



Solar Thermal Solutions for Brass Industries



1. Industry Overview

Brass manufacturing in India includes foundries, extrusion and forging units, precision turned components, electrical and plumbing fittings, decorative products and specialised engineering components. Typical operations include scrap/raw-material preparation, melting, casting, billet reheating, extrusion/forging, heat treatment, machining, cleaning, electroplating and finishing. The Jamnagar brass cluster is a major example, with many MSMEs using pit-type coal-fired and induction furnaces for melting and a sequence of casting, reheating, extrusion/forging, machining, cleaning and electroplating operations.

Solar Heat for Industrial Processes (SHIP) can contribute most readily to the lower- and medium-temperature thermal loads in brass plants. Direct solar substitution of the main brass-melting furnace is generally much more challenging because melting requires very high temperatures; however, solar heat can be integrated into hot-water cleaning, degreasing, electroplating, heat-treatment support, drying, boiler services and selected preheating duties. This makes load segregation particularly important when assessing a brass plant.

2. Typical Thermal Applications

Table 1: Brass industry applications, indicative temperature range and typical heat medium

Brass Industry application	Indicative temperature	Typical heat medium
Component washing / cleaning	40–80°C	Hot water
Degreasing / alkaline cleaning	50–100°C	Hot water / steam
Electroplating bath heating	50–90°C	Hot water / steam
Drying after washing / plating	60–150°C	Hot air / steam / thermal oil
Heat-treatment support	100–250°C+	Thermal oil / hot air / furnace
Billet / component preheating	150–400°C+	Hot air / HTF / furnace
Boiler feedwater preheating	60–120°C	Hot water / suitable HTF
Brass melting	900–1,000°C*	Gas / oil / coal / electric induction

3. Solar Thermal Technology Options

The appropriate technology should be selected based on required process temperature, heat-load profile, available area, solar resource and integration point.

Table 2: Solar thermal technology options, indicative applications and temperature range

Solar thermal technology		Indicative application	Temperature range
Non-concentrating solar thermal	Flat Plate Collector (FPC)	Component washing, cleaning and hot water	30–80°C
	Evacuated Tube Collector (ETC)	Cleaning, plating baths and preheating	40–100°C
Non-imaging concentrating	CPC/evacuated-tube CPC/xCPC	Medium-temperature cleaning and process heat	60–120°C
Concentrating Solar Thermal	Scheffler / parabolic dish	Steam and selected process heating	100–250°C
	Parabolic Trough Collector (PTC)	Thermal oil, drying and medium-temperature heat	100–250°C
	Linear Fresnel Reflector (LFR)	Steam and medium-temperature process heat	100–250°C
	Higher-temperature CST systems	Selected preheating / specialised thermal duties	>250°C

Thermal storage can improve the utilisation of solar heat where the solar resource and process demand do not coincide.

Potential storage options include:

- Hot-water tank: Low-temperature processes
- Pressurised water: Processes above 100°C
- Thermal-oil storage: Medium-temperature applications
- Phase-change materials: Specific temperature ranges
- Molten salt: Higher-temperature applications

4. How Solar Heat Can Be Integrated

A key principle in industrial solar thermal design is to identify the most technically and economically suitable integration point rather than simply connecting the solar field to the main boiler. IEA SHC specifically highlights process integration and selection of the appropriate integration concept as a critical part of SHIP project design.

