
The River Redgum Alternative
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PROJECT PROPOSAL

The Australian Hardwood Industry has survived for many years using resources and expertise both passed down from older generations and from the development and modification of techniques and processes.

An increasing national and international market for exotic Australian timber furniture (a result of internet shopping and marketing) reveals a demand for high quality furniture with a difference, that difference being practicality.

When considering the expanding market opportunities for this unique product it is necessary to evaluate the properties and characteristics of Australian Hardwoods. Production processes therefore need to adapt in a way that compliments the available transportation methods.

Evidently there is a need for a somewhat new approach to the production of Australian Timber Furniture to facilitate transportation whilst maintaining a high quality product.

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Identification of Need

Proposed Design Project

- To creatively design, produce and evaluate a Table incorporating ergonomic and practical solutions relating to production and international transportation.

- The table will be constructed from a locally available Australian Hardwood.

- The table will be able to either fractionally disassemble or completely disassemble thus facilitating transportation.

- The solution will consider the expansion and contraction properties of Australian Hardwoods.

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Purpose

- To open and/or expand international interest within Australia and the relatively small industry of Traditional Hardwood Furniture.

- To create a successful international market for small local operators by advertising a new and innovative product.

- The design will reveal the natural beauty and unique characteristics of Australian Timbers through the production of creative furniture.

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Target Market

- The target market for the first prototype would be an overseas investor, of whom would ideally generate foreign interest.

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Areas of Investigation

Existing Designs	**Available tools and machines**
Ergonomics	**Materials**
Aesthetics	**Finishes**
Woodworking Techniques	**Methods of extending table**
Joining Processes	**Design development**
Transportation methods	**Professionals in Industry**
Local/National/ International Market	

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Criteria to Evaluate Success

- Does the design incorporate appropriate dimensions?
- Is the table strong and durable?
- Does the design accommodate simple transportation methods?
- Does the table display evidence of creativity?
- Is the table aesthetically pleasing?

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Time Plan

	Term 4 2000	Term 1 2001	Term 2 2001	Term 3 2001
Research and development				
Project proposal				
Project planning				
Construction				
Evaluation				

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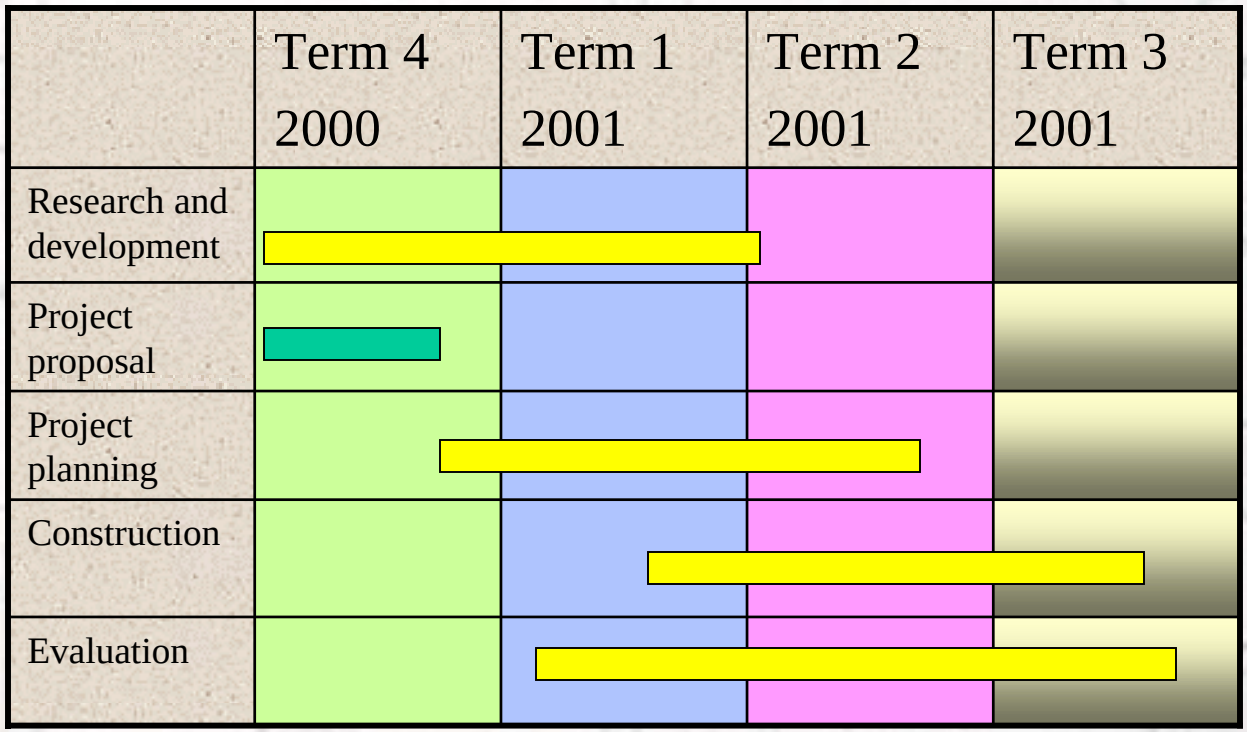
Actual Time Taken



= Time Plan Alteration

= Equal Time Estimation

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The two different time plans display the predicted time for each major task and the actual time. The second one being the actual time plan reveals the variations that were made often as a result of learning more skills and knowledge as the project progressed.

- **Research and development** continued on even into the second term. This was a result of evolving ideas and talking to professionals in the industry. For example the arms were redesigned with the help of Andrew Colquhoun to incorporate the adaptable screw

- **Project Proposal** remained in a similar time frame as planned. This reveals a focus from the beginning on the particular outcome

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- **Project Planning** was necessary in the later stages of the design as the product was continually being evaluated and analysed.

- **Construction** began and finished later than planned as the designer wasn’t initially aware of the difficult weight factor involved in moving the timber within the workshop

- **Evaluation** continued throughout the production as this became an important step which led to many changes and improvements such as the arm attachments.

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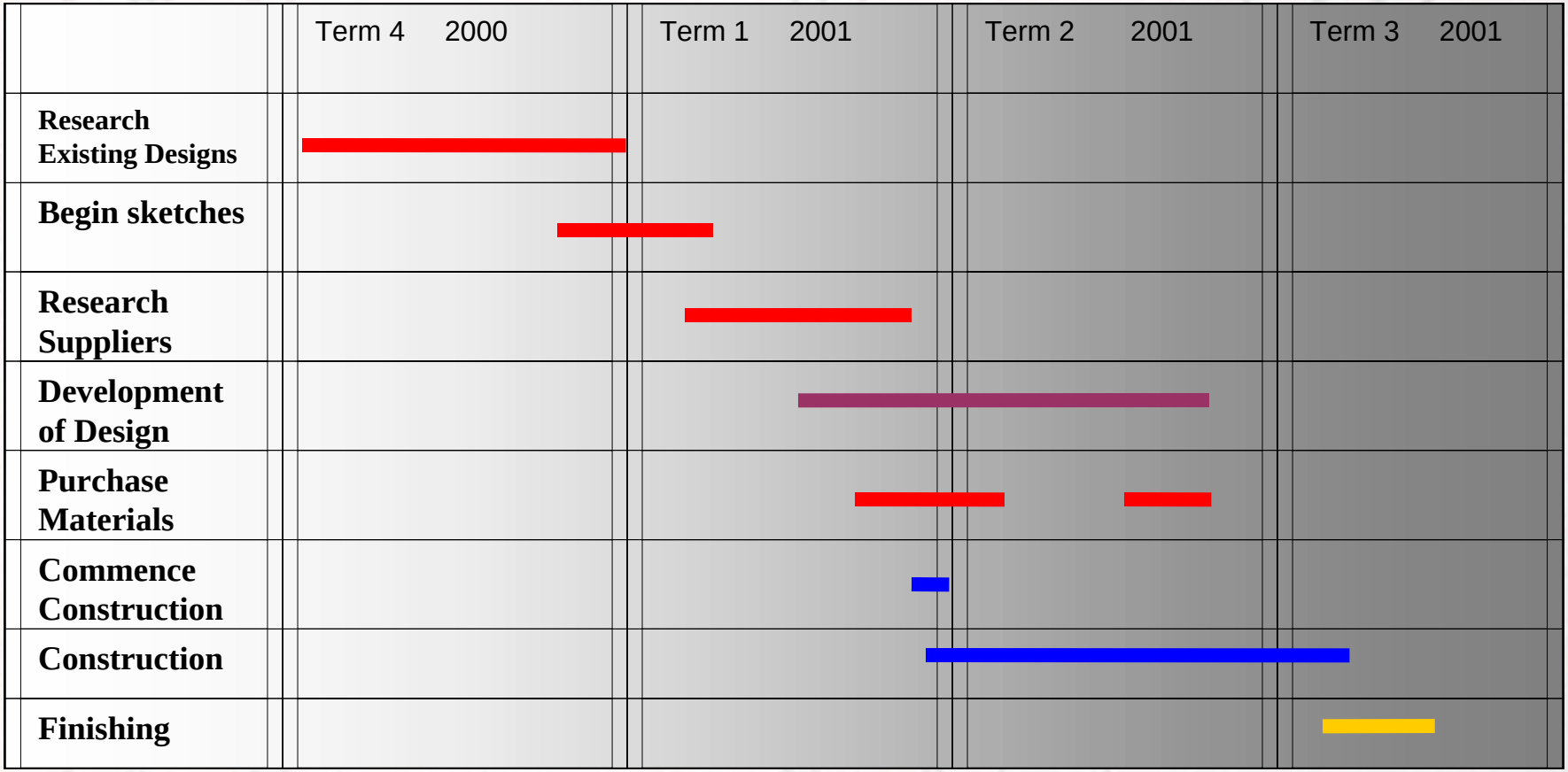
Actual Time - **Including Minor Tasks**



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ACTION PLAN

Action Plan Term 4 (a) 2000	**Action Plan Term 4 (b) 2000**
Research different MDP from previous years Attend Wood Show for ideas Brainstorm ideas for MDP	Design Native Hardwood Tables Research extension tables Research international furniture companies
Evaluation	**Evaluation**
Previous MDP's were found in a photo album from a school teacher Went to Melb. Wood Expo, discovered Native Australian Furniture Industry	Looked at traditional methods for extendable tables Talked to professional -antique furniture store re- extension tables Found international Company IKEA

