



# FLOTATION MACHINE MODEL SELECTION AND CELL-VOLUME CALCULATION GUIDE

Practical reference for KYF forced-air and  
SF self-aerating flotation machines



**KYF EFFECTIVE  
VOLUME**

**1–38 m<sup>3</sup>**

Forced-air  
configuration



**SF EFFECTIVE  
VOLUME**

**0.7–20 m<sup>3</sup>**

Self-aerating  
configuration



**SELECTION BASIS**

- Slurry Flow
- Residence Time
- Ore Type
- Circuit Duty
- Air Supply

## KYF vs SF FLOTATION MACHINE SELECTION

| ITEM                                                     | KYF FORCED-AIR FLOTATION MACHINE                                                                                                                          | SF SELF-AERATING FLOTATION MACHINE                                                                                                           |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Air supply method</b>                                 | External blower supplies air through air pipes                                                                                                            | Air is drawn in by impeller (self-aeration)                                                                                                  |
| <b>Cell-volume range</b>                                 | 1-38 m <sup>3</sup>                                                                                                                                       | 0.7-20 m <sup>3</sup>                                                                                                                        |
| <b>Main drive arrangement</b>                            | Motor drives impeller; air dispersed by rotor-stator                                                                                                      | Motor drives impeller; self-aeration by impeller                                                                                             |
| <b>Typical duties</b><br>(rougher / scavenger / cleaner) | Suitable for all stages; large cells commonly used in rougher and scavenger                                                                               | Suitable for all stages; widely used in rougher and cleaner                                                                                  |
| <b>External blower requirement</b>                       | Required                                                                                                                                                  | Not required                                                                                                                                 |
| <b>Main selection considerations</b>                     | <ul style="list-style-type: none"> <li>• Plant has blower system</li> <li>• Need independent air control</li> <li>• Preferred for larger cells</li> </ul> | <ul style="list-style-type: none"> <li>• Simpler air system</li> <li>• Lower auxiliary investment</li> <li>• Compact installation</li> </ul> |



KYF FORCED-AIR FLOTATION MACHINE



SF SELF-AERATING FLOTATION MACHINE



## REQUIRED PROJECT INPUTS BEFORE MODEL SELECTION

### 1 PROCESS DUTY

- Dry-solids throughput (t/h)
- Slurry flow (m<sup>3</sup>/h)
- Pulp density or solids concentration (%)
- Required flotation time (min)
- Roughing, scavenging or cleaning duty
- Number of cells and standby philosophy



### 2 ORE AND SLURRY CONDITIONS

- Mineral type
- Target valuable minerals
- Feed particle-size distribution
- Liberation size
- Expected froth characteristics
- Reagent and conditioning requirements



### 3 SITE AND EQUIPMENT CONDITIONS

- Blower pressure and airflow (for KYF)
- Plant elevation
- Ambient conditions
- Motor voltage
- Frequency
- Protection class
- Maintenance and standby requirements



## CELL-VOLUME CALCULATION

### Calculation formula

Required effective volume =  
slurry flow rate  $\times$  required residence time

### Example

Slurry flow rate: 120 m<sup>3</sup>/h

Required residence time: 20 minutes

$$120 \times 20 \div 60 = 40 \text{ m}^3$$

### Note

The calculated 40 m<sup>3</sup> is the theoretical total effective volume, not the size of one cell.

The final arrangement may use several cells in series to meet the required stage duty, mixing conditions and maintenance requirements.

