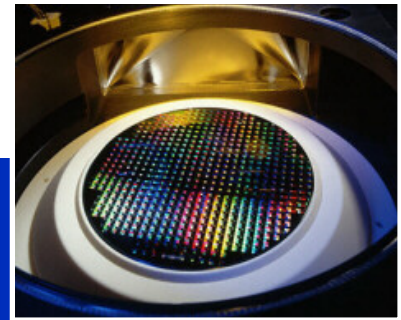




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Argon Recovery



For the Metals, Semiconductor & Solar Industries



Argon Recovery Systems



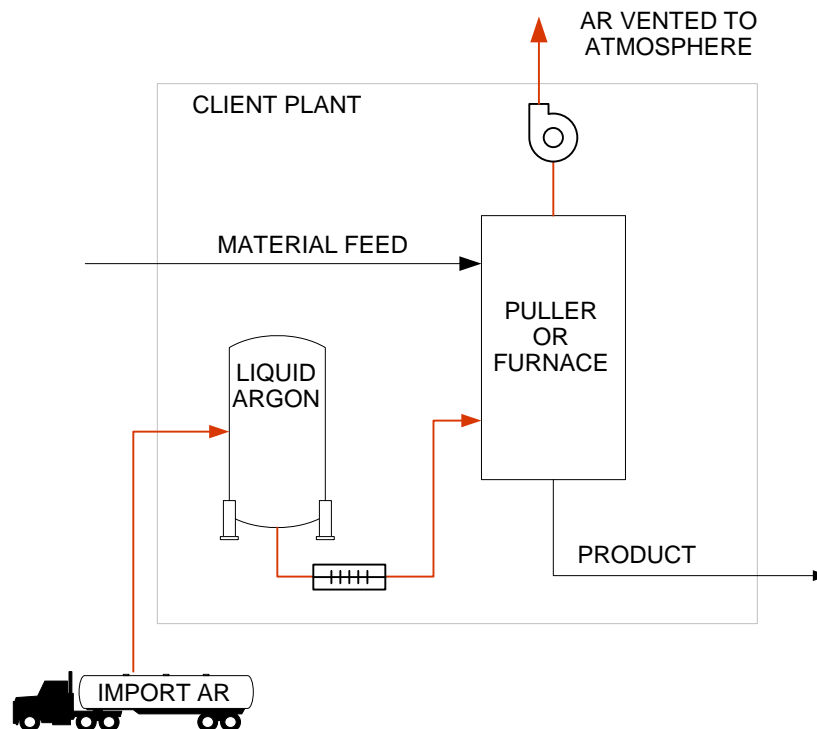
REAL SAVINGS • REAL RELIABILITY • REAL QUALITY

Advantages:

- Recovers up to 98% of argon
- Total net operating savings of 30-50% of argon costs
- Low maintenance costs: system has very few moving parts
- Process instantaneously adjustable to changes in argon input and demand
- Very high purity recovered gas
- Recoverable materials normally discarded to the environment provide additional savings
- Fully automated, including online quality monitoring and active control

Typical Client Site:

- Liquid argon is imported frequently by truck
- Argon usage is *once and done* – used in the process then exhausted via vacuum pumps
- Houseline gaseous nitrogen often imported as liquid for other uses on site





