



# **A SCIENTIFIC APPROACH FOR INVESTMENT CASTING**

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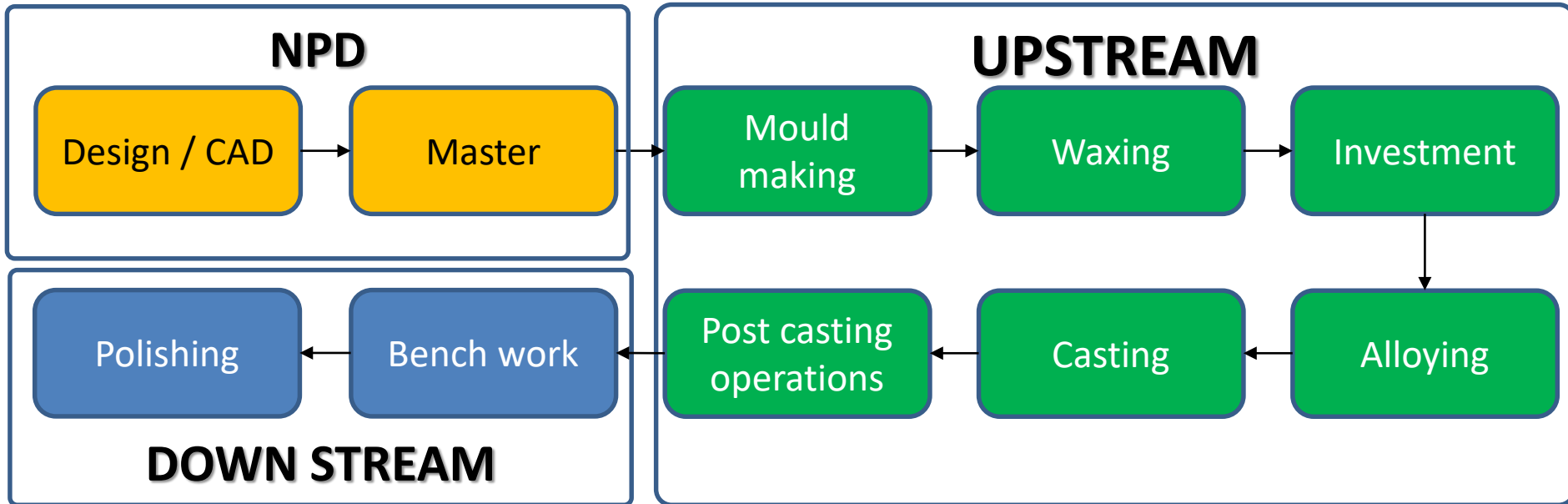
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## Flow of Presentation

- Wax tree making
  - Investment inclusion problem
  - Increase yield
- Investment
  - Complete wax burnout
  - Silicosis
- Alloying
  - Avoid oxidation
- Casting
  - Low flask & metal temperature

