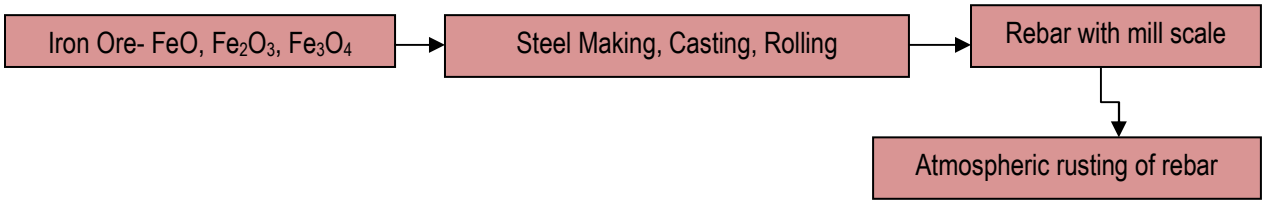
Information on Reinforcement Bars Usage

Rust is the oxide that is formed by open air oxidation of iron. Rusting is caused by the reaction of air and moisture, generally a slow process and is a very common phenomenon for most steel products and has practically no effect on the functional quality.

Corrosion on the other hand is the electrochemical reaction between a metal and its environment. The reaction causes formation of not only oxides but other compounds as well. Corrosion usually results in accelerated and uneven erosion of metal surface and may be detrimental to its intended service performance.

Oxidation of metal when exposed to atmosphere is rather a natural phenomenon and steel rebar is not an exception. Iron in common steel grades has a tendency to react with oxygen /water present in the atmosphere forming various types of oxides , brownish in color and is termed as rust. Process of rusting may be slowed down through various protective measures but cannot be completely prevented. In fact for most metals, the oxide is the most stable natural form as observed in the respective metallic ores in the nature. Therefore any steel, with presence of oxygen, would have a tendency to go back to its natural form of oxide.Rebar is not meant for its aesthetic look but for its some critical properties to reinforce the concrete for structural safety and these are mechanical strength, ductility, bond strength etc .

If we look at the above functional and essential properties of rebar, normal surface rusting as a result of atmospheric oxidation, does not any way impact the above properties. This has been tested time and again and the fact established. On the contrary, some amount of rusting makes the surface rougher and thereby enhancing the bond strength which is beneficial.



Check rebar for application is to clean the surface with a wire brush and observe whether there is any pit formation due to corrosion/over rusting which is not advisable to use. Pits look like small localized depression on the surface. Check whether the ribs on the surface have been washed out due to rusting or not. If it has not shown any rib wash out, it can be used safely. Severely rusted/pitted rebar is detrimental.

While usage of little reddish rebar has its own advantages, it is important to protect it from progressive corrosion. Corrosion is mostly dependant on the environment which the rebar is exposed to. Any acidic atmosphere in presence of salts like chloride or gasses like $C0_2$ may promote corrosion .Corrosion can also be encouraged if water is logged in some portion of rebar for long time. A common example of such situation which may be created when a portion of rebar extends from already cast concrete members. This is generally done when there is a plan to extend the construction in future.In such cases, the minimum

precaution to be taken is to cover such extended rebar with some coating like cement slurry. In absence of such protection, it may lead to accelerated rusting /corrosion and should be avoided.

Myth- Rusted rebar will have weak bonding with concrete.
Realty-Controlled rust improves bond strength.

Myth-Rusting of rebar reduces its strength.
Realty-Rusting has no effect on rebar strength.

Myth - Rust on rebar is not permitted as per rebar code/standard.
Realty- IS 1786:2008 indicates rust as phenomenon on rebar and not a cause for concern. Rust, seams, surface irregularities or mill scale shall not be the cause for rejection.