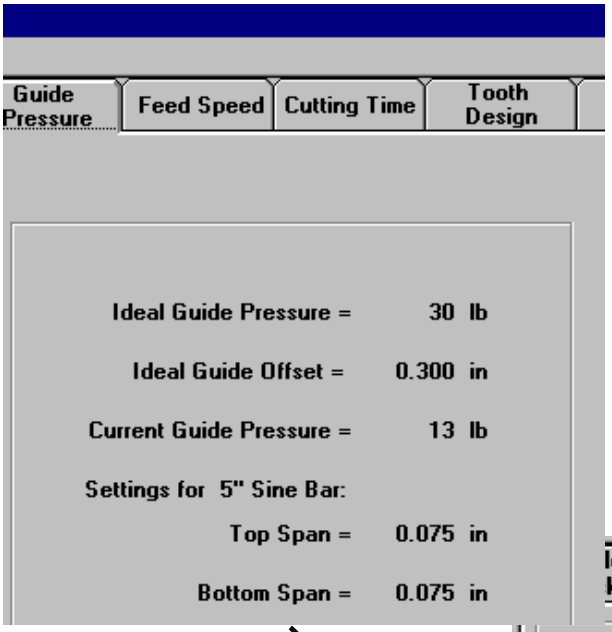
Help
The Help utility contains the entire manual.



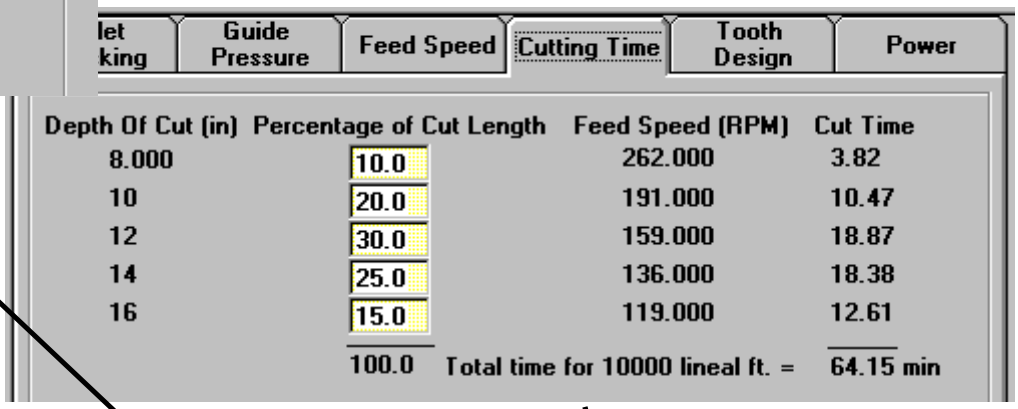
Choose the wood species and specific gravity (density) of the wood you are cutting from a list of common commercial wood species. This information is needed for calculating power requirements and sawing deviation.

