



eDART FLOTATION BYPASS SYSTEM



eDART Flotation Bypass System in use in the DRC

eDART FLOTATION BYPASS SYSTEM

eDART's zero unplanned downtime flotation bypass system gives the ability to automatically take any flotation cell offline for maintenance purposes whilst producing concentrate with the remaining cells.



BENEFITS OF A FLOTATION BYPASS SYSTEM



REDUCED DOWNTIME

- Flotation plant availability ~100%. Maintain at any time
- Maintenance is done on one cell whilst the plant is operational

SAFER MAINTENANCE

- Maintenance can be performed whilst the remainder of the plant operates
- External dart valves provide a significantly easier/safer maintenance environment
- Safe maintenance access to flotation machine or cell

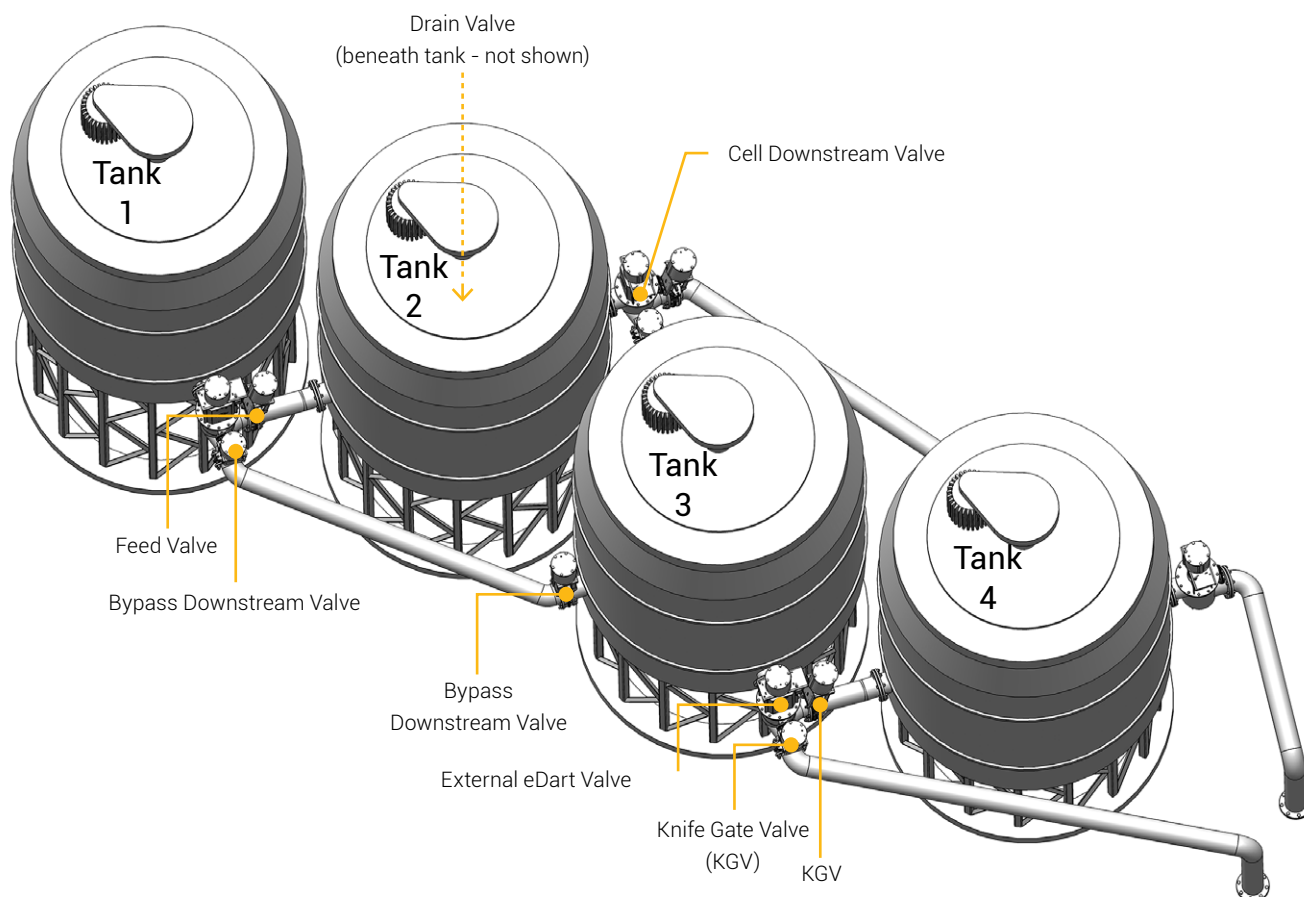
QUICK PAYBACK

- The system's rapid cost recovery is due to its ability to prevent concentrate loss during unplanned downtime
- Additional benefits from the latest level control dart valve technology when upgrading

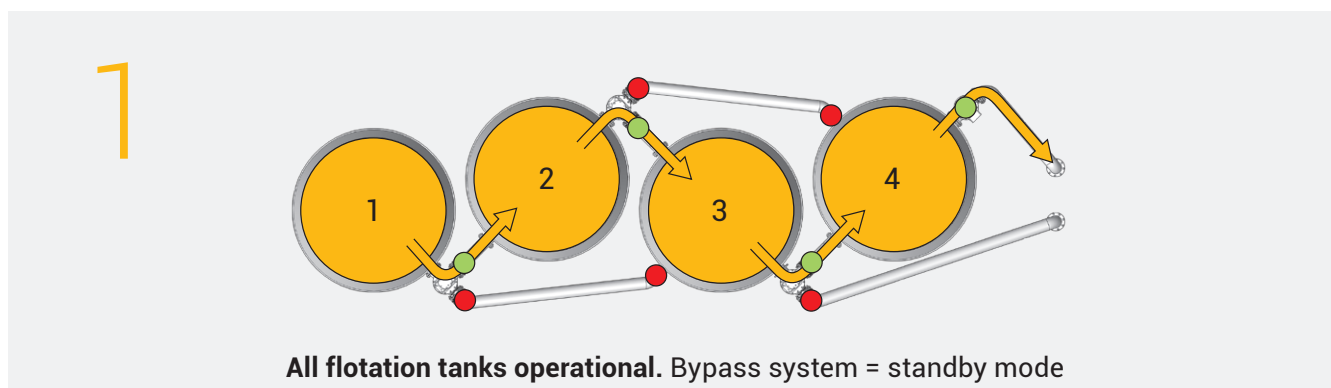


eDART FLOTATION BYPASS SYSTEM

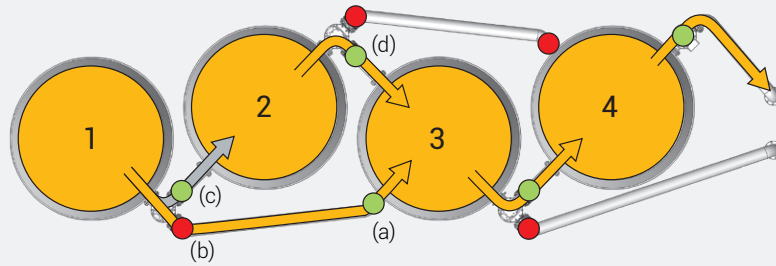
HOW IT WORKS



The following is an illustrated 9 stage example of how maintenance on tank 2 can be performed whilst the remainder of the plant stays operating.



2

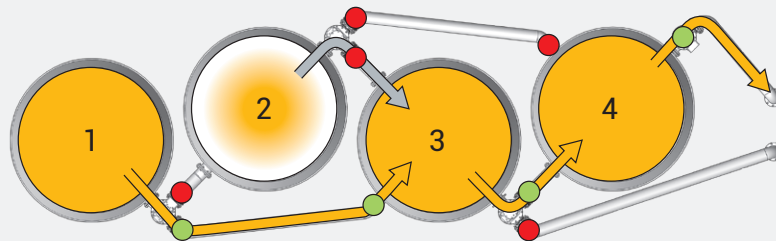


Tank 2 being taken offline. Tank 1 bypass line activated

NOTES:

- The Bypass line is activated first by opening the downstream valve (a) so the Bypass line begins to be partially filled from tank 3 before the upstream bypass line valve (b) from tank 1 is opened
- The level in tank 2 drops to the level in tank 3 without the drain valve activated at the bottom of the tank
- If the drain valve is opened at this time before the downstream valve (d) is closed, there will be back flow from tank 3
- The feed valve (c) to tank 2 is then closed

3

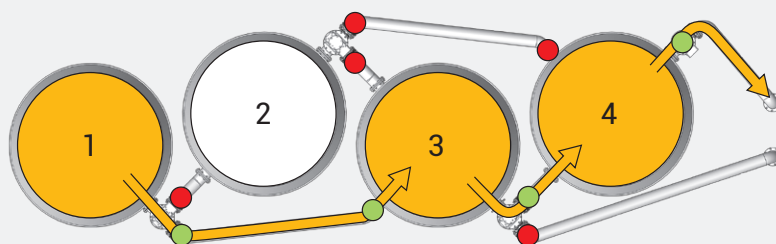


Tank 2 feed & discharge isolated

NOTES:

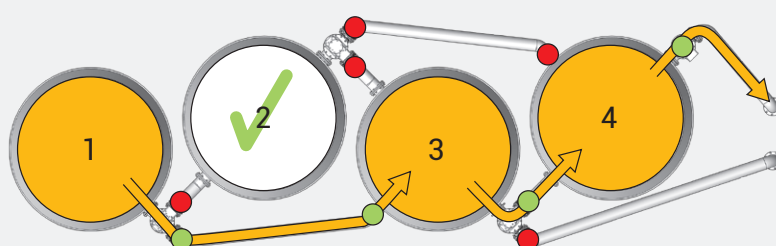
- Tank 2 drain valve is open

4



Tank 2 drained

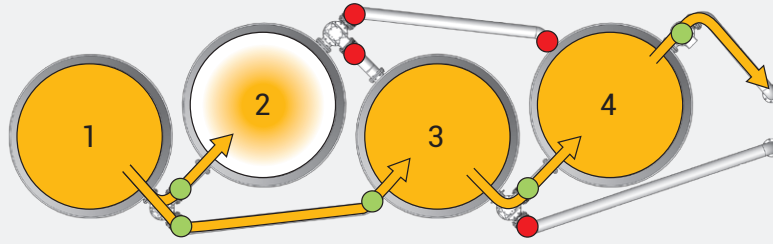
5



Tank 2 safe for maintenance



6

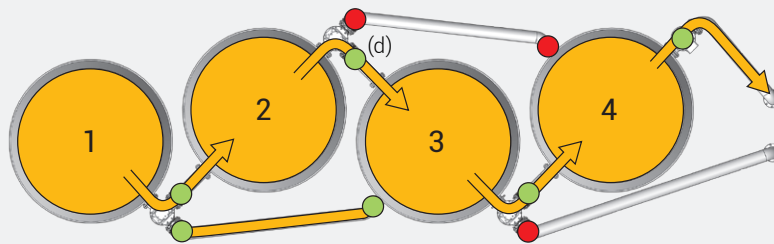


Maintenance complete. Tank 2 feed valve opened – tank slowly starts refilling

NOTES:

- Tank 2 drain valve is closed

7

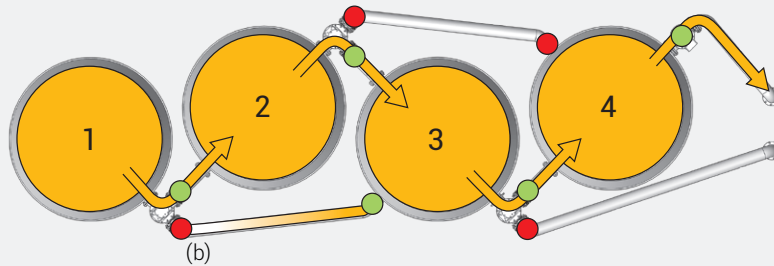


Tank 1 bypass line isolated

NOTES:

- Once the level in tank 2 reaches the level in tank 3, the tank 2 discharge valve (d) may be opened
- If tank 2 discharge valve (d) is opened before the level in tank 2 reaches the level in tank 3 then there will be back flow which unnecessary disrupts the flow through the bank

8

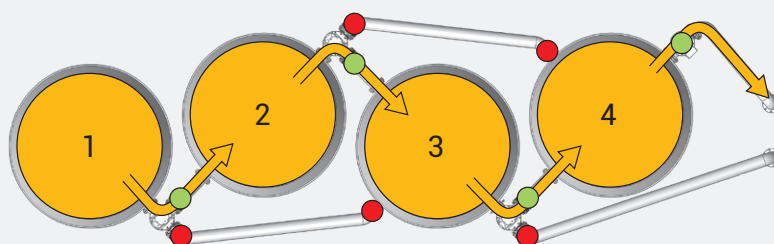


Tank 1 bypass line drained

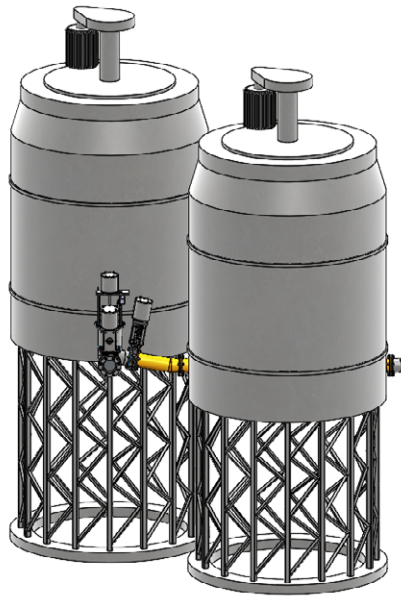
NOTES:

- As the upstream valve (b) to the Bypass line is closed, the Bypass line is flushed with a clean supply of water

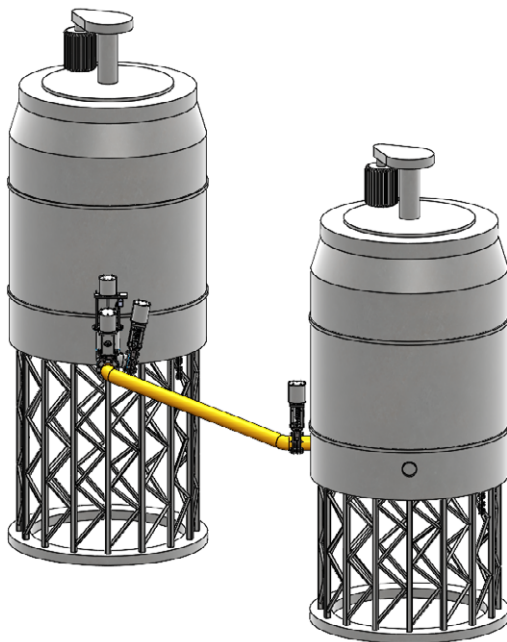
9



Tank 1 bypass line fully isolated. All flotation tanks operational. Bypass system = standby mode



Scheme 1 | Normal operating condition with short 800 NB pipe



Scheme 2 | Bypass operating condition with long 700 NB pipe

WHY IS IT ESSENTIAL THAT THE BYPASS SYSTEM SHOULD BE FULLY AUTOMATED?

There are a number of activities to closely coordinate and time accurately in order to bypass a cell with minimum process disturbance. This is why it is essential that the bypass system is fully automated. For example, the step height across a valve is doubled when a cell is bypassed and the controller needs to anticipate this state as the system goes into bypass more. Additionally, the automation system should continually monitor the status of all valves and raise an alarm if an unsafe condition arises.

eDART | EDART EXTERNAL VALVES

The Dual eDart is an external dart valve mounted on the side of a flotation cell. It has been optimised for variable slurry flow by having two plugs and seats within the body. This gives the valve a high range ability and fine control. Because the valve is external to the vessel it is ideal for plant Bypass systems and where safety is a concern.