NB:
(a) – first half
(b) – second half

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Action Plan Term 1 (a)	**Action Plan Term 1 (b)**
Design different tables Research local industry of Native Australian Timber Furniture Talk to professionals in industry Brainstorm Folio Presentation Ideas	Research internet for designs Make appointments to visit industrial settings Visit Kelvin Barton View supply
Evaluation	**Evaluation**
• Table designs went well • Industry research proved positive; *Frenchs Furniture - Culcairn, Alan Wilkinson – Wangaratta* • Folio Idea – Interactive CD	• Internet sites displayed many designs, saved to computer • Meeting with Kelvin Barton during holidays at his workshop

NB:
(a) – first half
(b) – second half

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Action Plan Term 2 (a)	**Action Plan Term 2 (b)**
Research National Market Surface Timber at *TimberShed* Surface legs manually Consult Andrew Colquhoun about arm design	Produce Mortice and Tenon leg joint + Pins to hold in place Sand tabletop –180'grit Cut table shape Assemble base Begin arm attachments
Evaluation	**Evaluation**
• Market - substantial in metropolitan areas, **major problem - awareness ie Marketing** • Surfacing done discounted price $130 • Cut and sanded legs to 180'grit • Andrew supplied info on adaptable screw concept.	• Mortice & Tenon Joint took longer than expected • Table top has been sanded, moistened and re-sanded • Assembled substructure • No time for arm attachments at school, taking to Tallangatta – Andrews Workshop

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Action Plan Term 3 (a)	**Action Plan Term 3 (b)**
Finish arm attachments with legs and tabletop Make middle support and cut recess in substructure Conduct interviews with Andrew C, Kelvin B and Gavin F. Finish sanding table to 320'grit Buy finishes and glues	Fill gaps with epoxy Re-sand project 600'grit Finish with oil and wax *Feast Watson* wax Focus on Folio work organise Video editing and CD burning.
Evaluation	**Evaluation**
• Arms were finished on holidays • Middle support was finished in two lessons • Interviews were successful however one was taped over • Glues and finishes have been purchased from mitre10	• Glue, sanding and finishing was done after trial exams during free days and was completed with the help of a friend and family member. • Folio was almost completed four days before due date - video editing had not yet been completed.

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Finance Plan

Approximate Budget - $ 1500

Material costs

There are obvious factors which effect the cost of Australian Hardwood, for example;

- ***Where it is purchased from***
- ***What type of woods purchased***
- ***Whether the wood is kiln dried***
- ***The unique quality of each piece***
- ***The dimensions of the timber***

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The Finance plan estimates the overall cost of the design solution. Although it may seem exorbitant, thorough research has revealed many different cost that quickly accumulate.

Predicted expenses

- Timber Slabs
- Surfacing
- Extra tools unavailable from educational-institution (eg buffer pads, fine sandpaper)
- Finishes
- Folio processing (eg. video editing)

The list above includes the major costs involved. All other expenses such as transportation were provided by John and Margaret [illegible].

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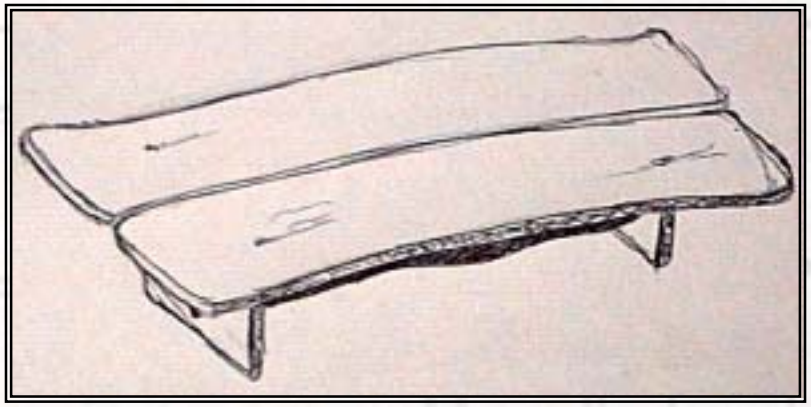
Continuing Evaluation

- The purpose, criteria, and project plans have established a strong guideline and base to creating the design solution. Further development and product research will continue to change the design considerations and therefore continuing evaluations as necessary and play a vital role in the design process.



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Resources

Human Resources:

- ***Andrew Colquhoun*** – As a professional in the Australian Hardwood Furniture industry, Andrew has been of great assistance in producing and discussing different concepts in relation to the MDP. From displaying and inspiring innovative ideas to offering the use of his workshop, materials and specialized machinery, Andrew has been an important influence on the success of the Redgum Slab-Table.

Click for interview with

Andrew Colquhoun

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•***Gavin Fletcher*** – The workshop/classroom teacher Mr. Fletcher has had a major influence on the success on the MDP regarding all areas of the project. Mr. Fletcher was both motivational and supportive in the production of the practical aspects as well as the theoretical side of the MDP. This included setting out of research assignments which consequently lead to the discovery of a new and revolutionary product/process in the Hardwood Furniture industry.

Click to view video interview with Gavin Fletcher

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- ***Kelvin Barton*** – After many weeks of research for the right timber supplier Kelvin Barton proved to be the best source for high quality, kiln-dried Redgum timber for the MDP. When it came to pricing the timber, Kelvin went further and showed special consideration for the student project, he even cut and transported the slabs to the local timber workshop where they were to be surfaced.

- ***Trevor Miller*** – Manager of *'Timber Shed Furniture'* in Wodonga, Trevor's workshop was the only one in the region with a large enough drum sander for surfacing the slabs. As well as completing the surfacing down to 120' grit, Trevor also offered to do the work well under the standard price and even allowed active involvement in the surfacing process which permitted a greater understanding of the industry.

- ***Les Owens*** – Designer and manufacturer of the *WoodWizz*, Les Owens offered a tour of his local business and workshop where the production of the *WoodWizz* machines takes place. Les supplied research information on his innovation that was used to conduct an investigation into surfacing in an industrial/commercial setting. This new process revealed a more efficient surfacing process for Hardwood Timbers.

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- ***Charlie French*** – From *Frenches Furniture* in Culcairn, it was Charlies collection of fine wood working that originally prompted thoughts in the direction of Australian Hardwood Furniture. His creative solutions displayed an interesting approach to furniture making a revealed an artistic approach.

- ***Vin Doolan*** – Purchasing Timber from Vin's collection of kiln-dried furniture was originally a possibility however because the table design exceeded two and a half meters Vin offered another possible supplier.

- ***Alan Wilkinson*** – Earlier in the project Allan Wilkinson offered his knowledge on timbers and processes that guided initial ideas towards more realistic designs after considering the properties of Australian Hardwood.

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Equipment:

- ***Drum Sander*** – The Drum Sander from Trevor Miller's Timber Shed Furniture was used in surfacing the two table top slabs and also the middle beam. This commenced with 60' grit paper and finished using 120' grit paper.

- ***Kiln*** – Kelvin Barton's Kiln was used before the purchase of the wood. This brought the moisture content in the slabs down from approximately 30- 40 % to 7-8 %, which is crucial for indoor furniture.

- ***Bench Saw*** – The school's bench saw was used cut and shape the support arms that are attached to the slabs.

- ***Thicknesser*** – The schools thicknesser was used to shape the arms and the middle support piece.

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- ***Portable Belt Sander*** – The school's Portable Belt Sander was used to sand the chainsaw-cut legs, the middle support, the end grain of the slabs and the inner sides of the slabs after the natural edge had been removed with a Jigsaw.

- ***Orbital Sander*** – The Orbital Sander was used for sanding all parts of the table from the pins to the slab tops, a wide range of paper was used i.e. from 80' – 320' grit.

- ***Electric Plane*** – The electric plane was originally used to cut the legs to size. However this process rapidly removed the wood and was not very appropriate.

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- ***Plane*** – Planes were used in the production of the table, one large, used in sizing the legs the other small, used to remove shavings from the tenon on the middle beam.

- ***Jigsaw*** – The Jigsaw was used to remove the inner natural edges on the slab, this machine was chosen because the cut adopted the same curve as the natural edge.

- ***Circular Saw*** – The Circular Saw trimmed the slab ends to equal length and cut one slab in two to form the two legs.

- ***Radial-arm Saw*** – This was used to cut and shape the tenon on both ends of the middle beam. It was also used to cut the arm lengths in half to form four individual arms of which would then be attached to the table.

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- ***Band Saw*** – The Band Saw was used to shape the middle support with similar curves to the arms and also to shaped the tenon on the middle beam.

- ***Router*** - The Electric Router cut the mortise holes in the legs for the middle beam to slide through.

- ***Portable Drill Press*** – Andrew Colquhoun's Portable Drill Press was used to cut holes on the top of the legs to attach the arms using Redgum pins.

- ***Drill Press*** – This was used to countersink the screws into the arms and shaping the hole in a way that would allow the wood to move.

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•***Fixed Belt Sander*** – The Fixed Belt Sander was used to shape the edges of the arms and the middle support leaving a small radius.

•***Portable Drill*** – The Portable hand drill was used to make holes in the underside of the table top for the stainless screws to attach the arms to the slabs.

•***Buffer*** – The buffer attachment was used in conjunction with a power drill and this was used to buff the wax on the finished slabs bringing the wax to a dull lustre.

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Other minor hand tools

- ***Chisel*** – Tenons, Mortices, Rebates
- ***Rasp*** – Edges, Tenon, Mortices, Rebates
- ***File*** – Edges, Tenon, Mortices, Rebates
- ***Sanding Block*** – All areas of slabs
- ***Clamps*** – Securing Slabs

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Research Resources:

- ***Internet*** – The Internet became a major research facilitator when searching for all types of information on existing designs, timber suppliers, products like the *WoodWizz*, market potential (national and international), sending and receiving data from all over the world was also made easy and fast using e-mail.

- ***Professionals*** – Andrew Colquhoun offered much assistance with differing theoretical concepts reflecting available processes. He gave enthusiastic yet rational advice and prompted critical thinking. This illustrates the amount of information that is readily available in industry and the often, willing approach professionals will have.

- ***Books*** – Books on joining processes, finishes and wood working techniques expanded my knowledge and awareness of available processes and even the woodworking industry.

