

The Plan of Action:

The Project would span over a time periods of twenty-two weeks, beginning in December till April. This time frame has been divided into three phases, each broadly concentrating upon the steps of design process.

Phase 1: Identification + Research

(Duration: 4 weeks)

- 1. Material Research:** an in-depth study about the pine needle, its properties and its relation with the environment, mostly done through second hand sources.
- 2. Adhesives Study:** Gaining primary and secondary information about natural adhesives and binding agents: through books, internet and personal visits at the research centres.
- 3. Machinery Research:** Study of different operation to be performed by different machinery and finding a low-tech solution for the same.
- 4. Market research:** trend study, competition study, consumer study and promotion study.

Phase 2: Analysis + Solution Development

(Duration: 8 weeks)

- 1. Machinery development:** Developing low-tech machinery to conduct experiments and make prototypes and products. The basic line of machinery comprises of a shredder and a compressor.
- 2. Product development and prototyping:** Designing suitable moulds in different designs.
- 3. Mould testing:** Testing the possibilities of different moulds for different products.
- 4. Product analysis parameters:** Utility, Aesthetics, Ergonomics, Economics, User testing, quality check and Product Colour/variations/-details.
- 5. Adhesive testing:** finding out the best suited natural binder and testing the strength of the same for different products and purposes.

Phase 3: Improvement/Re-design

(Duration: 10 weeks)

- 1. Improve products according to the market:** After studying the market our design will be revaluated to fit the market and demands.
- 2. Refinement of machinery and moulds:** The machinery will be given a concrete form and made fit for the production process on a small scale.
- 3. Development of collections:** A total of two collection of five products each would be developed.
- 4. Test Marketing:** Products will be kept in actual stores to study the buying behaviour in real life conditions.
- 5. Promotion:** Through online portals and blogs, Exhibitions and social media.
- 6. Compilation of the document:** The entire project will be simultaneously documented and compiled at the end of the plan to give a detailed overview.



Surveys and Interviews:

To understand the depth of the problems, interviews and surveys were conducted as a part of the research with local communities of artisans, concerned authorities and self help groups (SHGs).



