# The Affection of Concrete Recycling Technology and Achieving Sustainability in Construction

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***Abstract***

*Because of the global impacts of environmental issues, there is a general orientation for sustainable development to overcome these issues in all sectors around the world. It is common knowledge that construction is not environmentally friendly, so the recycling of building waste is very effective in improving this problem and it offers many advantages: Reduced demand for new resources. Reduction of associated transport and production expenses. Reducing the area of landfills. The waste resulting from the construction and demolition processes represents 10 to 15 percent of the total waste in the developed countries. [1], Waste from construction and demolition includes concrete, bricks, wood, glass, insulating materials, ceilings, wires, pipes, gravel and dust. Concrete is the most common waste and constitutes about 50 percent of the total waste [2]. In this research the possibility of recycling the concrete will be explored.*

**Keywords:** Concrete, Recycling concrete, Recycling Technology, Construction Sustainability, Environmental Friendly.

## 1- RECYCLING CONCRETE EFFECT OF PHYSICAL RECYCLING OF CONCRETE:

Construction waste is disposed of in landfills, and new quarry products are procured and supplied to the site for new concrete production. Energy is used to dispose of these wastes and produce new materials for construction. By recycling, construction waste can be used to produce new concrete, thus reducing the waste of more natural resources, as well as the cost and energy needed to transport materials.

## 2- The profitability and cost-effectiveness of the concrete recycling process can be determined by the following key variables:

The price of new rickham and the extent of its proximity, which affects the cost of transportation.

Prices of recycled aggregates and proximity. Quality of construction, demolition waste, and level of pollution. Government incentives related to procurement. Costs associated with waste disposal in landfills (taxes, transport, shipping and unloading). Demand for recycled concrete products, which rely largely on public opinion for recycled aggregates. Residues of industrial construction are not contaminated with other types of waste during the process of sorting, and there is no need

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for decontamination. Industrial waste should preferably be placed close to concrete treatment sites, thus reducing transport costs.

Figure 1: Reusing concrete can a good way to reduce construction costs while providing some benefits to the environment. [10]

**There are many examples of achieving a high saving ratio through the implementation of concrete recycling. Some are mentioned below:**

In the United States, many states have achieved savings of up to 60 percent through the use of recycled aggregates rather than new aggregates in public construction projects. [4] Forty-one million tons of concrete are recycled annually in the United States [3]. It is currently being used in concrete and asphalt products with better performance compared to new aggregates. Recycled aggregates are less in material, time and gross cost of the project and less weight per unit by 10 to 15% compared to new quarries. In Queensland, Australia, and annual costs have fallen by 85 percent when used for recycled aggregates instead of the new rubble, due to the cancellation of landfill fees, abstraction and detonation, lower associated costs and lower costs [2].In Europe, recycled concrete rubble can be sold at 3 to 12 euro per ton and at a production cost of 2.5 to 10 euro per ton. The highest selling price is obtained at sites where all construction and construction

waste has been recycled and maximized. This can be easily achieved with industrial waste. When it comes to least developed countries, a study was conducted in Thailand showing that the use of 100 percent of the rubble of concrete waste can lead to the production of hollow concrete blocks with good properties. Thus, the cost per concrete block is reduced to 70 percent compared to the normal price of the concrete block on the Thai market [5]

**3- Concrete Rubble**:

**3-1- Concrete Recycling Process:**

Concrete recycling processes vary depending on the sources of recycled aggregates. If the concrete source is demolished, the necessary processes are to sort the material according to their type. But if the source is industrial waste, there is no need for sorting. The concrete aggregates collected from the demolition sites are subjected to crushing, crushing and sifting. These systems start with the first jaw process, for the large aggregates of aggregates of different directions, to the size of the aggregates from 800 to 1200 mm. Followed by primary and secondary cutters, and determine

their use or non- dependence on the final product required. Rubbing heads are needed if the dirt and foreign parts should be removed. We also find that the screens of the fine surface remove the

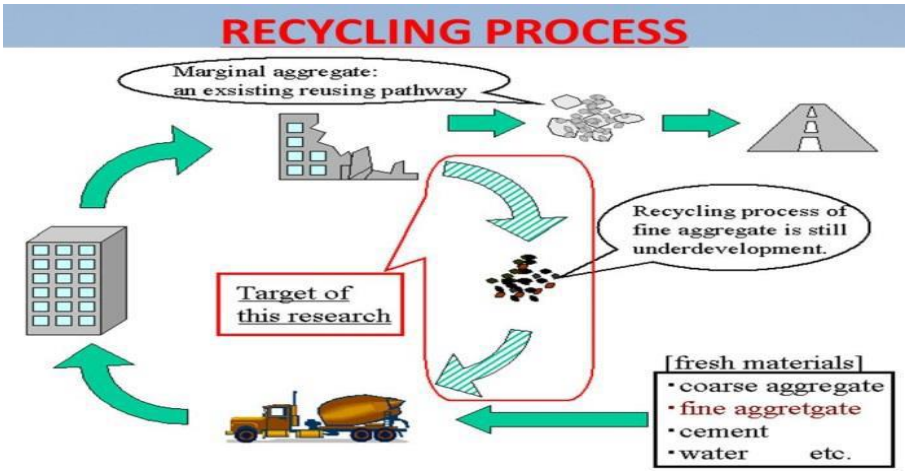


Figure 2: Material for building new oceanic reef habitats: Large pieces of concrete carefully positioned offshore can form the foundation for coral to build new reefs. [10]

fine materials from the rough rubble. And then if some of the dirt, mud, wood, plastics and organic materials are applied additional processes. This is done by floating in water, picking by hand, separating air, and using electromagnetic separators. With control and quality inspection, materials can be produced without the need for washing, as with new aggregates, which may be mixed with clay and silt [7].

