Pre-treatment process is simply a cleaning of metal surfaces and to modify the surface so as to make it easier for paint particle to have a proper bonding.

This process includes :

(1) **Cleaning;** this is mixture of mechanical and chemical cleaning. Mechanical cleaning means scratch brushing and/or sand blasting. The abrasive action here; not only removes the surface dust, rust etc; but also eliminates scratches and surface irregularities. Cleaning is very good, however, coating must be done immediately because the cleaned surface is in a highly reactive state and corrosion occurs very soon. Chemical cleaning includes removal of dirt, oil and grease, and the rust particles present on the surface by means of chemical actions. The chemicals may be applied by wiping, spraying or dipping. The nature of chemicals used depends upon the base metal.

(2) **Application of conversion coating**: the conversion coating helps in providing corrosion protection before spray painting , promote good adhesion of the paint particles to the surface and impart under paint corrosion & thereby improves the life of the painted product. The type of the conversion coating used also depends upon the base metal.

PRETREATMENT PROCESS FOR MILD STEEL

Mild Steel or MS is known for its tendency of going under rapid oxidation when exposed to atmosphere. The result of oxidation is the formation of thin oxide layer on the surface which we commonly call as 'RUST'. To avoid rusting, the MS material is not allowed to get directly exposed to the atmosphere. This is achieved by applying a thin layer of oil on the surface of MS surface after manufacturing. The oil does not allow the material to come in direct contact with the humid air and thus delays rusting. However, this doesn't entirely eliminate rusting but only delays rust formation. Some MS products are hardened for strengthening and some are welded during fabrication. These manufacturing/metal forming processes leave black scale on the surface. In short, MS parts generally have rust and/or grease-oil and/or black scale on the surface. All these cause severe problems for bonding of paint particles; id not removed before painting. He chemical process of removing oils is **DEGREASING** and process of removing rust is **DERUSTING.**

NEED OF CONVERSION COATING –After degreasing and rusting process, the bare MS surface is prone to fast oxidation. To avoid this, the surface needs to be coated with some type of coating which prevents further oxidation before applying paint and also gives adhesion for paint. This is called CONVERSION COATING.

{1} DEGREASING

Degreasing removes oil and grease particles deposited on the MS surfaces. The best method of degreasing; as of today, is by use of alkaline based degreasing powders. This is a blending of an alkalis' and surfactants and the best results are obtained under hot conditions.; generally 60-70 degrees centigrade.

{2} DERUSTING

Derusting removes rust and light scales from the MS surfaces. These are necessarily acidic chemicals and is a blend of mineral acids like phosphoric acid, sulphuric acid and hydrochloric acid with added inhibitors. Higher concentration of acids helps in removing of rust fin a faster way, but this affects the life of the conversion coating applied in later stages. Phosphoric acid based derusting chemicals are most suggested for MS components before applying paint.

{3} PHOSPHATING - a conversion coating

The most common conversion coating for MS is zinc or iron phosphate coating. Zinc phosphate coating is crystalline heavy coating; gray in colour. While iron phosphate coating is amorphous coating that ranges in colour from iridescent blue to gray. Iron phosphate coating gives minimum sludge formation and hence have a smoother finish than zinc phosphate. Apart from this the bonding characteristics are also good. Iron phosphate processes are much easier to operate than zinc phosphate processes and require fewer process stages ; while zinc phosphate coating requires a predip in activation chemical prior to phosphating to have micro crystalline grain structure. But

iron phosphates do not provide the degree of corrosion protection obtained by zinc phosphates.

Iron phosphate systems are therefore used for a range of products requiring a durable finish that are not exposed to severely corrosive environments. Zinc phosphate processes have been developed to provide exceptional durability in corrosive requirements.

{4} PASSIVATION - a post conversion coating process

After a metal surface receives a conversion coating, the surface is water rinsed to remove extra conversion coating chemicals and a post-treatment of passivation is applied. This helps in increasing corrosion resistance and humidity resistance when compared to conversion coatings without final rinses. Passivation is generally based on chromic acid chemicals in mild concentrations.