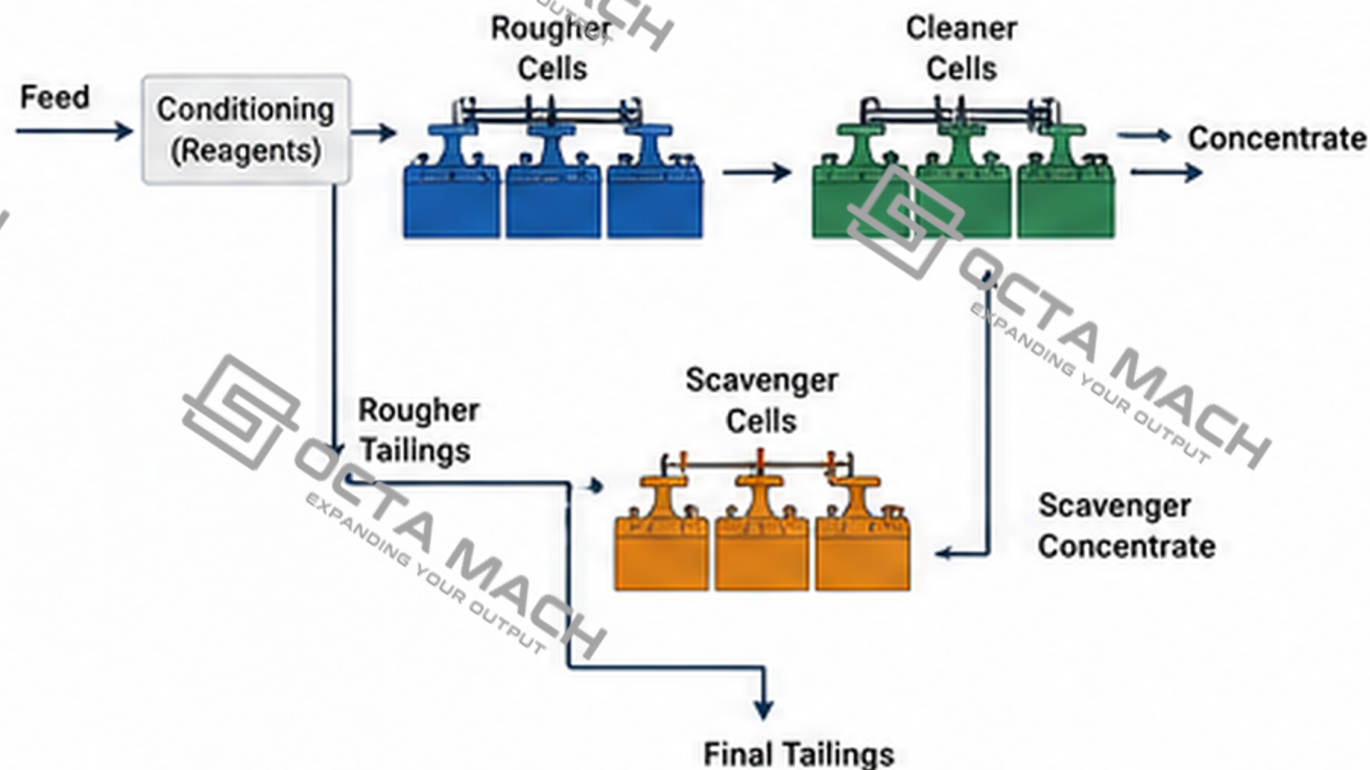


### Considerations

- ✓ Allow for operating margin (level control, froth depth, short-circuiting and process variation).
- ✓ Verify with mineral test work and pilot results.
- ✓ Final design depends on ore characteristics, reagent scheme and circuit configuration.
- ✓ Do not claim fixed recovery or energy saving percentages.



## TYPICAL FLOTATION CIRCUIT ARRANGEMENT



### Rougher Cells

Handle the full feed and maximize recovery of valuable minerals.

### Cleaner Cells

Treat rougher concentrate to improve concentrate grade and remove gangue.

### Scavenger Cells

Treat rougher tailings to recover remaining valuable minerals before final tailings discharge.

## FINAL SELECTION CHECKLIST

| ITEM                                                                                                                     | CHECK                    |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------|
|  Cell volume (m <sup>3</sup> )          | <input type="checkbox"/> |
|  Number of cells and standby            | <input type="checkbox"/> |
|  Air supply method and capacity         | <input type="checkbox"/> |
|  Impeller diameter and type             | <input type="checkbox"/> |
|  Impeller speed (r/min)                 | <input type="checkbox"/> |
|  Motor power (kW)                       | <input type="checkbox"/> |
|  Froth removal (scraper type and speed) | <input type="checkbox"/> |
|  Pulp level control method            | <input type="checkbox"/> |

| ITEM                                                                                                                                   | CHECK                    |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|  Blower pressure and airflow (for KYF)              | <input type="checkbox"/> |
|  Plant elevation                                    | <input type="checkbox"/> |
|  Electrical supply (voltage, frequency, protection) | <input type="checkbox"/> |
|  Maintenance access and platforms                   | <input type="checkbox"/> |
|  Wear parts and materials                           | <input type="checkbox"/> |
|  Instrumentation (if required)                      | <input type="checkbox"/> |
|  Documentation and drawings                         | <input type="checkbox"/> |

### IMPORTANT NOTICE

Selection and performance depend on mineral test work, mineralogy, liberation, reagent scheme, process conditions and circuit configuration.

No fixed recovery or energy-saving percentages should be claimed.