



## **MODERN ROCK (STONE) WOOL MANUFACTURING PROCESS**

Stone wool insulation has been manufactured since the 1930s in a wide range of forms and quality.

The product as it was first made was essentially an un-bonded, coarse form of loose wool which was manually collected and packed into bales for use in industry. This progressed to stitching the loose fibre to wire mesh and to various facings which completely enveloped the loose wool. Over the years technology was introduced into the fiberization process, fibre collection, binder application, curing and packaging. Today Rockwool Group is acknowledged as the world leaders in stone wool manufacture and technology.

### **EVOLVING TECHNOLOGY**

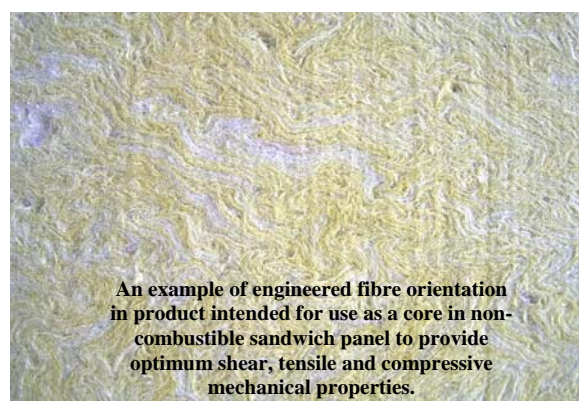
Since the development of the stone wool making process in the 1930s with every innovation came a significant improvement in product quality. Following are some of those key developments:

- 1950s Heat-curing binders and water-repelling agents introduced. Spinning technology replaced steam-blast method as a means of fiberization. The first 4 wheel spinner provided better levels of fiberization, yield and quality. Method developed for making lamella mat pipe and duct wrap
- 1967 Pendulum or "lapper" technology improved fibre distribution and overall quality.
- 1977 Light wool process enabled the production of high quality, low density stone wool for use in building and appliance insulation.
- 1982 Process developed to make pipe-block, a unique fibre orientation from which pipe sections and lags could be cut.
- 1995 Stone wool with low *bio-persistence* (bio-soluble) developed in response to concerns about possible health aspects of mineral fibre insulation. (All forms of stone wool insulation were subsequently re-classified in 2002 as *not classifiable* in terms of carcinogenicity to humans by world health authorities after an extensive 15 year scientific review).
- 2002 Vertical fibre orientation via continuous process developed for the production of non-combustible sandwich panel core material.