SO THE PRETEATMENT PROCESS SEQUENCE FOE MS WOULD BE:

1.	**Knock Off Degreasing**	**60-70º C**	**3 Min** (For heavy and old oil deposits)
2.	**Degreasing**	**60-70º C**	**8 Min**
3.	**Cold Water Rinse**	**Ambient**	**1 Min**
4.	**Derusting**	**50-60º C**	**2 Min**
5.	**Cold Water Rinse**	**Ambient**	**1 Min.**
6.	**Cold Water Rinse**	**Ambient**	**1 Min** (Preferred)
7.	**Activation**	**Ambient**	**1 Min**
8.	**Phosphating**	**50-60º C**	**6-7 Min**
9.	**Cold Water Rinse**	**Ambient**	**1 Min**
10.	**Passivation**	**40º C**	**1 Min**
11.	**DM Water Rinse**	**Ambient**	**1 Min (IDEAL)**
12.	**Water Dry Off**	**80º C**	**3-4 Min.**

PRETREATMENT PROCESS FOR ALUMINIUM

Aluminium products are known to undergo oxidation forming a thin layer of aluminium oxide on the surface. Also, anodizing process leaves layer of aluminium oxide under the influence of electric current. Hence, it needs to be removed before painting. Other than this, there may be oil on the surface which may have come during fabrication/forming process; which is also essential to be removed.

As Al is sensitive to alkaly; during the pre-cleaning, milder alkaline chemicals should be used. In case, there is presence of anodizing layer on aluminium, strong alkaline cleaner can be used. But, this would leave a black smut on the surface. To remove this; aluminium is treated with weak nitric acid.

CONVERSION COATING FOR ALUMINIUM: For Al, either chromium phosphate coating – green in colour or chromate coating – Yellow in colour can be used.

SO THE PRETEATMENT PROCESS SEQUENCE FOE AL WOULD BE:

1.	**Degreasing**	**60-70º C**	**8 Min**
2.	**Cold Water Rinse**	**Ambient**	**1 Min**
3.	**Derusting (Nitric Acid)**	**50-60º C**	**2 Min**
4.	**Cold Water Rinse**	**Ambient**	**1 Min.**
5.	**Cold Water Rinse**	**Ambient**	**1 Min** (Preferred)
6.	**Chromating**	**50-60º C**	**6-7 Min**
7.	**Cold Water Rinse**	**Ambient**	**1 Min**
8.	**Water Dry Off**	**80º C**	**3-4 Min.**

PRETREATMENT PROCESS FOR GI COMPONENTS

Like Al, galvanized steel undergoes natural corrosion forming a thin layer of zinc oxide or zinc carbonate on the surface which in the form of white rust. So, the pre-cleaning of GI components includes alkaline cleaning for removal of oil and acidic cleaning for removal of white rust. The acidic cleaning chemical is generally based on phosphoric acid.

SO THE PRETEATMENT PROCESS SEQUENCE FOE GI WOULD BE:

1. Degreasing	**60-70º C**	**3-4 Min**
2. Cold Water Rinse	**Ambient**	**1 Min**
3. Phosphoric Acid Rinse	**Ambient**	**2 Min**
4. Cold Water Rinse	**Ambient**	**1 Min.**
5. Cold Water Rinse	**Ambient**	**1 Min** (Preferred)
6. Activation	**Ambient**	**1 Min**
7. Zinc Phosphating	**50-60º C**	**6-7 Min**
8. Cold Water Rinse	**Ambient**	**1 Min**
9. Passivation	**40º C**	**1 Min**
10. Water Dry Off	**80º C**	**3-4 Min.**

PRETREATMENT PROCESS FOR CASTNGS.

Like galvanized sheets, die casting material also undergoes natural corrosion forming zinc carbonate or zinc oxide.

Therefore the pre cleaning of castings consists of mild alkaline chemical to remove greases and oils and phosphoric acid based chemicals for removal of white rust.

In conversion coating, chromate coating (yellow) is preferred.

SO THE PRETEATMENT PROCESS SEQUENCE FOE CASTINGS WOULD BE:

1. Degreasing	**60-70º C**	**3-4 Min**
2. Cold Water Rinse	**Ambient**	**1 Min**
3. Phosphoric Acid Rinse	**Ambient**	**2 Min**
4. Cold Water Rinse	**Ambient**	**1 Min.**
5. Cold Water Rinse	**Ambient**	**1 Min** (Preferred)
6. Chromating	**50-60º C**	**6-7 Min**
7. Cold Water Rinse	**Ambient**	**1 Min**
8. Water Dry Off	**80º C**	**3-4 Min.**