INTERNAL FEEDBACK

Wire drawn pots built into the actuator provide precise feedback that either replaces the encoder on the positioner or is configured to provide a 4-20 mA directly to the control room

LARGE ACTUATORS

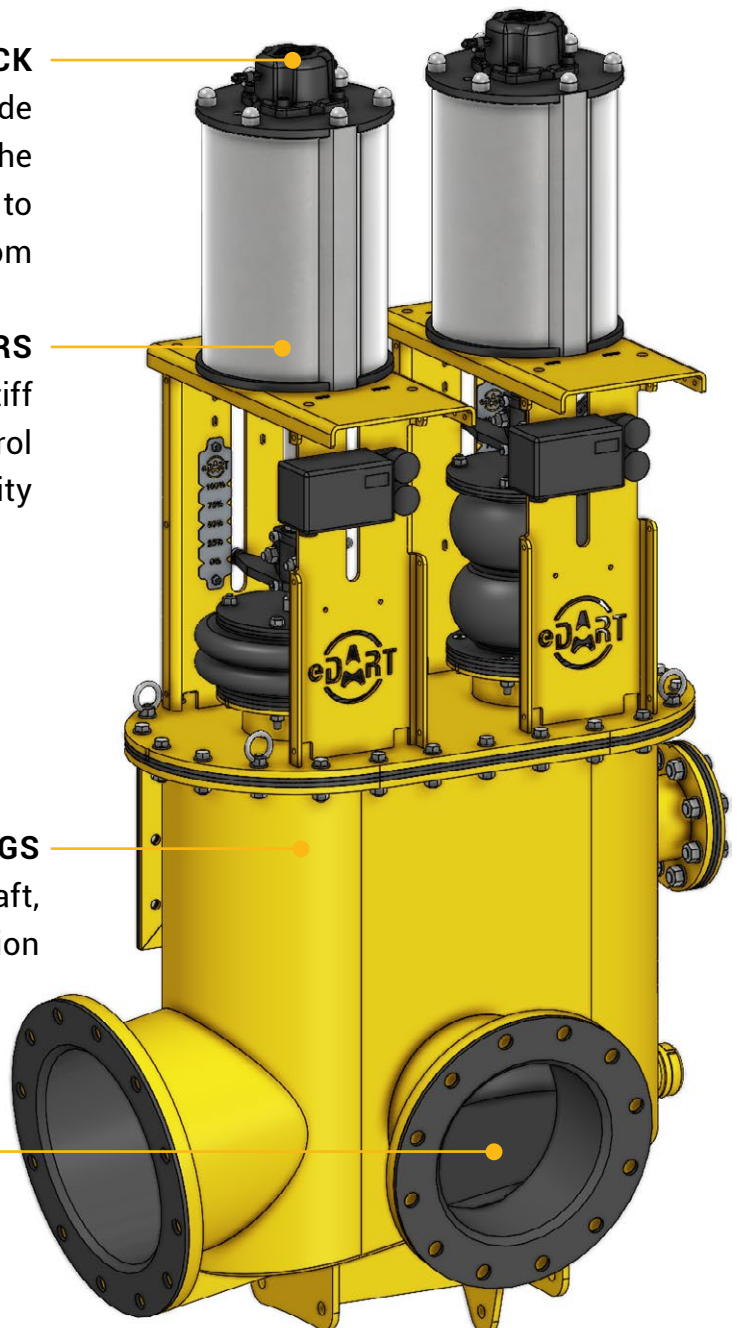
The actuators are sized to provide stiff modulating capability and for improving control and stability

CAGE GUIDED PLUGS

The plugs are guided on the head, not the shaft, for higher stability and vibration reduction

SECOND OUTLET PORT

This eDart Valve version has a second outlet port designed especially for a bypass



eDART | BYPASS KNIFE GATE VALVE

This specialised eDart Knife Gate Valve is designed specifically for bypass applications.