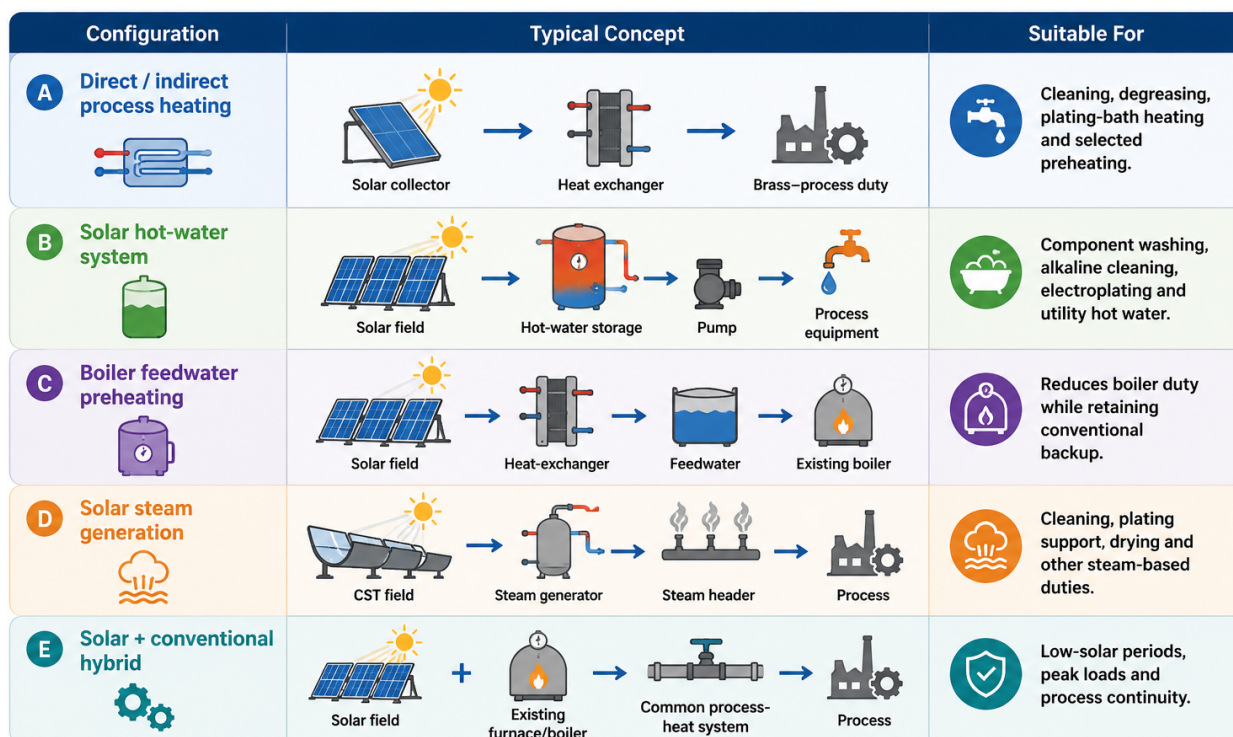


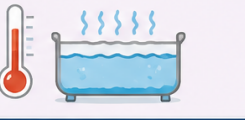
Figure 1: Illustration of solar heat integration to brass industries

5. Key Benefits for Brass Industry MSMEs

For brass plants, the solar contribution should be assessed against the solar-eligible thermal load rather than the entire plant thermal demand. A preliminary screening range of approximately 20–50% of suitable low/medium-temperature heat may be considered where solar resource, process temperature, operating schedule and collector area are well matched. The overall plant-wide solar fraction may be much lower when high-temperature melting dominates the energy demand. Actual solar fraction and fuel displacement should be established through project-specific hourly heat-load and solar-yield analysis. Key economic indicators include annual solar heat delivered, fuel displaced, annual cost savings, O&M costs, LCOH, NPV, IRR and payback period.

The illustration below presents key benefits for brass industry sector MSMEs.

Table 3: Key benefits for Brass industry sector MSMEs

BENEFIT	KEY BENEFITS
 ENERGY Use less fuel. Consume less energy.	- Reduces fuel/electricity used for suitable hot-water, steam, drying, plating and preheating loads; - Reduces boiler duty. 
 ECONOMIC Lower costs. Better financials.	- Reduces exposure to fuel-price volatility; - Can reduce thermal-energy costs and improve utilisation of existing utilities. 
 ENVIRONMENTAL Greener operations. Cleaner future.	- Reduces fossil-fuel consumption and associated GHG emissions; - Can reduce local combustion emissions where fuel use is displaced. 
 OPERATIONAL Reliable. Flexible. Easy to integrate.	- Can be integrated with existing boilers, furnaces and process equipment; - Storage can improve utilisation; - Hybrid operation preserves reliability. 
 PROCESS QUALITY Stable processes. Consistent quality.	Controlled solar preheating can stabilise water/bath/process temperatures while conventional heating remains available for final temperature lift. 

6. Indian Case Example

A useful brass-sector reference is the Jamnagar brass cluster in Gujarat. Published cluster documentation describes a typical manufacturing route comprising raw-material cleaning and feeding, melting in coal/oil-fired or induction furnaces, casting, billet reheating, extrusion/forging, cutting, hardening and tempering, secondary machining, cleaning and electroplating. The same documentation gives an example of Shiv-Om Brass Industries, a precision brass-component manufacturer in GIDC Phase III, Dared, Jamnagar, with reported annual production of about 708.8 tonnes.

No documented installed CST system was identified for this brass unit in the available project material. Therefore, the following should be treated as a sector-specific solar-thermal opportunity case but not as a completed solar-thermal project. The most practical first-stage solar applications are the lower-temperature loads in cleaning, electroplating, drying and utility hot-water systems, rather than the main brass-melting furnace.

Parameter	Reported project information
Location	Jamnagar, Gujarat
Industry	Brass components / precision manufacturing
Reference unit	Shiv-Om Brass Industries
Reported production	≈708.8 tonnes/year

Parameter	Reported project information
Typical process route	Melting → casting → reheating → extrusion/forging → machining → cleaning → electroplating
Main high-temperature load	Brass melting; coal/oil-fired and induction furnaces reported in cluster documentation
Potential solar-eligible loads	Cleaning, degreasing, electroplating-bath heating, drying, boiler services and selected preheating
Recommended first integration	Solar hot-water system + storage + heat exchanger to cleaning/plating loads
Backup philosophy	Retain existing electric/fuel-fired heating for peak and low-solar periods
Case-study status	Opportunity assessment; not a documented installed CST project

7. Sources and References

- 1) UNIDO / BEE / CII, EE & RE Technology Compendium – Jamnagar Brass Cluster, including brass manufacturing process information and renewable-energy case material.
- 2) Suresh, N.S. & Rao, B.S., 'Solar energy for process heating: A case study of select Indian industries', Journal of Cleaner Production (2017), for the methodology of matching process temperatures and loads to solar collectors and assessing fuel/economic/GHG impacts.
- 3) TERI, Policy Brief on Solar Thermal Energy for Industrial Decarbonization (2026), for the current Indian industrial-decarbonisation context.