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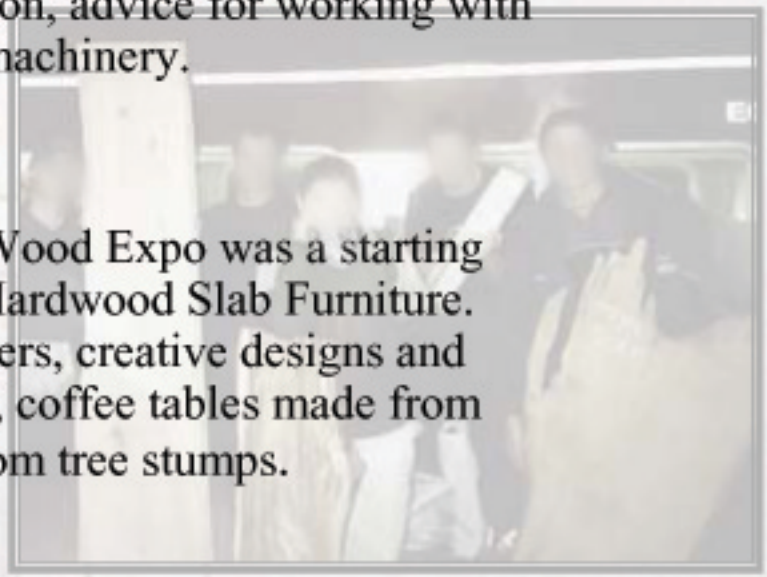
- ***Wood Magazines*** – These were of great use in the developmental stage of the project as they display both traditional and contemporary solutions, and even though often they may not reflect table designs the creative ideas stimulated innovative thinking leading to unique designs.

- ***Bradman Furniture*** – The workers from Bradman Furniture gave information on timber suppliers in the region, advice for working with Redgum and also offered the use of their machinery.



- ***Wood Exhibition 2000*** - The Melbourne Wood Expo was a starting point for idea generation with relation to Hardwood Slab Furniture. The expo displayed a large variety of timbers, creative designs and furniture such as 15 – 20' foot Jarah Slabs, coffee tables made from Redgum Burls, Pendulum Clocks made from tree stumps.

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Initial Idea Generation

This table Eight seater pine table boasts a simple and effective rustic look.
Designed and constructed by IKEA

A six seater table extendable to an eight seater using the Stem and Leaf method.
Designed and constructed by IKEA

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Rare English Early Victorian mahogany 14 seater Dining Table with 5 removable leaves and detailed turned legs, Circa 1850, plus 14 Matching Victorian Mahogany Dining Chairs.

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Traditional six seater table made
from Australian hardwood.

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This conference table combines a number of features including a wooden inlayed design down the centre, multiple different types of wood and an elegant shape.

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This Redgum table was made in NSW using a unique leg structure which incorporates wooden slats.

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This dining table has a double leg extending system.

This Elegant looking table has the same extension system but is made From a lighter looking pine.

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Large table surface area

Innovative under rail design

Highly polished finish

Solid Redgum hardwood

Elegant leg design

Rectangular top

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Evaluation

Personal Likes

Type of wood used – Redgum

Style of table – Two leg frame

Personal Dislikes

The finish used – High gloss

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Extendable table

Murray pine

Removable leaf

Steel track sliding system

Low under rail

Turned legs

Home

Evaluation

Personal Likes

Sliding track system

Personal Dislikes

Type of wood used – Murray Pine

Shape of table – Oval

Style of legs – Three way design

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Redgum slab table top

Simple design

Unique natural wood design

Basic square legs

- Four seater table

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Evaluation

Personal Likes

Slab of timber – Solid Redgum

Finish – Natural dull luster

Personal Dislikes

Basic leg style – Four legged

Slab shape – Rectangular cut

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- Six seater dining table

Made from European pine

Basic Table design

Interesting and useful sliding extension

Low gloss finish

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Evaluation

Personal Likes

Sliding extension

Personal Dislikes

Shape of table – Basic rectangular

Style of legs – Four legged

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Glossy finish

Simple Frame
Two-Leg
Frame

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Design Idea – Extension Table

An extension table prototype was constructed from cardboard in order to assess both aesthetic and practical possibilities

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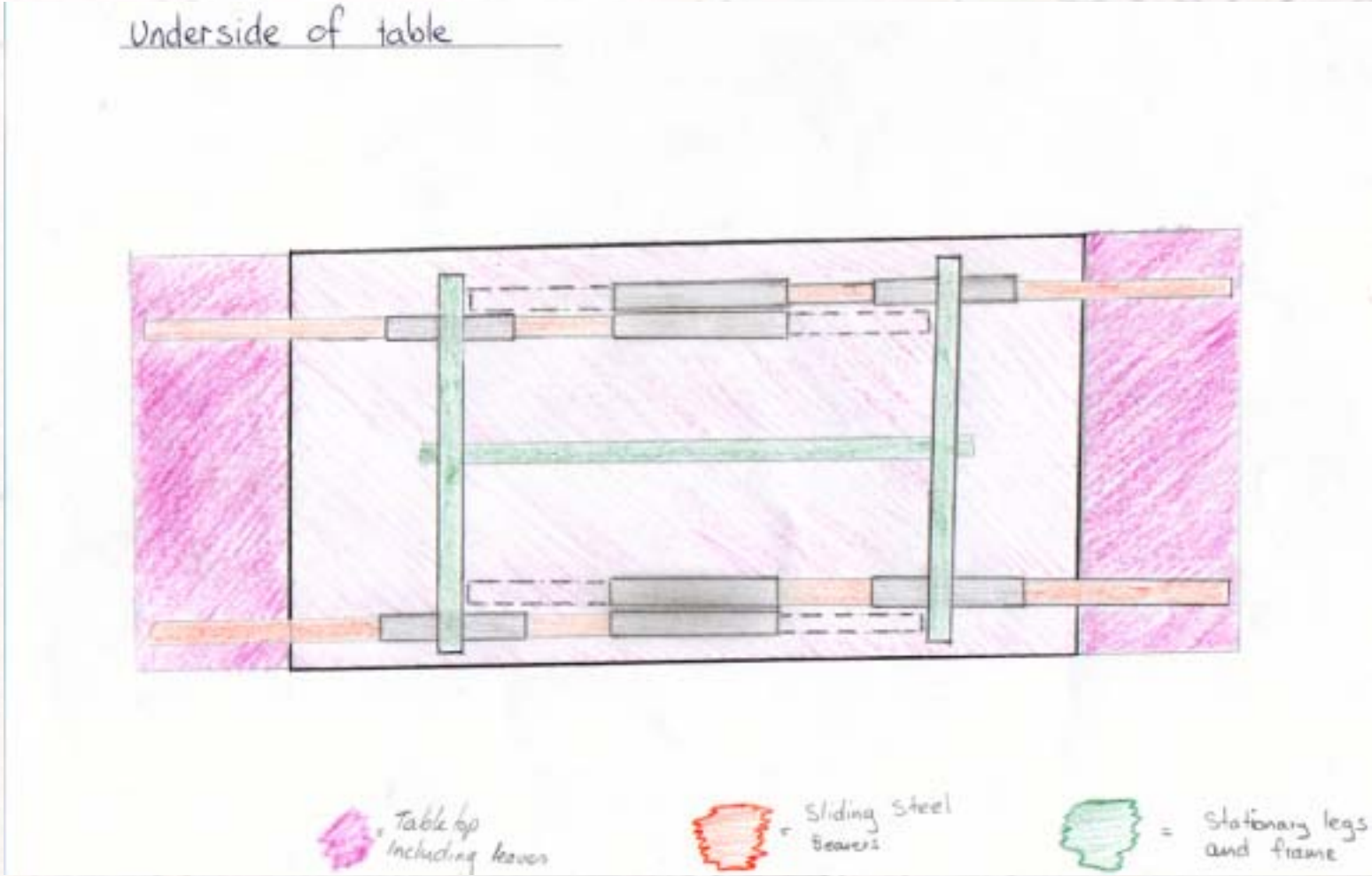
Drawing of extension table



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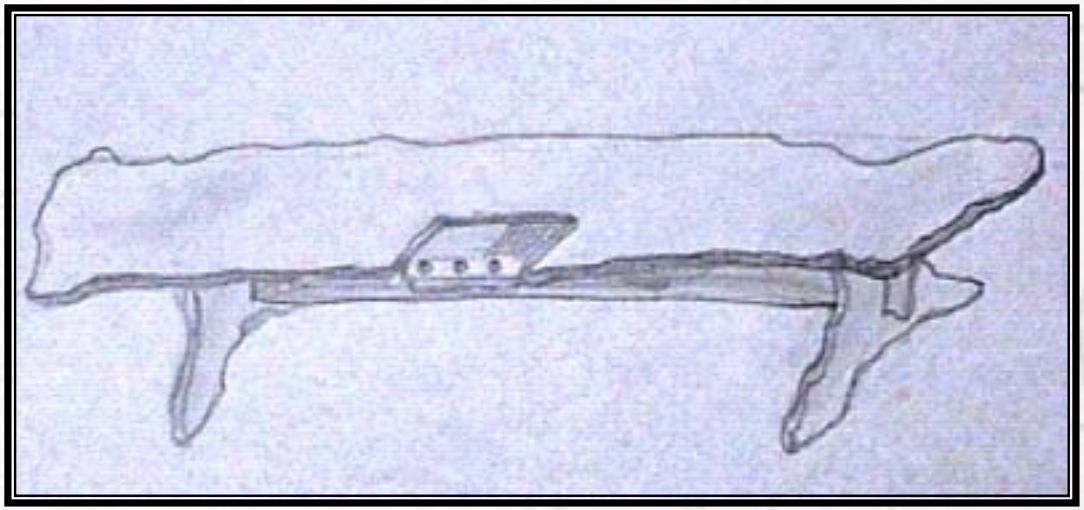
Continuing Evaluation

- The idea generation process has been a largely beneficial method as it has stimulated creative thinking and consequently innovative designing. This mode of design development can save time as it often reveals more practical contrast between ideas between personal and existing designs.



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Design Factors

Cost:

When Considering costs of Australian Hardwoods such as Redgum there are two major options which are;

- Kiln Dried Timber
- Air Dried Timber

When comparing one to the other there is a considerable difference in price. For example one quote from *Frenches Furniture* displayed the following;

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Average cost of **AIR-DRIED** Hardwood slab :

2m x 1m	$200 - $500
3m x 1.2m	$400 - $800

Average cost of **KILN-DRIED** Hardwood slab:

2m x 1m	$500 - $900
3m x 1.2m	$1000 - $1600

These quotes reflect the time and labor involved in kiln drying, a process that can take days or even weeks depending on the moisture content, size and dimensions of the timber to be dried

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- When Producing indoor furniture such as tables and chairs, it is crucial to use Kiln Dried timber. Kiln drying removes about 90% of the moisture in the wood therefore stopping it from buckling and cupping under different temperatures and humidities. Although kiln drying is not guaranteed to hold its shape or position, it certainly has a much lower possibility of warping.

- However for an outdoor table setting seasoned, air dried timber is often used as the movement in the timber is more accepted and not a big issue.

- Other cost factors relate to the quality of the wood in relation to the grain structure (eg fiddleback), imperfections (flaws), age and shape.