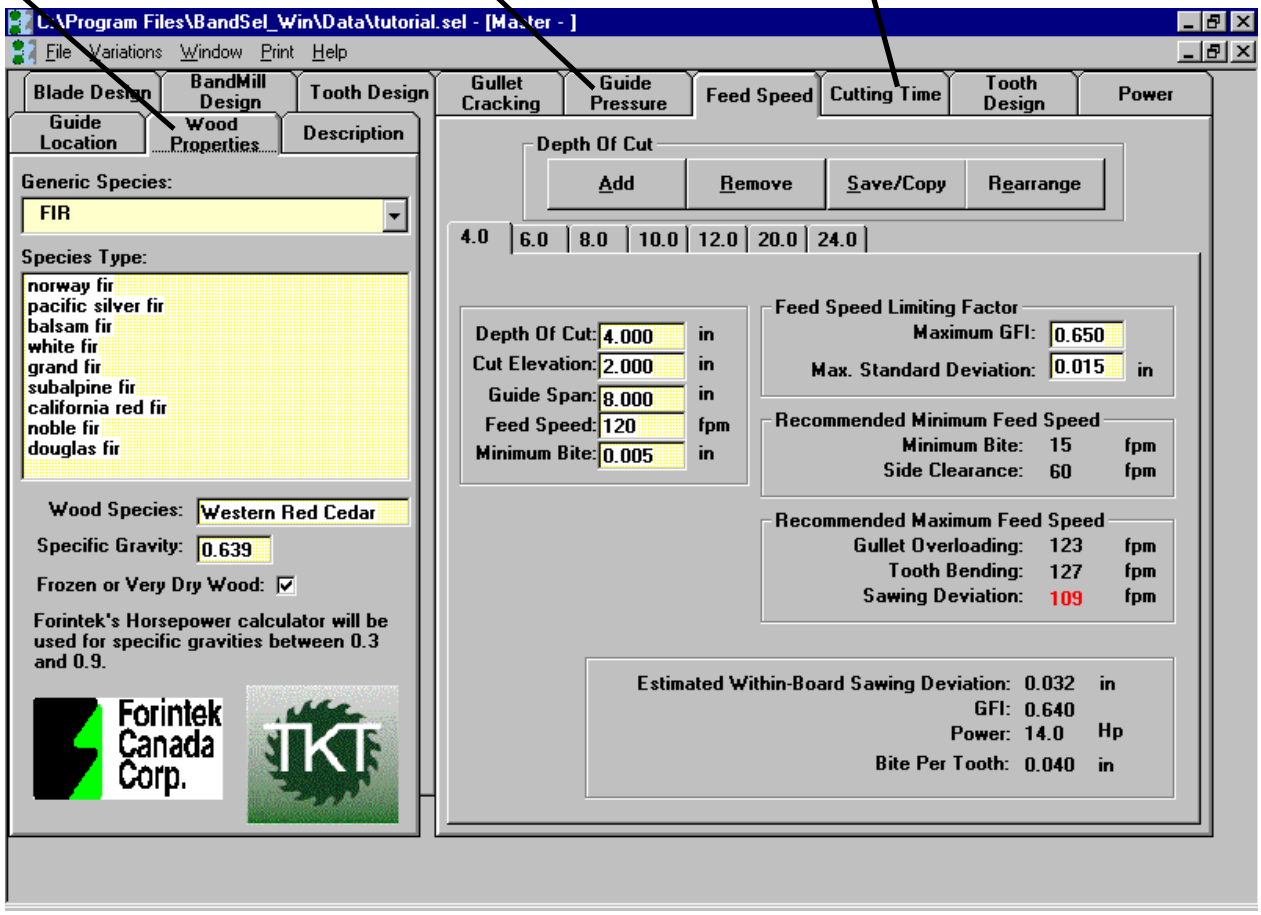
Frozen wood or very dry wood are harder to cut. ***BandSel*** can take this into account.

Determine optimum guide pressure settings and offset. Also calculate the settings for the TKT Sine Bar.



Maximize production by calculating the cutting time for 10,000 lineal feet of lumber for different log diameter mixes. Very useful if you are facing changes in log size.





Sawing Conditions

Strain	15000 lbs	Feed speed	200 fpm
Wheel Diameter	5 ft.	Depth of cut	12”
Guide span	28”	Bite	0.035”
Cut Elevation	4”	Gullet Feed Index	0.65
Pitch	1.75”	Wood	Douglas Fir
Gullet area	0.65 sq. in.	Saw changes	8 hr.
Blade speed	9990 sfpm		

Within-Board Sawing Deviation

Plate Thickness

Side Clearance	0.049”	0.058”	0.065”	0.072”	0.084”
0.020”	0.137”	0.078”	0.055”	0.041”	0.027”
0.025”	0.048”	0.032”	0.025”	0.021”	0.016”
0.030”	0.037”	0.027”	0.023”	0.020”	0.016”
0.035”	0.035”	0.027”	0.023”	0.020”	0.017”

Fibre Loss
(Kerf + 2 Total Sawing Deviations)

Plate Thickness

	0.049”	0.058”	0.065”	0.072”	0.084”
0.020”	0.366”	0.259”	0.222”	0.203”	0.191”
0.025”	0.203”	0.183”	**0.179”**	0.180”	0.185”
0.030”	0.193”	0.185”	**0.186”**	0.189”	0.195”
0.035”	0.200”	0.195”	0.196”	0.199”	0.206”

Note: Between-Board Deviation = S_B = 0.020” in the above example
Within-Board Deviation = S_W
Total Sawing Deviation = S_T
$S_T^2 = S_W^2 + S_B^2$

$$\text{Fatigue Index} = \frac{\text{Time to crack}}{\text{Shift Time}}$$

Plate Thickness	Fatigue Index
0.049”	4.6
0.058”	3.0
0.065”	2.2
0.072”	1.6
0.084”	1.0

Gullet Fatigue Index is the number of shifts the saw will run free of gullet cracks. So for a GFI of 1.6, the saw will run free of cracks for 1.6 shifts

Lumber Recovery

The problem is how to get the right balance between kerf and sawing deviation. Thin blades with low side clearance have a small kerf, but they do not cut straight. Thick blades cut straight, but have a big kerf. ***BandSel*** can help you find the best combination of plate thickness and side clearance to get the most lumber from a log.