Recycled aggregates are smaller in size and usually range in size from 0-12 mm and are usually used in construction activities, such as the construction of interlocking concrete blocks, replacement of substrates such as base gravel, etc. For the production of specific elements, recycled aggregates are mixed with quantities Suitable for cement, water, and sometimes other additions. The most common treatment period is 28 days.

The MILL TRACK M 5000 is a compact crusher with a hammer and a slot of mm.450x 300 powered by Isuzu diesel engine (21.5 kW). It features a mill with swing hammers, a portable conveyor belt and a feeder that has been built into a large box for loading. . The Mill Track MT 5000 can handle aggregates and concrete (except reinforcing steel), marble, gypsum, glass and others, and convert waste into good reusable materials. MILL TRACK M 5000 is controlled remotely. Through the screens available. This crusher can produce gravel from recycled concrete and construction debris in sizes ranging from 10-30mm, allowing the use of aggregates in various applications. Developed countries strongly support mobile crushers, due to the possibility of crushing waste on site, thereby avoiding transport to recycling sites. The right size of the TRACK MIL 5000 make it the perfect choice to be used directly at the site to handle the components of aggregates and stones from construction residues. Ideally, the contractor will have an effective

waste management system resulting from the demolition and construction process that will reduce the complexity of the operation. Through intelligent planning some construction waste can already be used in situ as packing materials. In addition, we find that the treatment of debris in the site facilitates the process of transport.

**4- Concrete Mixer Trucks Working:**

**4-1- Technical possibilities for recycling of concrete:**

There are many successful experiments in the use of aggregates in the production of component elements of concrete. Good compressive strength is achieved with different types of recycled aggregates, ***at different rates.***

***Here are some of them;***

In Lebanon, P. succeeded. Matar and R. El Dalati in obtaining Hollow blocks containing a certain proportion of recycled aggregates, which was compressive strength higher than the masses of natural aggregates. The recycled aggregate was obtained by crushing the debris of the structural concrete, ranging in size from 6-12 mm. The compressive strength of the concrete blocks produced from the aggregates was higher than 7 to 38 percent, depending on the rate of the added components (recycled aggregates, water, cement, and superior cities). In Belgium, concrete blocks with a high proportion of recycled aggregates were produced under the trade name Recy Mblock. Thus, a total mass containing 95% recycled aggregate was presented. While the hollow mass contained 75% recycled materials and no damage was detected after 14 cycles of freeze and melting test. However, further tests are needed to ascertain the suitability of this concrete block to meet construction or external work in case of continuous contact with water.In Japan, the concrete consists of 30% of the weight of recycled rubble instead of the natural aggregate, as it has the same compressive strength compared to the similar materials as it has the same (the dose of cement, W/C and its initial efficiency), which was achieved only with the natural debris. The recycled aggregate of the returned concrete (used concrete from the factory in the concrete truck as the excess material) was provided. The design of a new concrete mix included the replacement of the rough natural aggregates with the new aggregates (replacement by 30%) and the replacement of fine aggregates with smelting smelting Copper (replacement by 36 percent). The total diameter had a maximum of 25 mm. The water permeability, frost resistance and penetration resistance tests

chlorine confirm that concrete made of new aggregates.

Figure 3: Equipment should have a powerful electromagnet or water flotation or an air separator system that can pull steel from concrete. [11]

In China, recycled concrete blocks have been produced by adding concrete blocks, ranging in size from 5-40mm. With different percentages of recycled aggregates added, and the pressure strength was higher than the concrete containing the natural aggregate alone. The highest compressive strength was reached when 70 percent of recycled aggregates were added. But when the rate of recycled rubella was 100 percent, the pressure strength was a little lower but still good. In Kuwait, al-Mutairi used an old concrete with a size of 0-19 mm to replace 50% and 100% of the rough aggregate required, and used saltwater instead of fresh water to obtain reasonable concrete strength.

Recycled concrete treatment in seawater for 28 days. The results indicated that even with me using 100 percent of the total recycled concrete can achieve a design with a strong 35 Mp. The highest resistance is obtained when 25 percent of the sea water is mixed and 75 percent of the water is fertilized [9].

**5- RESULTS:**

If recycled aggregates are provided in large quantities and high quality, this offers different opportunities in use and in the trade. There are some examples of such applications: paving applications, concrete elements and dirt walls (in the case of large parts), stone landscapes, paving, roadblocks, noise barriers, interstitial walls, road barriers, etc. There is still a widespread view that concrete containing recycled aggregates has less compressive strength than new concrete. However, there are many cases where recycled concrete has shown an equal or higher strength than the new one. There are also some benefits to recycling on natural aggregates. Recycled aggregates contain better thermal insulation properties and concrete insulation capacity proportional to the proportion of recycled aggregate [10]. Where recycled rubble often has better compression properties and is the preferred material for applications such as road base and layer under foundation [4]. Less cement can also be used in layers under the foundation. Another benefit is the low weight of the unit of recycled aggregates which makes dealing with it cheaper. The recycling of concrete is particularly interesting for oil-rich countries, as these countries usually have a decline in the prices of diesel and crackers usually work with diesel.

**6- Recommendations.**

Recycling of demolition and construction waste has tangible and measurable benefits. In the GCC region there are two factors that increase the possibility of recycling. First factor costs are very low, reducing the cost of energy-intensive processes such as stone cracking. Second, because of the scarcity of water and the ability to use seawater in the treatment process, it reduces costs and even more. This is achieved in particular and from an economic point of view not only savings to the concrete manufacturer but also to society by reducing the use of subsidized goods.

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