Other Costs

Many other costs are involved when constructing a piece of Australian Hardwood furniture including;

- Labour
- Machinery
- Tools
- Materials
- Finishes
- External processes

The greatest of all the costs is the labour, this is a result of the density of the wood. Redgum for example is a heavy wood and when constructing a large piece of furniture moving the piece often takes two men. Also because of the density, working the timber is a difficult process in which many resources are used at a higher rate than soft woods.

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- For example, sanding a large slab of Redgum will take more than twice as long as a more soft, traditional timber and will use about three or four times the amount of sandpaper. However the beauty of the finished Native Hardwood far out weighs the cost and effort involved in comparison to the soft wood.

- Therefore, when making Native Hardwood furniture there are often hidden expenses such as machine ‘ware and tear’ which all add up to a substantial cost.

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Aesthetics

- When designing Native Australian Timber Furniture a major factor of the design is to involve and include it's natural beauty as much as possible as this will almost always supersede any fancy workmanship. So in order to have a successful design the workmanship and construction processes must compliment the timber and not take away from it.

Influences on the natural beauty of the timber come from the following;

- *Shape* – The shape of the pieces should run with the grain in order to create a flow in the design. Any shaping should reflect that of the original shape in its natural context.

- *Joining techniques* – These can have a positive or negative affect on the aesthetic beauty of the design (eg a hard stainless steal screw would harden the look of the timber while a wooden peg will soften and compliment the natural beauty

- *Finishes* – A controversial issue, however, a Glossy lollypop finish on a Native Australian Timber can often be overpowering in a room and not look as soft as the dull lustre of an oil/wax finish.

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Functionality

The Functionality of the design is often the basis for regarding the design as innovative or not. Wether the design fulfils the outcome is one issue however if the design succeeds in doing so in a way that is more efficient than other previous designs it can be regarded as innovative.

To construct an innovative table design it is therefore necessary to research existing designs and analyse them and their major concepts then set out creating a more effective solution for the process or product.

An innovative table design is therefore often one that.

- Involves a simple concept (eg joining techniques).
- Requires minimal comprehension.
- Requires minimal effort with respect to constructing and dismantling.
- Combines available technology within a desired table design.

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Ergonomics

When considering the ergonomics of a table design one must review standard heights for dining tables as this is an important influence on the success of the innovation. The design should work so that it best uses human capabilities with out exceeding human limitations. As the table may involve moving parts or being dismountable there are further ergonomic considerations.

- Weight of moving parts or parts to be moved
- Size and shape of pieces to be lifted
- Ease of understanding the concept by which the user interacts with the product

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Durability and Obsolescence

- The Durability and Obsolescence of a Hardwood table is governed by both the workmanship and also the Natural aesthetic beauty of the design and timber used.

- As Native Hardwood Tables are often works of art their lifetime would therefore be dependent on the appreciation of the design and the physical workmanship. A result of this is therefore an increase in value over time, as the timber become more difficult to acquire and the production of Native Australian Furniture decreases.

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Safety

This is an extremely important factor for any designer and closely relates to the design of the table. Some safety issues to consider when making a Native Harwood Table are

- Texture of finished product (eg no sharp splinters)
- Strength and Durability of materials used such as screws, wooden pegs, joining techniques
- Types of finished used (ie. Are they carcinogenic?)
- Workmanship with relation to design and ergonomics (eg. tabletop : leg weight ratios)

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Environmental Sustainability

The production of Native Hardwood Tables in Australia is a relatively small, almost backyard industry and because of this there is only a limited amount of manufacturers. Therefore the consumption of Timber is on a somewhat sustainable scale as most businesses run on low production. Factors affecting the environmental sustainability are

- Mode in which the timber is acquired (eg. cut down or from fallen tree.)
- Annual amount of timber usage
- Number of Native Hardwood Timber manufactures.

Click for video interview with Andrew Colquhoun

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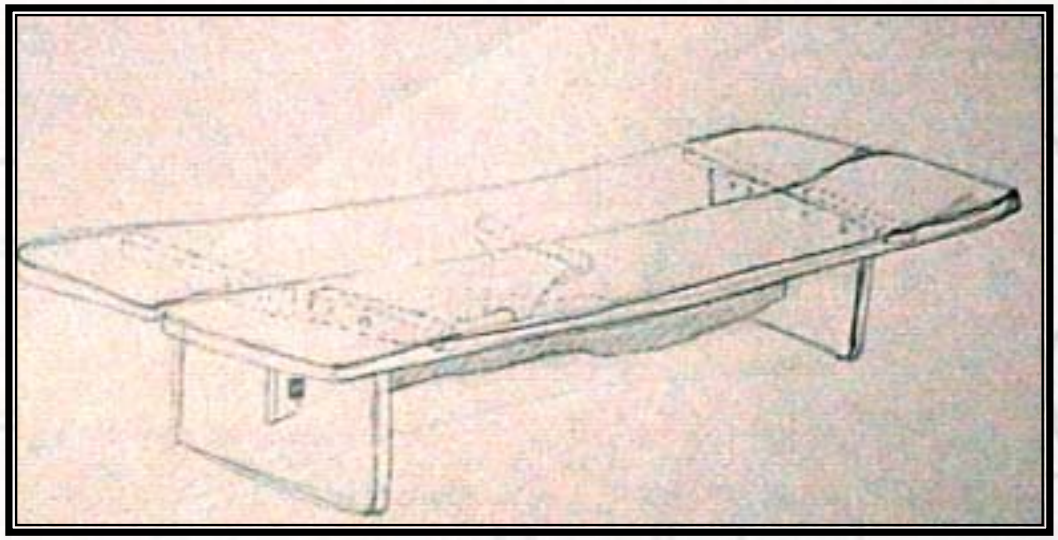
Continuing Evaluation

- A thorough analysis and knowledge of design factors enables an realistic approach to designing the solution. The consideration of these factors was taken on board by the designer and this saved wasting time on designs that were inappropriate.



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Research, Experimentation & Testing

BBQ Table

Early on in the design process a number of creative designs were considered one of which included a BBQ plate in the center of an out door table. This design was then drawn and researched.

Research was conducted by consulting

- Class Teacher
- People from BBQ stores
- Professional furniture makers.

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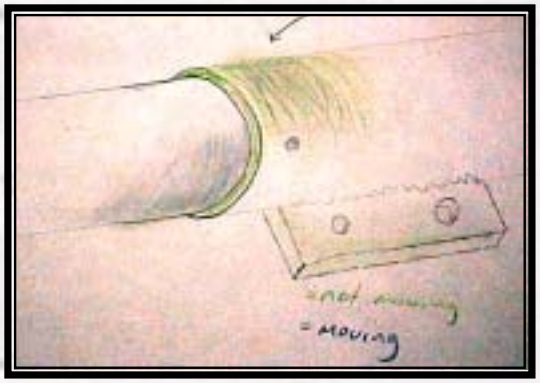

- The precise joining methods from the sliding stainless steel under-frame to the tabletop would be very difficult to construct.
- The incredible weight increase because of the stainless steal used.
- The cost involved with stainless steal sliding mechanism
- The density of Native Hardwoods prevents easy maneuverability thereby preventing the table from being ergonomic.
- Because there are moving parts there would be a shorter life expectancy as they would slowly deteriorate.

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A positive approach was met by the professionals in industry, however after talking to Professional furniture makers they brought forward the possible problems with the table warping as a result of the heat concentrated in one area.

Originally solutions to this problem were considered and research such as;

- Metal flashing around the contact points of the table
- Lowering or raising the hotplate so as not to contact the timber
- Leaving a greater clearance space between the hotplate and the timber

These solutions however would only minimise the heat effect and would not guarantee the table to hold its uniform moisture thus causing it to warp. Finally after much consideration of the BBQ Table design including a Strength/Weakness analysis it was abandoned.

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Slab Tabletop:

After Purchasing the two Redgum slabs for the tabletop from Barton Furniture in the Kiewa Valley some decisions had to be made as they were slightly bow-shaped which left many possibilities,

- How to attach them?
- Which way should they sit next to each other
- Which side would be most ideal?
- Should the natural edges be cut off and the table cut rectangular?

To help the visualisation and decision making process the slabs were accurately measured and cardboard prototypes were made. Theses enabled a simple perspective of the slabs and tabletop designs could be easily pictured.

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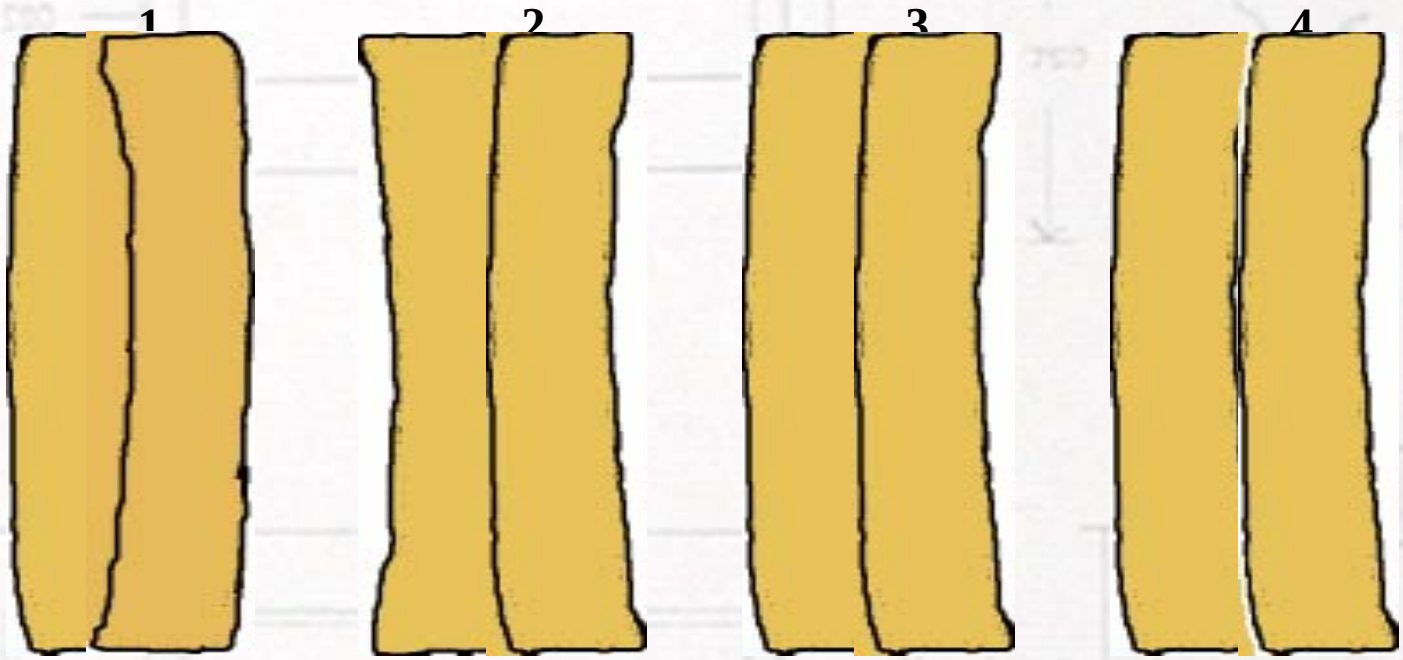
Cardboard design configurations



- Experimenting with different options resulted in choosing the design that was most aesthetically pleasing to the design/producer. From the variety of configurations this chosen design (4) had the least amount of wastage wood possible that still maintained an appropriate spacing solution between the slabs.