## Jewellery making process



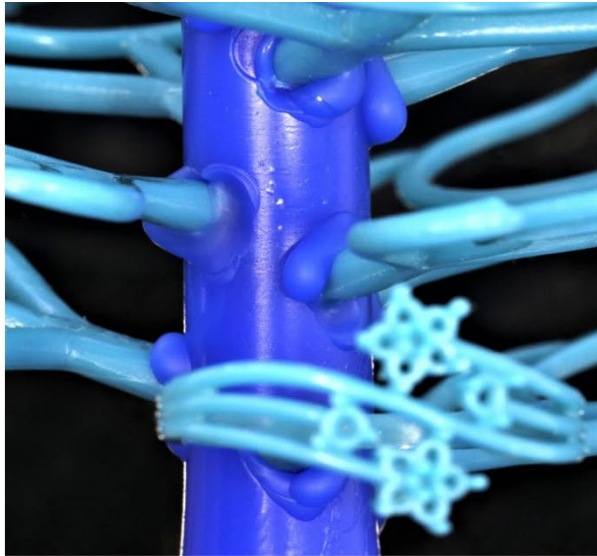
# Investment inclusion

## Inclusion

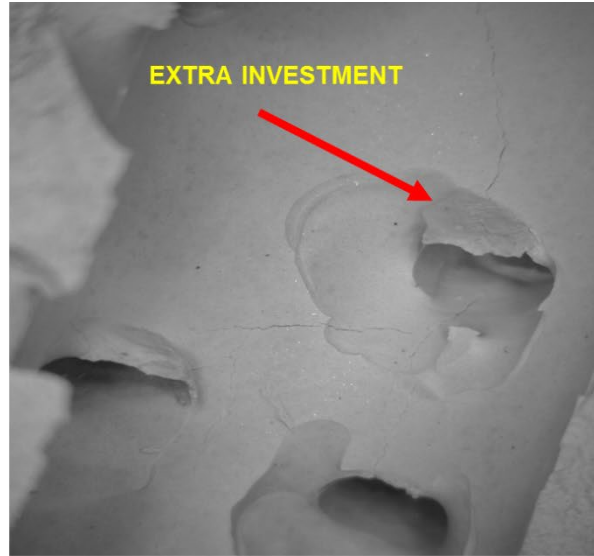
Investment inclusion



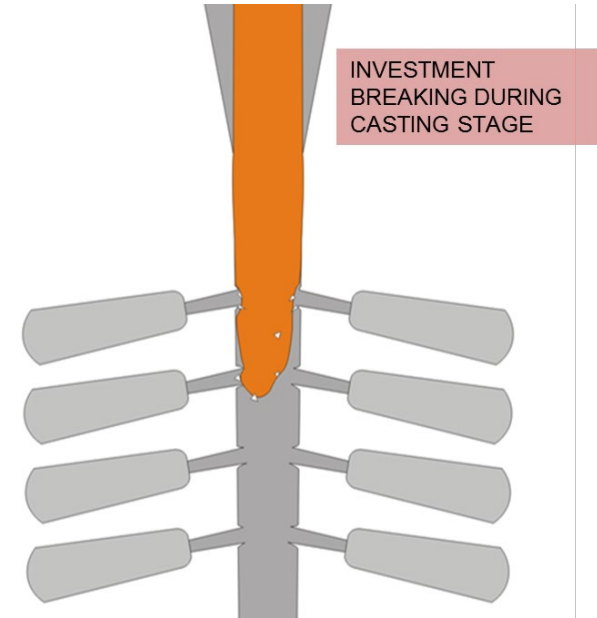
## Investment inclusion



OLD TREE MAKING METHOD



FLASK INSIDE VIEW – SPLIT FLASK



Waxing

Investment

Alloying

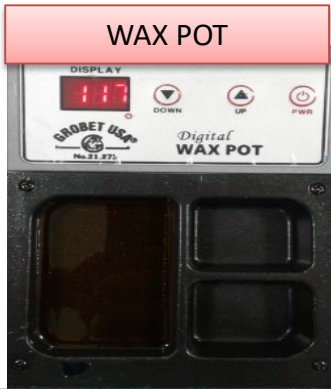
Casting

## Investment inclusion

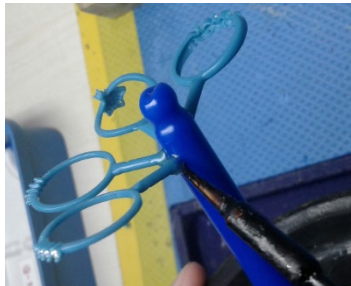
STICKY WAX PELLETS



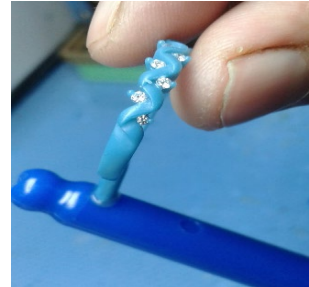
WAX POT



ROUNDING



STICKING



COMPLETE TREE



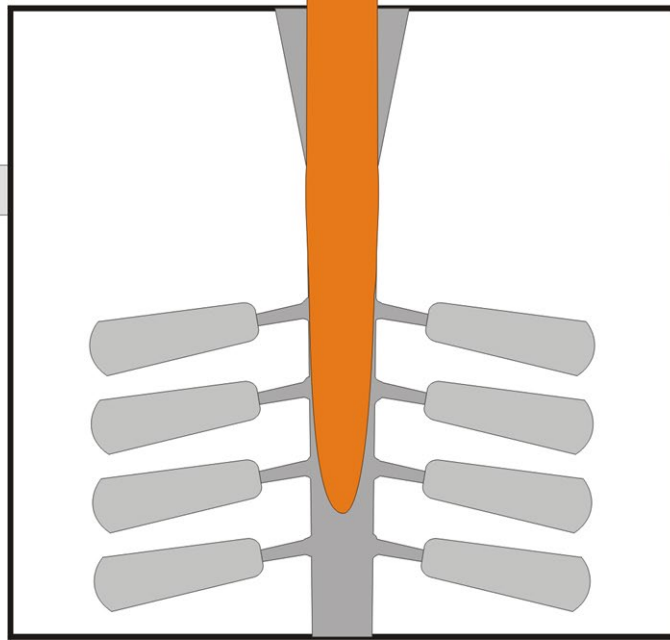
Waxing

Investment

Alloying

Casting