The analysis on the left is for a typical bandsaw application. For each plate thickness and side clearance, ***BandSel*** was used to calculate the within-board sawing deviation. The results clearly show that the you don’t want the side clearance to be smaller than 0.025”.

From these calculations, the 0.058” and 0.065” saws have about the same fibre loss at 0.030” side clearance. Considering that the side clearance gets smaller with each sharpening, the 0.065” saw looks like the best saw for this application.

The information in the first table was put in a spreadsheet program to calculate the total sawing deviation and the Fibre Loss, which is made up of the kerf plus a common estimate that the planer loss is equal to two total deviations.

These are some other scenarios you can look at:

- Thin blades can carry more strain without cracking - how will this change the results?
- The top guide is 12” above the wood - what would happen if the guide span were increased to 24”?

The last table on the left shows how the plate thickness affects the Fatigue Index. Basically, the 0.084” plate will crack in one shift, and the 0.072” saw will get a few cracks. The other plates should be free of cracks. One option is to reduce the strain for the thicker plates...but what will happen to the sawing accuracy? Use ***BandSel*** to find out.

What happens when there is a change in wood species ?

These are the some of the concerns:

- Slow down or speed up the from the existing feed speeds?
- Use thicker or thinner saws?
- Slow down or increase the saw speed?
- Change tooth pitch or gullet design?
- Will the existing saw motor have enough power?

BandSel allows you to explore all of these options to find the best solution.

The factor that has the most effect on power requirements, cutting forces and saw deviation is the wood specific gravity (density relative to water). This upgrade of ***BandSel*** has a list of most commercial softwoods and hardwoods, including tropical woods, and their average specific gravities. If, due to local growing conditions, the wood you are cutting has a different density, you can enter your own value for specific gravity. You can also enter the name of the wood.

The calculation of cutting forces and power has an improved to also include the effects of :

- Bite per tooth
- Kerf
- Frozen or very dry conditions

For member mills of Forintek Canada Corporation, the data from Forintek's recent extensive mill measurements of cutting power is incorporated within ***BandSel***.

When surface finish has to be improved, this is how *BandSel* helps

If there is a need to improve surface finish, what can you do? Using the "Feeds & Speeds" example shown previously, where a table was developed to optimize for production, you could develop a table to optimize for surface finish using the smallest bite per tooth as the main determining factor. The table below the 8" depth of cut and different feed speeds for four tooth pitches. The table below optimizes the best surface finish based on the lowest bite/tooth .
So, if surface finish is the premium, the best selection would be the 1.5" tooth pitch and slow all the feed speeds down as shown in the previous table.

The 1.5" tooth, feed at 246 fpm, will produce the smoothest surface.

Tooth Pitch	Feed Speed	Cutting Accuracy	Bite per tooth
1.5"	246 fpm	0.016"	0.039"
1.75"	298 fpm	0.020"	0.055"
2.00"	295 fpm	0.019"	0.063"
2.25"	262 fpm	0.017"	0.063"

Not much difference in feed speeds……

Not much difference in sawing deviation…..

The background of *BandSel*

Sawing wood accurately and efficiently involves many variables. Dr. Bruce Lehmann, the developer of the original program and owner of Thin Kerf Technologies Inc., now presents a Windows version which incorporates many improved techniques and updates.

BandSel uses proven sawing technology such as Gullet Feed Index, bite/tooth, tooth design, and combines it with new technology such as the "Bandsaw Fatigue Index" developed by Bruce from his research carried out when he was at the Wood Sawing Laboratory at the University Of British Columbia.

The technology of the previously used Load Index, which is a measurement of blade stiffness, is still used, but it is now expressed as an index of cutting accuracy using the Quality Control terminology of "within-board standard deviation".

Important features about the bandmill that have an effect on sawing are wheel condition, guide location, guide pressure, strain system, strain levels and wheel speeds. What ***BandSel*** does is to present them in the program so you can easily see how changes made to these items effect sawing performance by viewing the combined work sheets on one screen.

Saw preparation also has an effect on saw performance such as tension levels, gullet grinding and gullet area . Again, the program uses the combined worksheet screen to show how changes effect the cutting performance.

System Requirements

- Pentium 75 Mhz or higher processor
- For Windows 95 or 98
- 8 Mb RAM minimum; 16 Mb of RAM recommended
- 10 Mb free space on hard drive
- CD-ROM drive
- VGA or higher resolution monitor, Super VGA recommended
  (Minimum 600 x 800 resolution)

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