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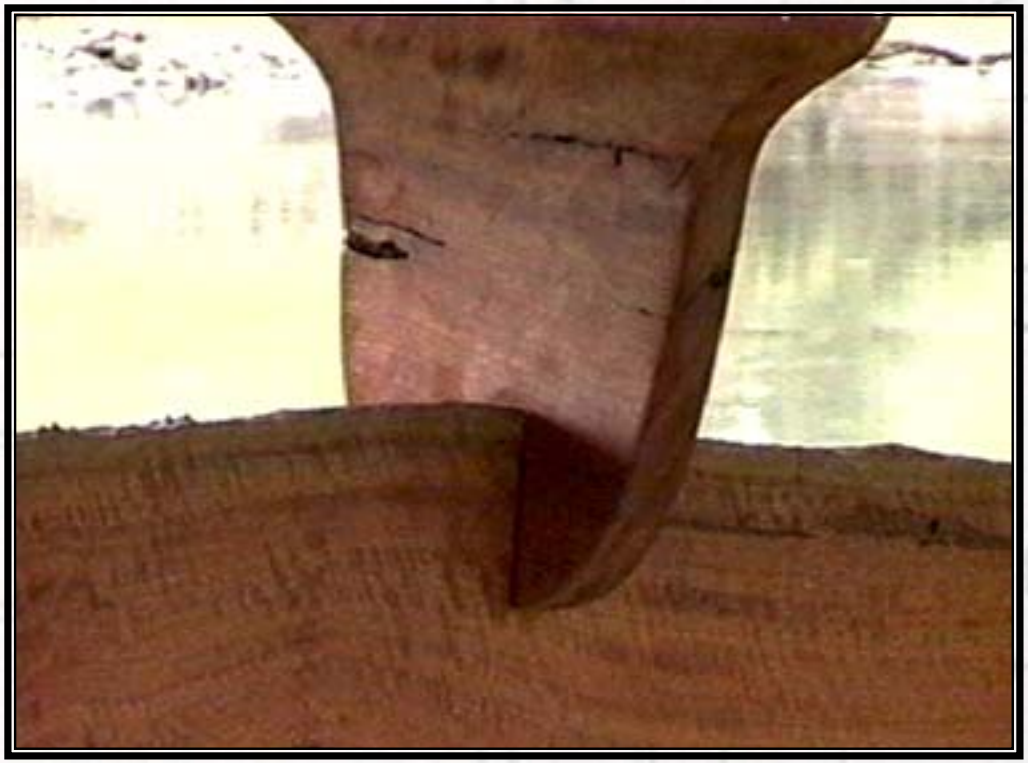
Middle Support:

A middle support for the table needed to be designed as it would give the table the extra substructure that may be needed after possible months of storage. Long-term storage can have a detrimental effect on Australian Timbers if they are not stored correctly.



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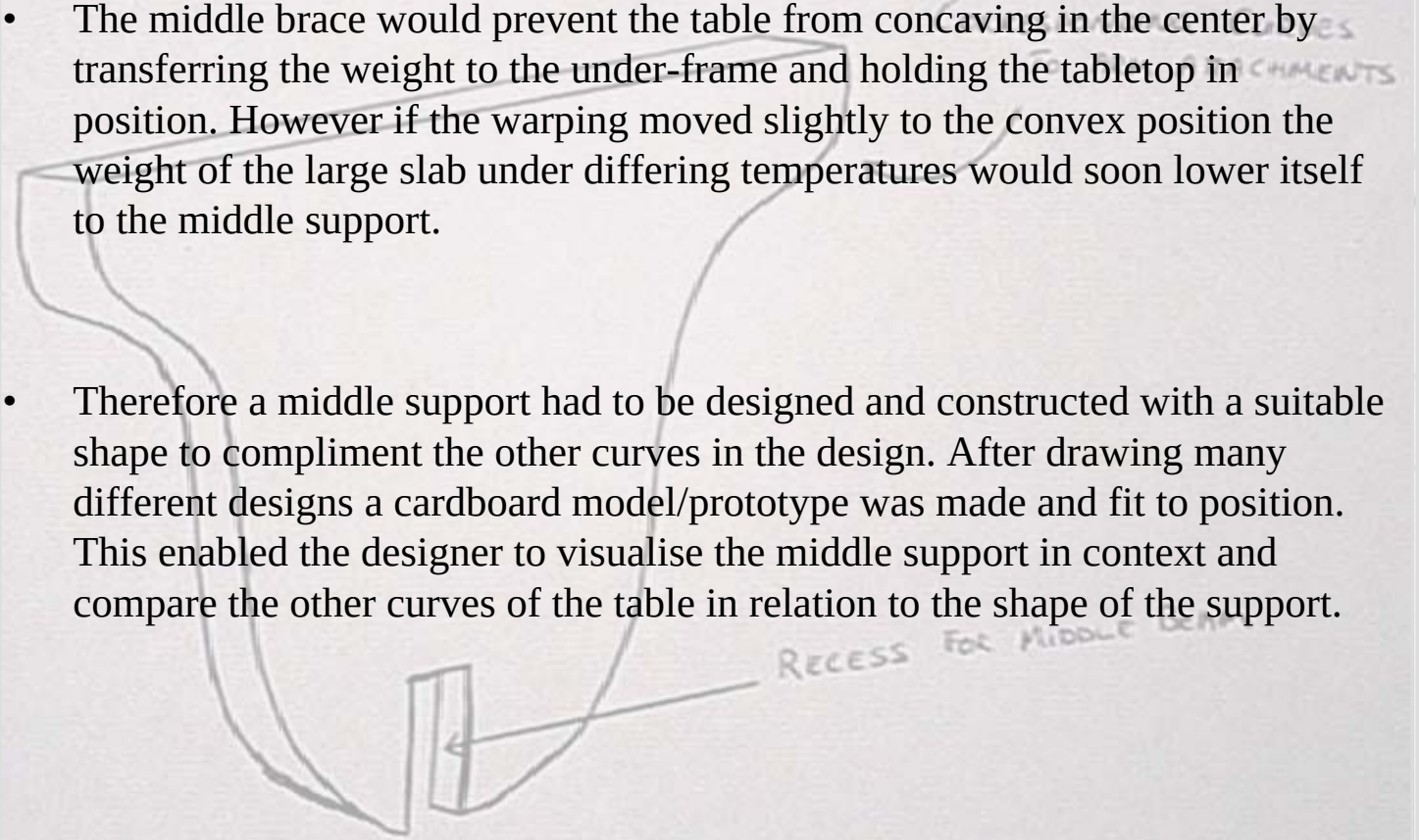
Middle Support

- The middle brace would prevent the table from concaving in the center by transferring the weight to the under-frame and holding the tabletop in position. However if the warping moved slightly to the convex position the weight of the large slab under differing temperatures would soon lower itself to the middle support.

- Therefore a middle support had to be designed and constructed with a suitable shape to compliment the other curves in the design. After drawing many different designs a cardboard model/prototype was made and fit to position. This enabled the designer to visualise the middle support in context and compare the other curves of the table in relation to the shape of the support.



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- The cardboard design was chosen because of the similar curves that were incorporated into the design such as the arms and the underframe beam. These curves therefore suited the overall design of the table and contributed to the visual flow of design.

- The cardboard prototype was then traced onto a piece of Redgum and cut out using the bandsaw and shaped on a fixed belt sander to generate the curves.

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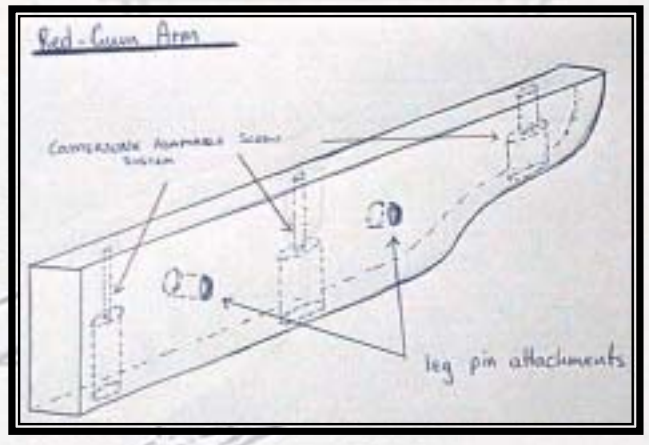
Fixed arm attachment:



- Slabs of Native Australian timbers can easily warp and bend if not stored in a way to discourage this movement.
- In order to prevent this from happening to the two tabletop slabs in this particular design it became necessary to develop a solution.
- Furthermore the width of the slab tops were too wide to sit on top of the legs alone and so extra support was needed towards the outside edges.

One simple solution was to brace attachments onto the underside of the slabs while being stored or transported. However this becomes impractical when considering this process on number of similar tables, that is if the table went into production. It was therefore necessary to integrate this brace into the design itself without taking away from the natural beauty.

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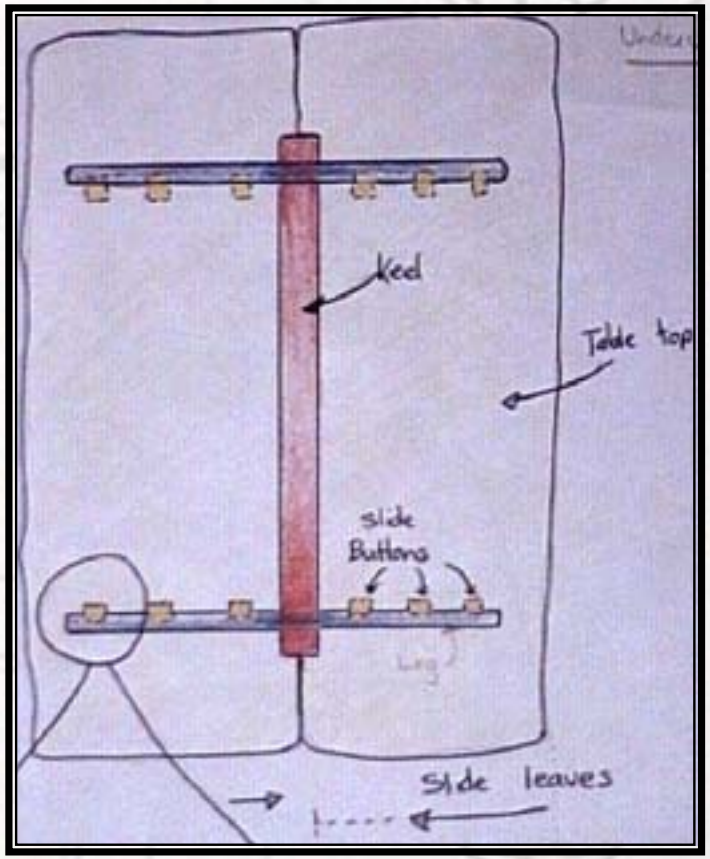
Different solutions were designed and the final design incorporated an arm attachment at each end of each slab. The finished design did far more for the table than originally planned For example it,



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- Provided the extra support needed as the slabs greatly overhung the legs.