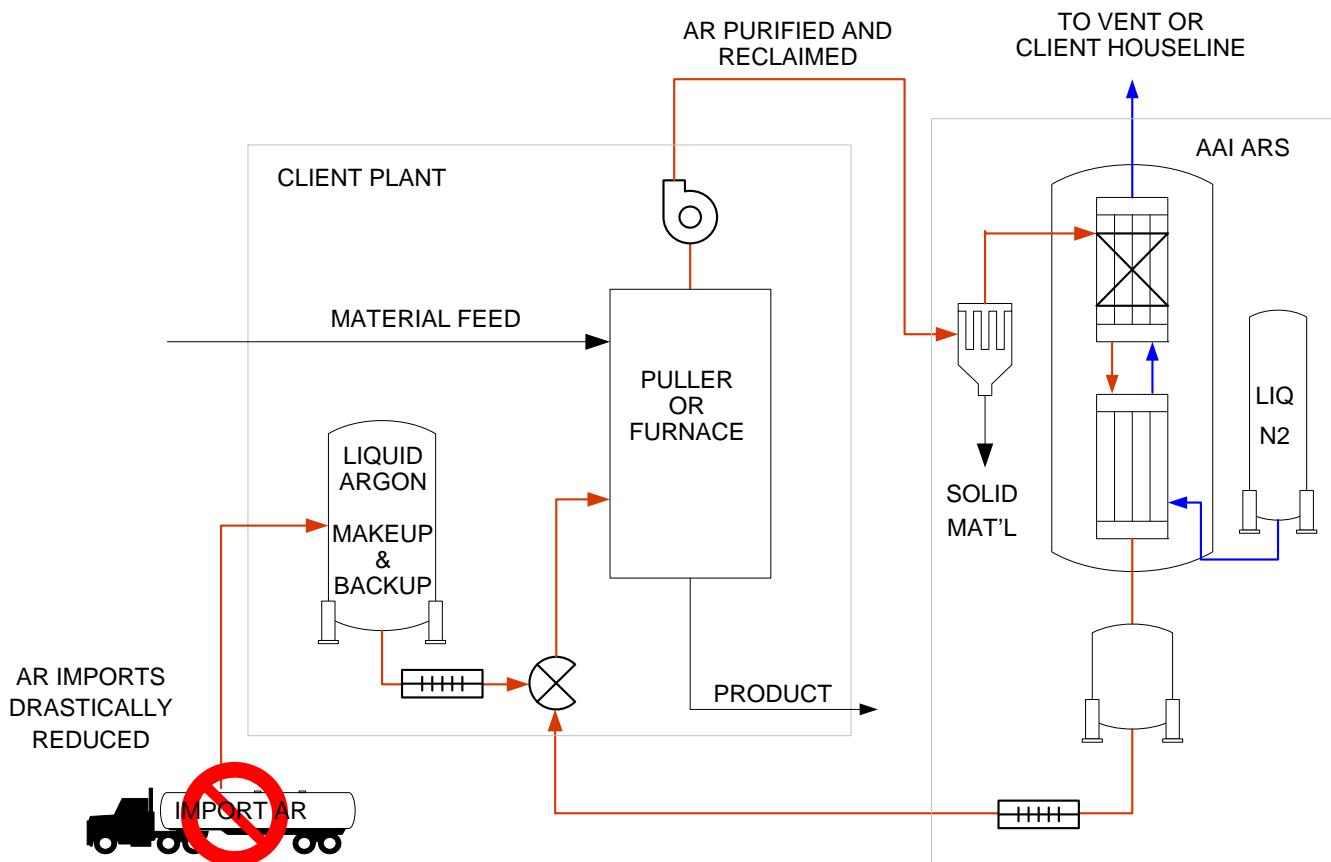
Argon Recovery Systems



REAL SAVINGS • REAL RELIABILITY • REAL QUALITY

Client Site with AAI ARS:

- Argon imports can be cut down to 2% of baseline import frequency
- Liquid N_2 imported or generated on site, depends on site setup and economics
- Gaseous N_2 from AAI ARS is vented or integrated to client houseline N_2
- Recycled argon is continually purified and stored for reuse in the process
- Recycle system upsets (although rare) are seamlessly made-up with existing import argon
- Entrained dust is collected and returned to client or disposed of





Argon Recovery Systems



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How the AAI ARS works:

- Simplicity is the key to reliability and good economics. The AAI ARS uses a thermally driven vacuum system driven by liquid N₂ or other refrigerants to pull exhaust argon and simultaneously purify and separate it for reuse in the client system.
- The only moving parts in the argon process are valves and a utility glycol pump. These items are easy and inexpensive to maintain.
- The argon processing stream uses no compressors, which would normally have several problems: cost, high maintenance, minimal adjustability.
- Dust is removed continuously using elements of our patented filtration and dust handling arrangement.
- Purity is continually monitored using online, real-time analyzers. Continuous analysis feeds into the plant control system which reacts immediately to upsets and provides additional purification if necessary.

Economics:

- The savings basis and capital costs for a AAI ARS includes many factors. Some of these are:
 - Client import argon cost
 - Argon recycle quantity
 - Import N₂ cost
 - Electricity costs (especially if doing onsite N₂ generation)
 - Space and proximity at site
 - Desired recovery %
 - Desired argon purity
 - Client argon exhaust arrangement
 - Client exhaust impurities
 - Client exhaust dust loading
 - A turn-key system from AAI can be purchased (capitalized) with the client owning the equipment. Alternatively, systems can be fully financed by AAI and leased by the client (expensed) with AAI retaining ownership of the system. Leases with a purchase option are also available.
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