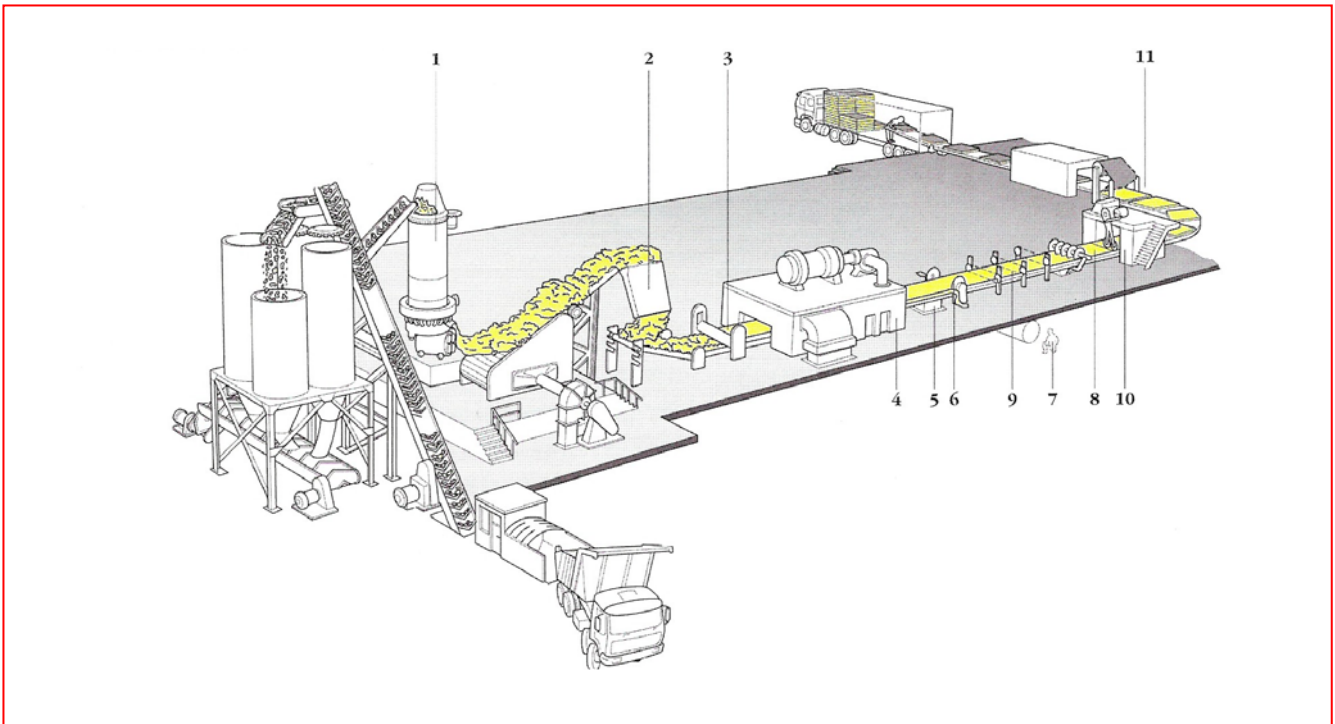
*Wired mat production in the 1940s*

Along with these milestones came a range of ongoing operational improvements most of which are patented technologies all combining to provide the world's best stone wool insulation. Many producers outside of the Rockwool Group, especially those in third world countries are using 1950s technology which results in product of considerable variation with high shot content (unfiberized material), density variation and soft spots, limited water-repellent properties and poor handling characteristics. To compensate for these shortcomings the product is often made at much higher density than is necessary. Density is not an indication of performance. ***Differing technologies produce different performance properties at the same density.***



**An example of engineered fibre orientation in product intended for use as a core in non-combustible sandwich panel to provide optimum shear, tensile and compressive mechanical properties.**

The following illustration of the modern production process is typical of that used in all Rockwool Group factories including the Roxul Asia plant which supplies most of AIS requirements for the Australian market.



1. **Melting / Spinning process.** Stone wool is made of diabase, a volcanic rock. Coke and diabase are automatically fed into a cupola oven; the coke is burnt and the diabase is melted at 1500°C. The melted diabase is fed into a spinner which consists of high speed rotating wheels. The centrifugal action of the wheels forms small droplets which are turned into fibres by a high velocity air stream. During this process binder and oil are added to the fibres. The fibres are collected on a spinning belt thus forming a thin fleece. Mineral oils give the product it's water-repellent properties.
2. **The Pendulum.** The thin stone wool fleece is zigzagged onto a conveyor in order to achieve the optimal distribution of the wool. This is also known as a "lapper."
3. **Weighing.** The area weight of the product is determined by state of the art technology. Line speed is controlled to ensure a constant weight of the product.
4. **The Curing Oven.** At this point the thermo-setting binder is cured by the forcing of hot air through the wool. The final thickness of the product is determined by the distance between the conveying presses in the oven. The cured product thus attains it's final shape and stiffness.
5. **Cooling.** The cured wool is air-cooled .
6. **Trimming and Slitting.** Side trim and slitting provide the final width dimensions of the product.
7. **Facing.** Facings such as foil and glass tissue can be applied at this point.
- 8 -10. **Sawing.** Final specified dimensions of the product are achieved.
11. **Packing.** Slabs and rolls are packed in shrink-wrap polyethylene and are labelled with all production details to facilitate trace-ability.

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