- Balanced out the design both physically and visually with respect to the overhanging tabletop

- Served the prevention of warping and cupping in the timber during storage

- Enabled a new simplified and faster process for attaching and detaching the tabletops to the legs using pins (the previous method used button attachments screwed into the underside of the table – a time consuming assembly/disassembly process)

Home

Materials

Timber:

The timber researched for the project included only Native Australian Timbers;

➢ **Redgum**	➢ **Jarah**
➢ **Stringybark**	➢ **Murtle**
➢ **Applebox**	➢ **Black Heart Sassafras**
➢ **Redbox**	

- To research these timbers the designer visited wood galleries in the region and saw the furniture of local producers in local settings such as cafes and pubs. The majority of these works were made from Redgum and the simple reason was because of its natural beauty in comparison to the other available timbers.

Click for interview with Andrew Colquhoun

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The result of the search was the choice of River Redgum for the project because;

- Redgum is often riddled with fiddle-back, gum-veins, natural flaws and is itself a captivating, divine artwork.

- The cost of River Redgum is relatively lower than other timbers not from this region (eg Murtle, Jarah, Sassafras)

- The durability of Redgum although not much different to the other Hardwoods, far outweighs other softwoods (eg Murray Pine)

- It is a locally used timber and the product, if marketed internationally would represent not only Australia but this Upper Murray Region

- The name River Redgum Alternative is appealing to the designer/producer as it is suggestive of an exotic timber. This would be a valuable selling point when marketed nationally or internationally.

River Redgum was therefore chosen and purchased from Kelvin Barton of *Barton Furniture* in Kiewa.

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Kiln Dried/Air Dried:

Talking to Andrew Colquhoun, Charlie French and Kelvin Barton, professionals in the industry of Hardwood Furniture production, allowed the designer/producer to come to the following conclusions.

When purchasing Native Australian Timbers for indoor furniture it is important to have the timber Kiln Dried. This process involves reducing the moisture levels in the wood to below 9 or even 7 percent by placing them in a warm and dry environment.

Without the moisture in the wood, the slab has less chance of moving and buckling in the normal environment of the furniture.

Click for interview with Andrew Colquhoun

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This process becomes crucial for indoor furniture if it were to be sold, as a warped table can leave a very angry and unsatisfied customer.

Before Purchasing the wood, research therefore had to be done on costs of Kiln Dried wood and locations of available timber suppliers.

The four major suppliers in the area were;

- Ryan & Mcnaulty in Benella
- *Frenches Furniture* in Culcairn
- Vin Doolan in Rutherglan
- *Barton Furniture* in Kiewa

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After contacting these suppliers and visiting each one individually it became evident the Kelvin Barton's Timber was the most appropriate for the design task. This was a result of

- Considerate student pricing
- Wide range of available good-quality timber
- An approachable and helpful supplier (Kelvin Barton)

After purchasing the Kiln Dried, chainsaw-cut timber, Kelvin offered to transport the materials, at no extra cost to *Timbershed Furniture*, the decided location for industrially surfacing of the slabs.

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Timber Finishes:

A wide range of finishes are available for timber furniture and the only way of discovering the best is to seek advice from those who have used different finishes over years of experience.

Different advice however came from each professional;

- Kelvin Barton from Kiewa uses a two-part epoxy resin over the whole table to completely protect the table from scratches, heat damage, splintering and give it an extremely durable finish. With the epoxy finish choices are available for a gloss finish or a matte finish.

- Andrew Colquhoun from Tallangatta uses only natural oils and waxes for his furniture such as tongue oil and bees wax. These type of finishes give a dull lustre and deeper look to the wood and grain structure. However an oil/wax finish need up-keep depending on use and abuse.

- Kurt Peele from Yackandanda uses both, epoxy to fill natural holes in the timber and oil/wax for the rest of the piece. This combination allows a finished piece to have natural holes that can be seen into and also a deep, dull lustre over the rest of the timber.

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Pros and Cons of finishes

	Pros	Cons
Two-part Epoxy	➢ Strong Durable Protective Finish ➢ No up-keep necessary ➢ Clear finish	➢ Unnatural – poisonous while liquid ➢ Prohibits user interaction* with product ➢ Can be an overpowering finish in comparison to a wax
Natural Oil/Wax	➢ Natural, non-carcinogenic product ➢ Stimulates user product interaction * ➢ Permits natural odours off wood, wax and oils. ➢ Warmer softer look	➢ May need a re-wax or oil after 5-7 years ➢ Not a very strong finish – allows timber to dent and scratch

NB: Products are similarly priced

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Finishing Techniques

Matt Finish:

This requires rubbing the surface along the grain with flattened grade 0000 steel wool. Hold to the light to make sure shine has been removed then wipe wax on to a cloth and rub in to the wood with a circular motion. Leave overnight then Burnish surface with a clean soft cloth.

Satin Finish:

Fold 000grade steel wool into a pad and load with beeswax. Rub along the grain with moderate pressure. Turn the pad over and remove the residual wax with the other side of the pad. Finally with a clean cloth buff the surface to the required sheen.

Gloss Finish:

Rub a block of wax and abrasive powder back and forth against the rotating linen mop of a burnishing machine. Hold the work lightly against the rotating mop. Regularly replenish the mop with wax. Finally polish with sheepskin mop.

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- **User Product Interaction –** Redgum tables have many features (ie. Holes, grain structure, imperfections etc.) which provide interest for the user and often result in a physical user-response such as touching and feeling the textures of the wood.

  Having an oil/wax finish allows the user to experience the texture of the timber where as an epoxy finish covers all such features and only allows visual interaction for the user.

After careful consideration of these properties the combination of epoxy and oil/wax was chosen. This combines the better aspects of User Product Interaction with practicality.

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Tools & Machines

Surfacing:

Surfacing is the process of removing wood from the exterior of the slab to produce a uniform, homogenous surface. There are many ways to surface a slab, some more effective than others.

- Machines are available to facilitate timber surfacing, for example the Portable Belt Sander. The belt sander revolutionised hand sanding because if its speedy removal of wood. As a result of the speed however, the belt sander could often do more damage than help to a piece of timber. This form of surfacing is also very inaccurate because of the size of the belt sander, as it would pass over abnormalities smoothening them down rather than correcting them.

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- The Electric Plane is another tool used for surfacing, though it too is very inaccurate and when using Australian Hardwoods. The blades do not stay very sharp for long and they can often tear the grain, if this happens much work is need to remove the damage caused.

A Drum Sander is another process for surfacing timber slabs, it was an option because a local furniture company offers this service. A Drum Sander is a large machine through which the whole slab passes and is surfaced using low-grit (60) abrasive.

Although this is a lengthy process, there are many benefits in using the Fixed Belt Sander such as; uniform shaping of the surface, no risk of tearing the grain, considerably faster than hand/portable-machine sanding and can be sanded to 120-grit.

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- Drum Sanding was the method used for surfacing the Red-Gum-Slab table because; it was a locally available process, the time saved when comparing to belt or hand sanding outweighed the cost of having it surfaced, it left a satisfactory 120-grit finish, the work was done in a clean dust-free environment. Professionals in the industry advised this method at the time of the decision.

- Drum Sanding saved many hours of work using an electric plane or belt sander that may have amounted to an unsatisfactory result.

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Cutting & Shaping Tools and Techniques:

Many different cutting tools and methods were experimented with and used throughout the project ranging from router-cutting to Japanese Dozuki-saw cutting, they were as follows,

After using the Tenon saw for shaping the tenon at one end of the underframe beam another process was researched and found, that was the highly accurate Japanese Dozuki saws. These saws allowed precise cutting which was crucial as the whole substructure of the table depended on these joins.

The Dozuki Was used again for shaping the mortices in the legs and cutting a recess for the middle support.

Two options were available for shaping the slabs, the portable circular saw or the Jigsaw. The shape to be cut was a curve and therefore the Jigsaw was chosen as it could handle the shape and movement with more precision than the portable circular saw.

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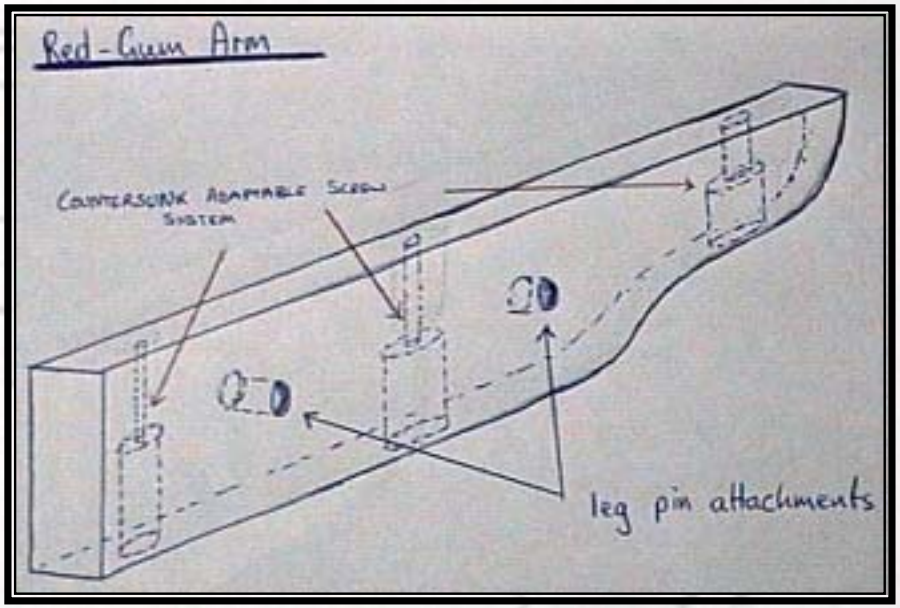
Countersinking:



- In order to attach the arms to the slabs a process called countersinking was involved as the stainless steel screws needed to be in a dignified position.