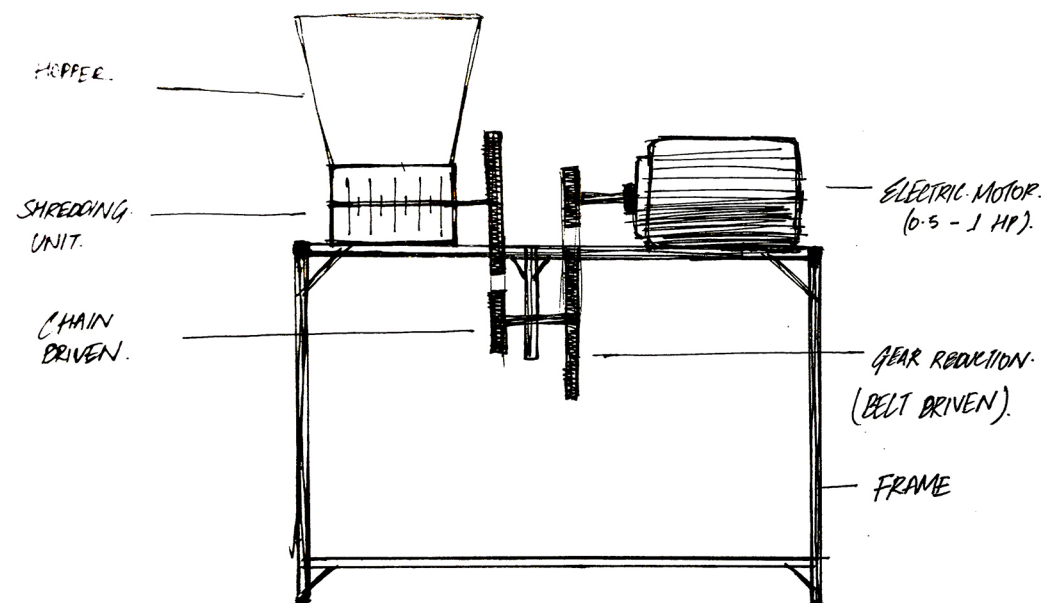
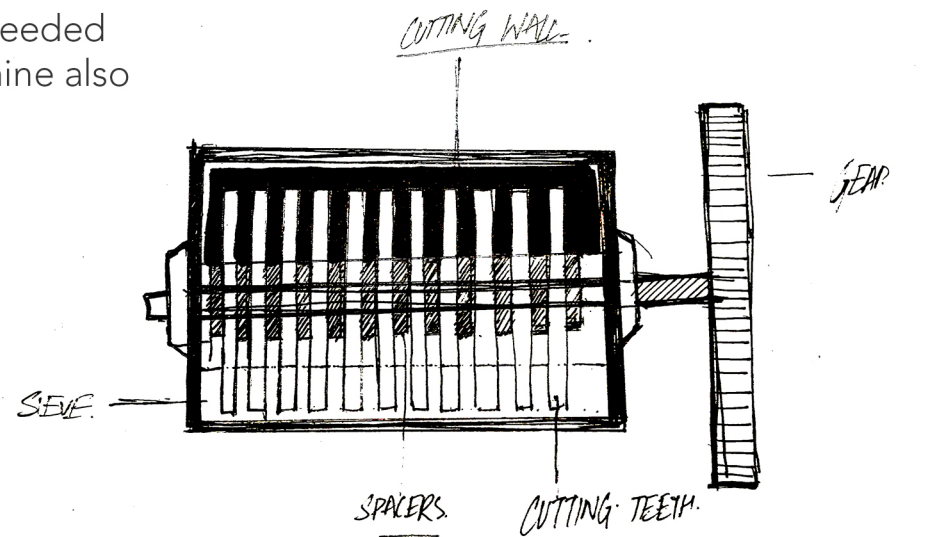
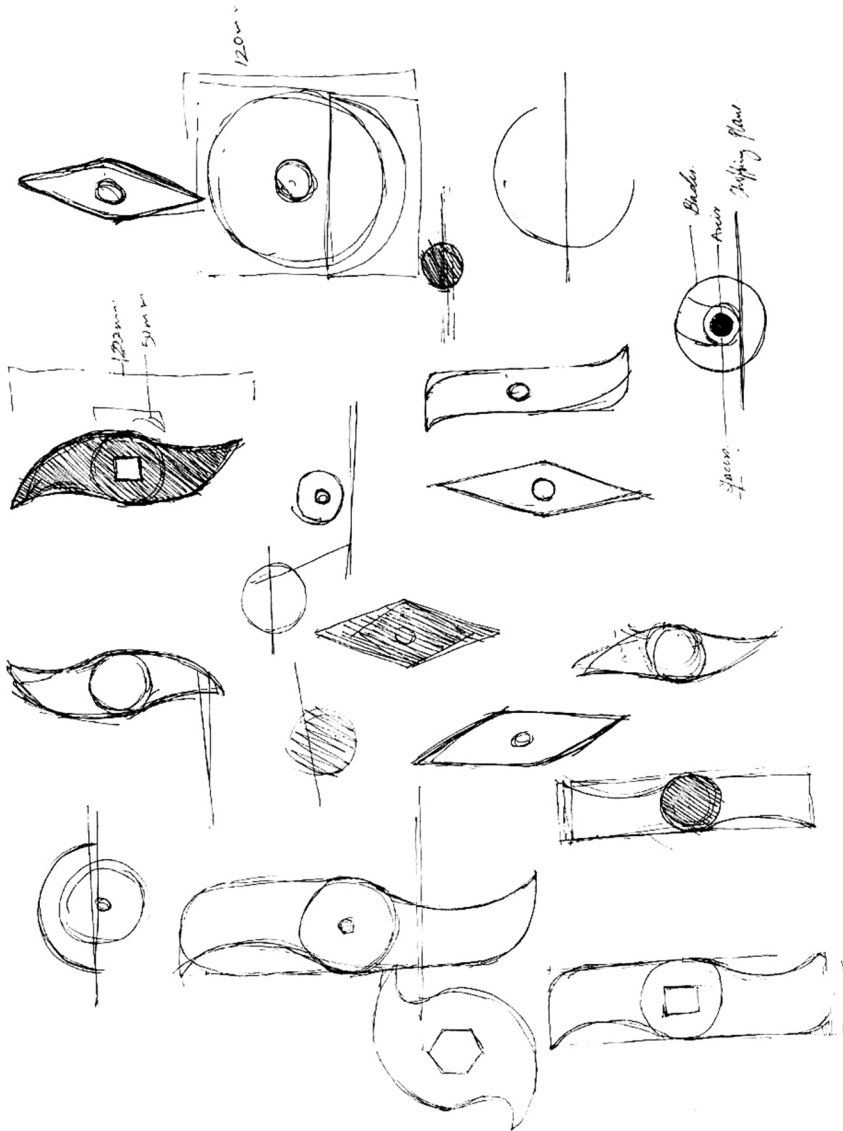
Early Shredding Experiments:

The shredding experiments were done through kitchen equipments used in almost every household of Himachal Pradesh. 'Saag Cutter' used cutting leafy vegetables and 'Chilly Cutter', as the name suggest used for cutting chillies and onions.