## Investment inclusion



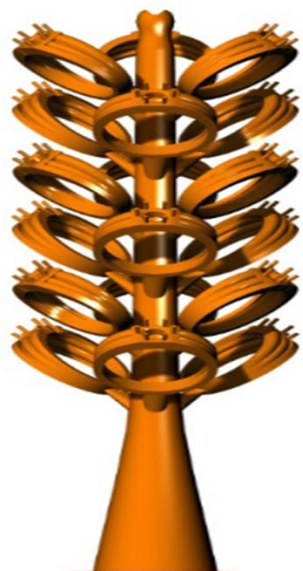
Waxing

Investment

Alloying

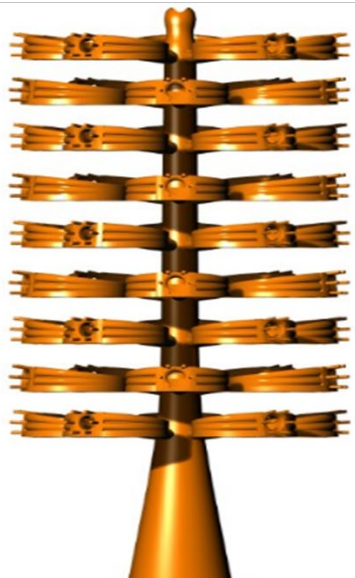
Casting

## Increasing yield



45°

**18 Nos**



85°

**45 Nos**



Category:Thin

Waxing

Investment

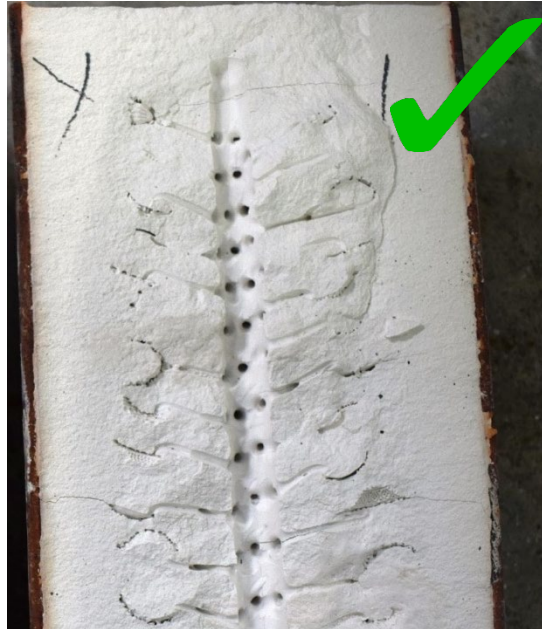
Alloying

Casting

## Complete wax burnout



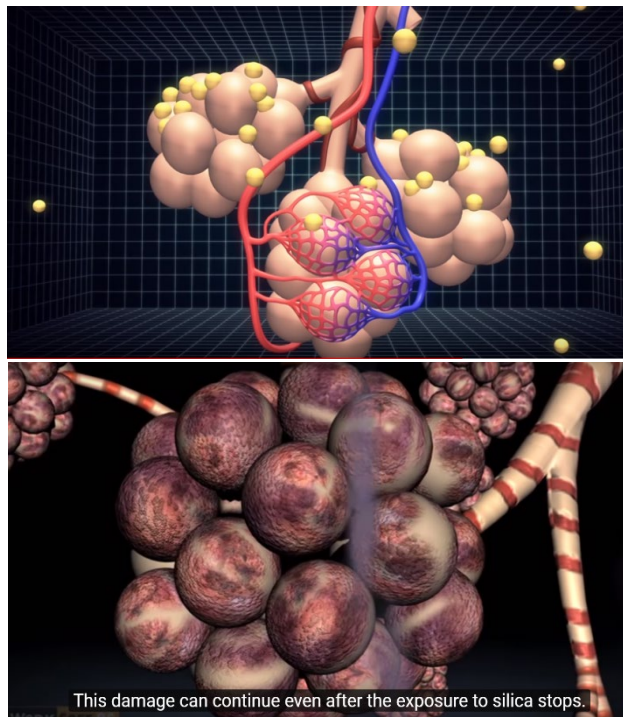
Without Calcium nitrate



With Calcium nitrate

- Stone in place casting
- Enriching oxygen -Calcium nitrate
- Addition of 20g per liter of water
- Decomposes at around 500°C/932°F by the following equation:  
$$2\text{Ca}(\text{NO}_3)_2 \rightarrow 2\text{CaO} + 4\text{NO}_2 + \text{O}_2$$
- oxygen is set free during that reaction.