- This involved seeking professional advice from Andrew Colquhoun and even using his equipment.

- Andrew had the machinery at his workshop to carry out this important process in the best possible way.

- The importance of this process was not in the countersunk holes but in the unique shape of these holes. As with all Native Australian Timbers the design of Redgum furniture needs to enable movement in the timber. These holes were cut in a way to facilitate horizontal movement by the screws and thus allowing movement of the tabletop depending of atmospheric temperature and humidity.

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Other minor techniques were tested and experimented such as

- Routing the mortise in the legs
- Rasping a small radius on almost all the edges
- Sanding techniques
- Finish application techniques (ie. Oil and wax application)
- Cutting techniques (eg Bench saw, Radial arm saw)

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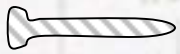
MATERIALS LIST

Material	Quantity	Dimensions	Basic Shape
Top Slab	2	(Approx) 3.12m X 0.61	
Legs	2	0.75 X 0.68	
Arms	4	450 X 100 X 40mm	
Middle Support	1	200 X 170mm	
Wooden Pins	8	110mm	
Stainless-Steel Screws	12	70mm	
Stainless-Steel Washes	12	12mm	

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	Quantity	Price	Purchased @
Timber	---------	$ 750.00	Barton Furniture
Surfacing	3 hrs	$ 130.00	Timbershed Furniture
Organ Oil	1 L	$24.75	Mitre10
Pure Gum Turps	500mL	$5.71	Mitre10
Epoxy Resin	500mL	$19.18	Mitre10
Hardener	200mL	$10.81	Mitre10
Stainless Steal Screws + washers	15	Donated by Andrew Colquhoun	Tallangatta
Redgum Dowel	1.5m	Donated by Andrew Colquhoun	Tallangatta
Carnauba Wax	500gm	$30.31	Wod. Paint Center

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Final Design Construction

Construction of The River Redgum Alternative

Purchasing The Timber

Researching timber suppliers revealed that the ideal supplier for the chosen design was Kelvin Barton.

A trip to Kiewa was made during March and two ten-foot Redgum slabs were purchased along with another smaller, one and a half metre slab for the legs. These pieces were chosen by the designer from a large collection. The purchase price of $750.00 included any other timber that was necessary for the production of the table and later that week Kelvin delivered a middle support-beam-slab and a piece from which the arms were to be made.

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Surfacing

After consulting Kelvin Barton and Andrew Colquhoun the decision was made to surface (ie. Shape the top for a smooth, flat surface) the timber tabletops and support beam at *Timbershed Furniture* a local Furniture company with a greater range of specialised machinery than the school.

As Kelvin had delivered the timber the was a relatively simple task.

The process involved two people to lift the large slabs and feed them into the Drum Sander, because the drum lowered at a fraction of a millimeter each pass this was a time consuming and repetitive task.

In order to help cut costs the designer inquired about being involved himself, this was welcomed and appreciated.

The involvement not only cut costs and helped out the workers but it also taught the producer a new process used in industry.

The price of surfacing was greatly discounted because of the student position and a total of $130.00 was paid, this was very much appreciated.

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Manual Surfacing of the legs was decided upon as the material and labor costs for the project were far from complete.

This process involved a portable Belt Sander, two 80’grit belts, a 120’ grit belt and an orbital sander with 180’grit.

Months after the surfacing had been completed for the table a new process was discovered that had recently revolutionised the surfacing process specifically in Australian Hardwood. The surfacing machine is called the *WoodWizz* and has taken Native Australian Furniture Production to new heights because of the time efficiency.

(More information on this product can be found on the Industrial/Commercial Setting link on the Home-page)

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Planning & Preparation

Preparing the legs and middle beam for cutting mortices and tenons first involves cutting them so they have a parallel top and bottom. This means

- Measuring to find the middle of both ends
- Drawing a vertical line
- Drawing a perpendicular line to this as close to the top and bottom as possible
- Finally sawing off along the line then planing for a parallel finish.

These steps illustrate the planning and preparation involved before making each cut.

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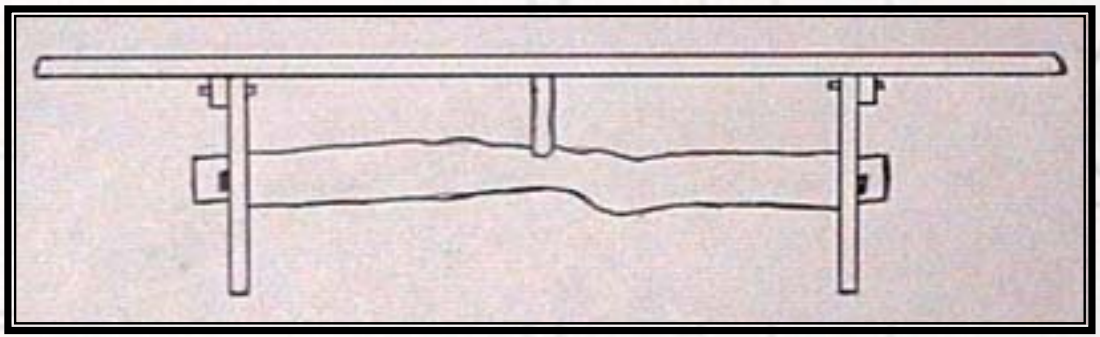
The Legs

Cutting the mortise in each leg was done with a router, a Japanese Dozuki saw, a chisel and a rasp.

This involved

- Preparing a jig for the router to follow. This was made from pine as it is easy to work and was appropriate for the task.
- Clamping the jig to the leg
- Slowly routing around inside the jig so as not to splinter the wood.
- Sawing precise 90 degree angles with Dozuki
- Chiseling out the final shape
- Rasping the corners and edges for a uniform finish



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The Tenon

The Tenons were first cut using the radial arm saw this involved multiple trenches to be made using the blade then removal of these with a chisel. This was then sanded with course sandpaper and shaped according to the corresponding mortise with a rasp, a lengthy process.

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Wooden Block – Pins

These were made to secure the substructure in such a way that there would be no or minimal movement.

They were simply made from leftover cuttings from the support arms.

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Sanding the Slab

One of the longest, time consuming processes in the Redgum Table was sanding the slabs. This was done with an orbital sander and many pieces of sandpaper. The process was time consuming because of the density of the timber.

One piece of sandpaper on the orbital would last only ¾ of a square meter before it no longer bit into the wood. This meant sanding out imperfections such as deeper chainsaw marks took a considerable amount of time and energy.

After the entire slabs were sanded to 180’grit they were moistened with a cloth. This process allows any fibers that were not cut but were instead pushed down during the sanding process to absorb the moisture and rise above the surface to be cut off.

This technique was used for all the timber slabs and took much time and patience.

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Cutting the Slabs

After the sanding process was complete to 180'grit the slabs needed to be cut and shaped in a way that they could be joined. Much thought and planning went into this as can be seen in the Experimentation/Testing section.

The results of testing led the producer to cut off one natural edge from each slab while maintaining a similar curve to its pair. This involved bending and clamping a piece of steal to the slab and drawing on a curve.

The curve was then cut using a jigsaw as it could follow the curve leaving more of a natural look than a circular saw.

It was important to the designer/producer that the curve wasn't a perfect looking shape but flowed in a similar way to its natural-edge pair. This allowed the design to be unique in the same way each piece of timber is also unique.

The End Grain

Often one of the most dreaded processes in hardwood timber furniture is shaping and sanding the end grain. This is the hardest part of the timber because of the structure of the cellulose fibers.

Initially, sanding seemed too slow and the producer began planing however this damaged the wood further by tearing the grain. Sanding with 80’grit then 120’ and 180’, although slow, was therefore the only reliable process for this tedious task.

End Grain

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The Arm Attachments

The expertise and equipment for the arm structure, after much research, was supplied by Andrew Colquhoun. He offered his equipment and knowledge to help with the arm attachments and concept of the adaptable screw design.

This involves the horizontal movement movement of the screw to allow the slab to expand and contract with atmospheric temperature fluctuation. Without this, the table can break, or tear the screw from its holding position.

Process:

- The arms were each marked out with holes for the pin attachments and the countersunk screw holes
- The countersunk holes were drilled from the underside of the arms using the drill press with horizontal plane movement, this enabled the holes to be elongated.
- Then the screw holes were drilled through the topside of the arms using the same process.

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The arms then needed to attach to the legs so,

- After clamping the arms in position on the end of the legs, a portable drill press was used to drill eight holes through both the arms and the legs

- Redgum Dowel was cut into 110mm lengths and the ends were shaped on a vertical drum sander.

- This 19mm dowel further needed sanding to fit into the pin holes and this was done by hand sanding each piece.

- Holes were then drilled in the underside of the slab with a portable hand drill for the arm attachments.

Home

Middle Support

The middle support had to be picked up from Barton Furniture as it had not yet been designed when the slabs were first purchased.
After being given generous amounts of timber for the middle support a video interview with Kelvin Barton was carried out.

Click to view movie

The middle support was cut out with a design template that is specified in the Experimentation/Testing section and shaped using a fixed belt sander.

A recess had to be cut in the under-frame beam for the middle support to connect to. This was cut using the precise Japanese Dozuki saw and later shaped with a chisel and rasp.

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Epoxy or *Timbermate*?

Click for interview with Kelvin Barton

Towards the end, the natural holes on the Redgum slab had to be filled up to prevent foreign materials to enter and cause rotting.

There were two major choices for this Black *Timbermate* Putty or clear two part epoxy. Although the Black *Timbermate* was waterbased and non toxic, the clear epoxy appealed strongly to the designer as it stimulates interest and user-product interaction.

Therefore the epoxy was used. After mixed it was applied with a syringe into some of the larger crevices.

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- Injecting glue into holes using syringe

- The designer/producer wanted some of these natural holes left in the timber as this allows users to feel the natural textures of the timber and again promotes user-product interaction.

After the glue had cured it was removed firstly with a razor for the larger amounts then it was sanded down with 320’grit paper and finally 600’grit.

This evidently left a satisfactory clear and smooth finish.

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Finishing

Before a finish could be applied, a final re-sanding had to done over the entire table and dangerous edges needed to be transformed into smooth corners. This involved

- Rasping sharp splinters in natural edges
- Re-sanding over all timber surfaces, 320’ > 600’grit

Finally a finish could be applied this was firstly a pure gum-turps mix with *Organ Oil* 1:3 then an O*rgan Oil Interior* coat was applied with 800’grit sand paper

After the Oil had cured a *Feast Watson Cornauba Wax* was applies with flannel and buffed with a sheepskin buffer attachment to a power drill.