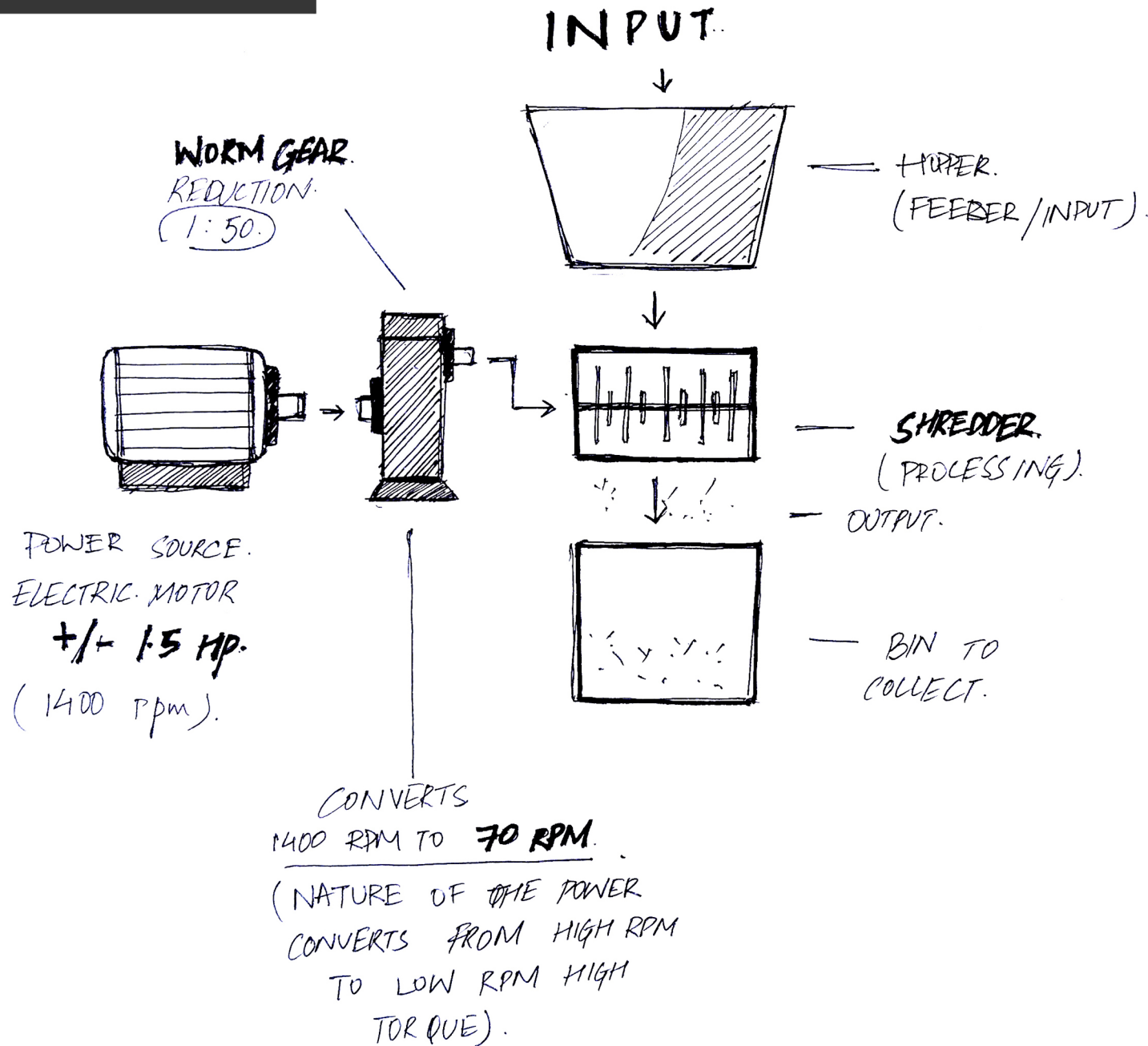


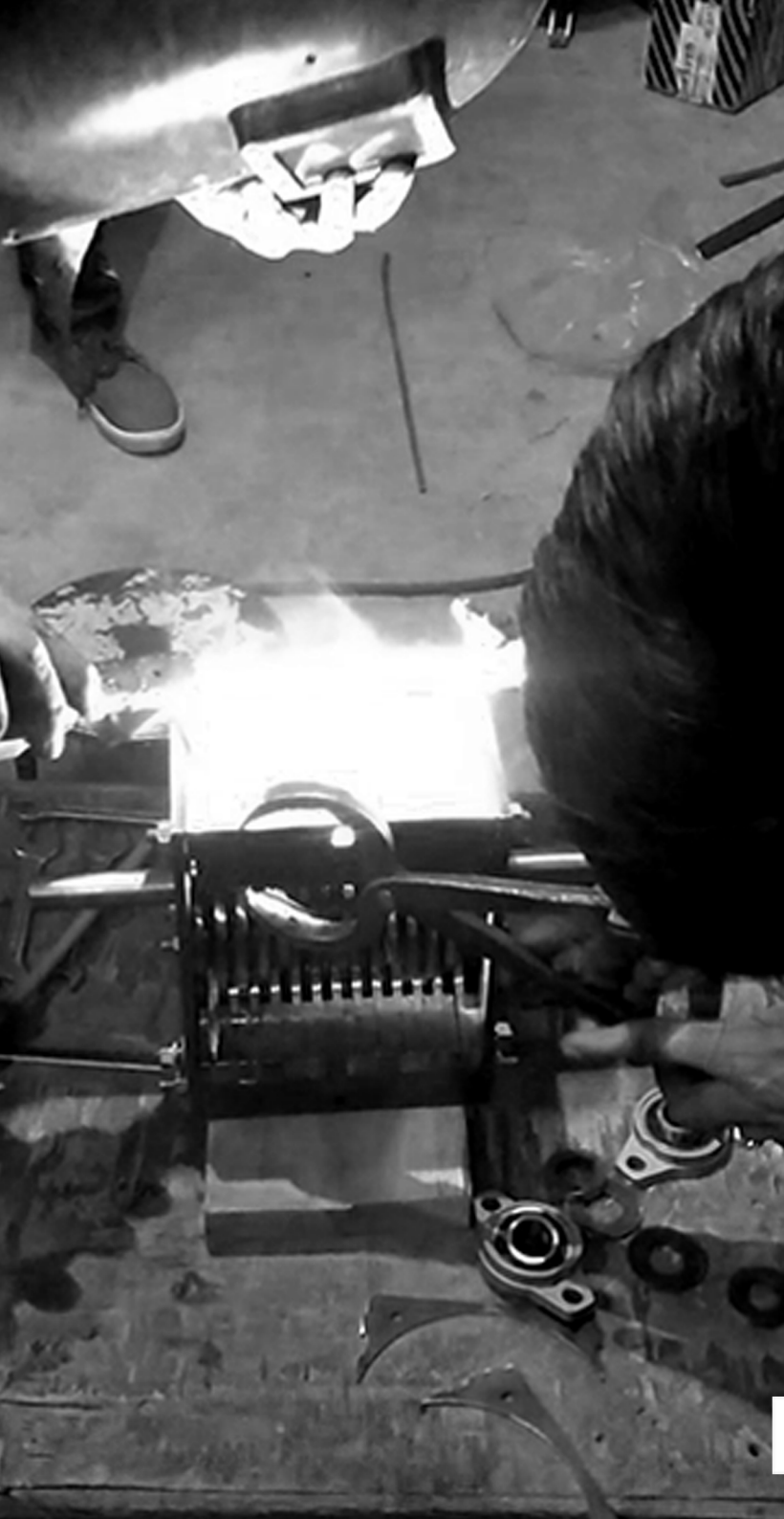
Pine Needles Shredder Ideation Process:

Even though open source plans were available, the shredder still needed to be recalibrated to shred pine needles. Some parts of the machine also needed substituted due to lack of resources in the region.



Workings of the Shredder:





Building the Shredder

Experiments with Natural Dyes:

One of the experiments conducted was of dying, but keeping it true to the principles of the project. Ingredients like tumeric and beet root were used to achieve completely natural colors.



Workshop With Artisans:

The objective of the workshop was to create a collaborative environment that facilitates mutual exchange of knowledge and learning.



Material Experiments and Object Design:

A series of objects and explorations made with the pine needle bio-composite demonstrates the different properties that could be achieved with the material like: Strength, flexibility, rigidity, formability, modularity etc.