## Investment powder safety - Silicosis prevention



Waxing

Investment

Alloying

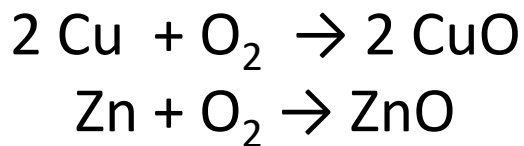
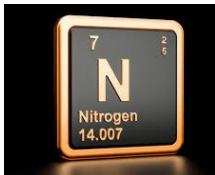
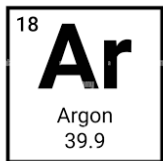
Casting

## Alloying - Oxide crack prevention

### Oxide cracks



## Preventing oxidation



**INERT GAS ATMOSPHERE**



**DEMINERALIZED  
WATER**



**IPA**



**PURE GOLD - 99.95%**



**DIVISIONAL CHARGING**

Waxing

Investment

**Alloying**

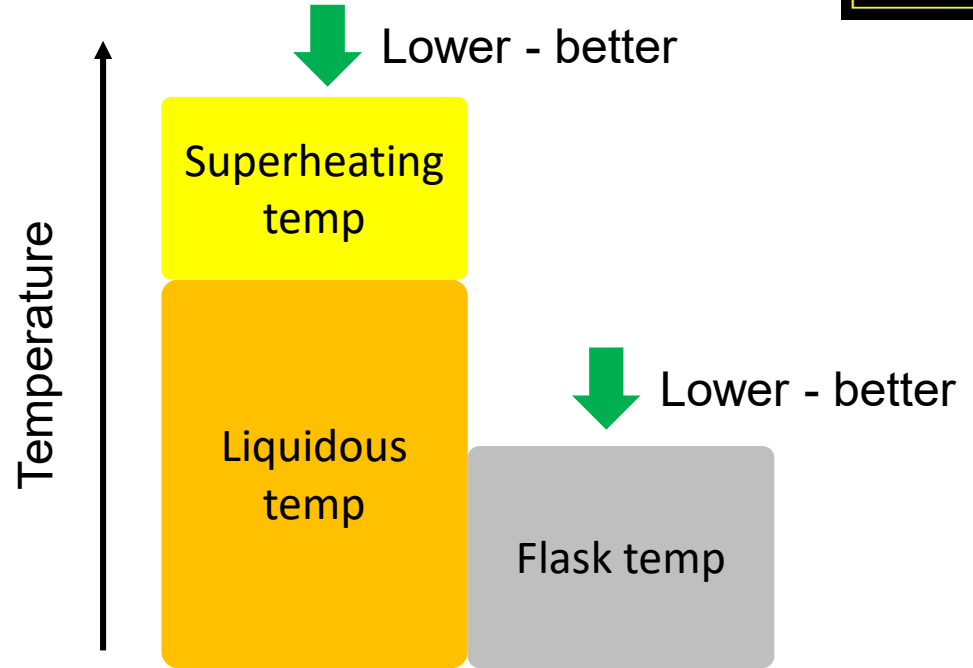
Casting

## Filter the oxides

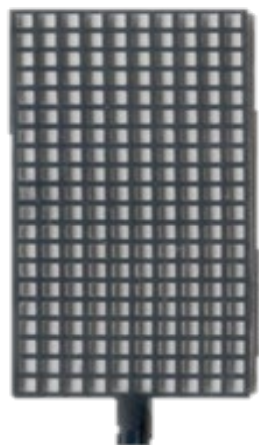


1. 50% scrap usage in casting after regraining
2. Auto-valve hole size is critical-Maximum 1.3mm
3. Helps to filter the oxides present in the scrap

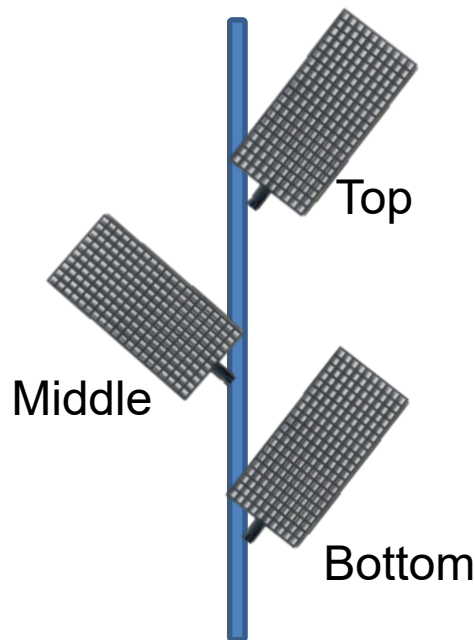
## Reduce metal mould reaction - gas release



## Grid test



Wax Grid



**Example:**

**Category:** **Thin**

**Karat:** 18KT yellow

**Minimum System temperature for complete grid filling**

**Cast temperature:** 1072 °C

**Flask temperature:** 600 °C



Thank you