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Industrial/Commercial Setting

Surfacing of Chainsaw-Cut Timber:

Many of the processes used in the construction of the design were those used in industry. This was because the design forced production parameters outside of the schools facilities. The surfacing process has been chosen because of the large surface area that a project like a ten foot Red-Gum-slab table has. Surfacing is the process of removing wood from the exterior of the slab to produce a uniform, homogenous surface. There are many ways to surface a slab, some more effective than others.

Initially timber slabs had to be surfaced by hand sanding, this was an extremely long, exhausting process, and for pieces ten feet long would have been non-existent. However, technology has allowed this process to become possible and nowadays relatively simple.

- In industry, many timber furniture manufacturers use the Drum Sander as a method for surfacing their tabletops and burls.
- However, after talking with Andrew Colquhoun, a professional in Australian timber furniture manufacturing the designer learned of a new process undertaken for surfacing timber, and was introduced to Lez Owens, the designer and manufacturer of this new machinery called the WoodWizz.

•The locally designed and produced *WoodWizz* has had a revolutionary impact on the process of surfacing and dressing timber slabs.

•A manual timber-surfacing machine that produces a precise cut on all timbers regardless of size, shape, thickness or grain character.

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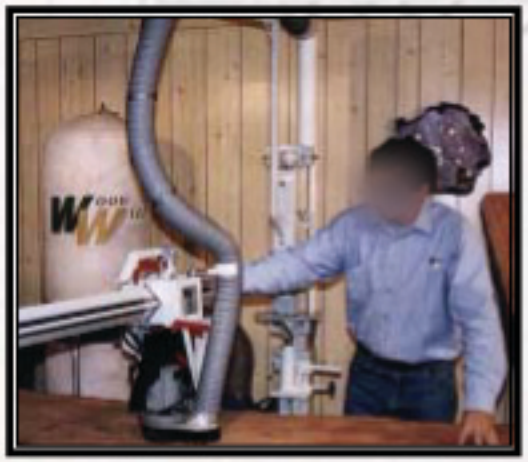
•It is essentially an overhead radial arm routing system consisting of a vertical stand that supports an articulated arm.

•A router attached to the end of this arm can be positioned at any point in the horizontal plane.



•The workpiece is secured on a frame below the router and the arm lowered so that it can cut the first skim from the highest areas on the slab.

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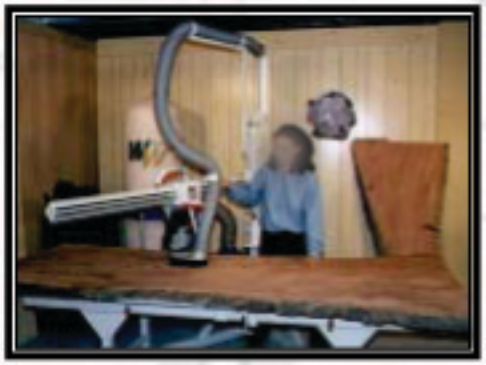

- Upon interviewing Les in his Thurgoona showroom it became clear that the Wood Wizz has been on the market for little under three years and has undergone many changes. As well as having a large Australian Market, Wood Wizz Machinery Pty Ltd now successfully exports their product throughout the United States of America.

- In this picture the dust extractor is not fitted to the Wood Wizz

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Final Evaluation

For a thorough evaluation of the Redgum Slab Table it is necessary to refer to the *criteria to evaluate success* and *purpose* which are as follows;

Success Criteria	**Purpose**
Does the design incorporate both appropriate and balanced dimensions?	To open and/or expand international interest within Australia and the relatively small industry of Traditional Hardwood Furniture.
Is the table strong and durable?	
Does the design accommodate simple transportation methods?	To create a successful international market for small local operators by advertising a new and innovative product.
Does the table display evidence of creativity?	
Is the table aesthetically pleasing?	The design will reveal the natural beauty and unique characteristics of Australian Timbers through the production of creative furniture.

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It is evident that the final design incorporates balanced and appropriate dimensions. This can be seen when viewing the table from different angles.

The spacing between the legs and middle support greatly contribute to the overall balance of the table as these separate the table into a symmetrical shape with four equal quadrants.

The other major contribution to the overall balance of the table is the Tabletop. Although it is not a perfectly machined shape its original shape reveals a more natural balance rather than a fabricated balance.

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These two major balance factors therefore combine a handmade balanced design with the natural balance of the Native timber and this reflects the purpose;

To reveal the natural beauty and unique characteristics of Australian Timbers through the production of creative furniture.

- ***International Consideration:*** *The table stands a fraction under 770mm high. This is still within the standard height (70-80mm) however towards the higher end. Designing the table like this allows for adjustment depending on the purchaser. For example on the purchasers request the relative height can be adjusted to suit their needs*

The Durability of the table can be tested by applying pressure in key points on the table such as

- Pushing the end
- Pushing the side
- Applying top pressure to the end, sides and side edges

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Simple and quick assembly of the table is a major design feature. The following movie reveals the assembly process of The River Redgum Alternative in its *Natural Environment*

Click the Screen to view table assembly

Home

An important success point for the table is the simplicity of design. When the need for transportation arises, the design is easily dismantled and ready for storage or transportation.

Dismantling the table simply requires

- Removal of the slab-top-attachment-pins
- Removal of top (ideally stored facing each other)
- Removal of the substructure pins
- Then dismantle the substructure

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Creativity of design is evident throughout the entire product. From the tree's ***original edges*** and the ***naturally shaped center beam*** to the ***international market strategy*** and ***interactive CD presentation (with <u>online</u>, website capabilities).***

The natural edges reveal a unique perspective of the table and its original environment this idea was decided upon from early on in the design process as the designer new the aesthetic beauty and creativity that this feature would display.

The naturally shaped beam again captures the original environment and natural freedom of the Native Timber. It suggest an alternative approach to furniture making, integrating the natural features and designs of timbers with contemporary methods of construction.

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An International Marketing Strategy proved to be a contemporary form of presentation for the River Redgum Alternative.The success of this presentation reveals greater possibilities including a new perspective for the industry.

Interactive CD Presentations promote user product interaction and reveals a modern approach and **use of emerging technologies.** Furthermore, by developing a CD the presentation of the design solution can be viewed by a far greater audience because of the versatility and ease of reproduction.

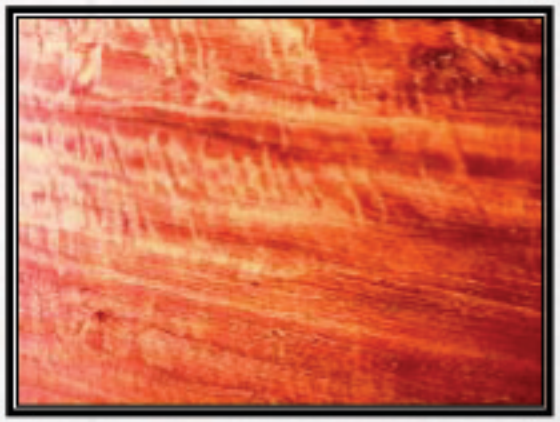
Home

Aesthetically pleasing?

A single glance at the River Redgum Alternative answers this question. The eye capturing beauty and representation of the table in its natural environment stimulates a desire for detailed perusal.

All of the previous criteria combine to justify the aesthetic success of the River Redgum Alternative. Furthermore, the creation of international interest and an international market can only begin after the assessment of the design and presentation and therefore is unable to be included.

Although the workmanship and design successfully compliments the native timber, the beauty of this piece far more credited to the natural splendor of the timber, with gum-veins and native imperfections it is itself a captivating divine artwork.



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Impact on Society & Environment

The River Redgum Alternative can be seen to have a both positive and negative effect on our society, however the latter effects are considerably outweighed by the former.

The major negative impact that can be understood is the use of Native Australian Timbers. This is an important consideration as we in Australia have seen the negative effects of deforestation in places like Tasmania.

However the production of this unique style of furniture is in many ways limited by the properties of the timber itself along with the production processes. The furniture is unique because it is handmade and mass production is improbable because of the high labor costs and low returns.

Although the River Redgum Alternative suggests a widening market and more realistic sales values, production of this high quality furniture will always be determined and limited by those in the industry and their traditional processes. This will therefore prevent mass deforestation from this particular industry.

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The ***River Redgum Alternative*** has many positive effects on our society and even on our environment.

The production of similar Native Furniture in the local industry does not involve clearing bushland and felling huge amounts of trees. It is in fact illegal to remove any tree without a reasonable justification to the local council.

The local producers have two major ways of acquiring timber,

- Timber that has already fallen

- Acquiring timber that has been felled by council projects (eg. road building, land development)

The timber used for the *River Redgum Alternative* was originally acquired from a council project and is therefore a form of recycling by making use of a waste product.

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- The international target market scheme for the River Redgum Alternative is a way in which Australia can be recognised for fine, high quality, unique furniture.

  This scheme will be very beneficial for Australia's Image and reputation on the International trading scene.

- The finishes used on the Redgum are natural oils and waxes these encourage environmentally friendly practices and processes and do not support environmentally degrading products.

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Furthermore the River Redgum Alternative introduces to the consumer an organic form which allows them an appreciation of natural products rather than synthetic products. Synthetic products are in most cases mass produced and this is an environmentally degrading process.

Click for interview with Andrew Colquhoun

However the native timber furniture formed in a way that is both environmentally friendly and sustainable, this is a result of the small production structure of the furniture businesses.

- Consumers of these Native Furniture products are supporting environmental sustainability and **not** commercial harvesting of timber forests.
- The production of this Native Australian Furniture therefore has a positive effect on society and the environment.

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Gallery

Other Australian Timber Products made by the Designer

Buffing the timber with a lambs wool buffer mounted on a power drill

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The Fantastic Support Crew included;

Anthony, Dan, Arnie, Matt ,Matt, Kimmy and Janelle

Tom Docking and Kelvin Barton next to the Murray river

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Disassembled and ready for storage

Transportation of substructure

Home

Construction crew
hard at work

Home

Credits

Andrew Colquhoun

– Donating time, materials, personal opinions, constructive criticisms, ideas and a great deal of enthusiastic support

Kelvin Barton

- Providing quality timber, considerate pricing, helpful advice,

Amos Sanzo

- Editing videos, donating time and expertise, CD burning

Gavin Fletcher

- Providing continual support and motivation

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John & Margaret Docking

- Financial and construction support

Anthony, Dan, Arnie, Matt ,Matt, Kimmy and Janelle

- Supporting and helping construction and transport

Claire Dalby

- Table Photography

Matt Fowler

- Video Camera donation

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