Solutions for Piping Skids
Applications for Oxygen Enrichment

With an experience of over several decades in the field of pressure and flow control instrumentation, Forbes Marshall provides end-to-end solutions in the form of stand-alone piping skids along with controllers, for various industries. A strong knowledge base coupled with an application oriented approach and precise engineering has made us the preferred supplier of these skids for handling services like cooling water, steam, nitrogen, argon and fluids like oxygen, hydrogen and natural gas.

The concept of complete piping and valve stations with field instrumentation as well as control systems, provides an enhanced value to the industry in terms of accurate control over process parameters and ensures safety. Forbes Marshall has installed proven packages, including test bed automation, for metal industries like steel, zinc, lead, cement and glass industries.
Combustion air used in any furnace contains approximately 21% of oxygen. Oxygen enrichment is the increase in the percentage of oxygen in combustion air by 3-4% by the controlled addition of pure O₂ into the cold air duct at the furnace inlet.

Oxygen enrichment is necessary because air contains 78% of nitrogen, which is an inert gas, and does not contribute towards combustion. The high percentage of nitrogen inhibits fuel from reacting with oxygen and absorbs heat from the combustion reaction. This results in lower flame temperature. Increasing the percentage of oxygen improves overall combustion efficiency.

**Benefits**
- Higher flame temperature and hence better combustion
- Reduction in fuel consumption
- Consistency in oxygen quality
- Better burner zone control
- Reduced CO₂ emissions
- Increase of 4% to 4.5% in furnace output

**Applications**
- Blast furnace
- Reheating furnaces in steel re-rolling mills
- Roaster and smelter in a zinc or lead plant
- For glass cupola (glass wool manufacturing industry)
The Forbes Marshall Solution

Flange to flange skid for O₂ pressure control and flow control including control valves, flow meters

Skid also includes safety devices including shut-off valves to ensure safe operation of skid

Skid designed to fit into existing plant piping and as per the lay-out

A dedicated controller for reliable operation of skid

Oxygen injector which is carefully designed based on the cold blast air process parameters and duct dimensions

Oxygen pressure reducing station

Oxygen enrichment skid

Oxygen diffuser

Control system and SCADA with reporting

Oxygen analyser (optional)

O₂ skid assembly and testing as per standard procedures by a qualified engineering execution team makes Forbes Marshall a formidable solution provider.