Specific features for flotation bypass systems:

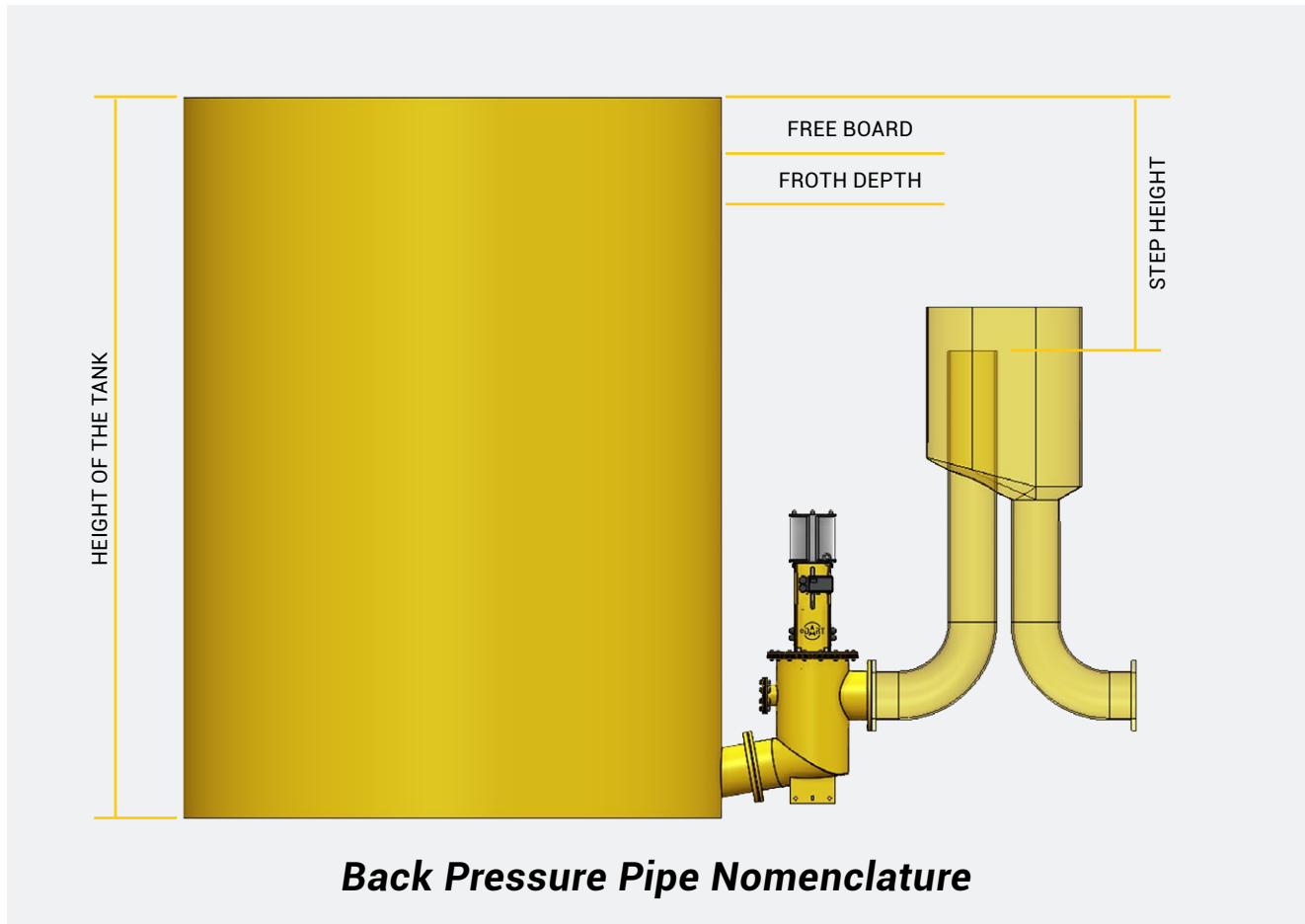
- Low pressure valves suited to tank pressure which results in the best system to reduce cost
- Actuated for system automation and ensures best recovery rates because the system can't be left in a partially open state which is the case with manually operated bypass systems
- Internal feedback to supply 4-20 mA to control room without positioner which allows for more controlled valve operation and partial stroke tests for diagnostic purposes
- Lockout for safety

Knife Gate Seal:

- Polyurethane is moulded into the body with a gate in place, this fills the chest cavity and lines the port where the valve fits into the line with no exposed valve body material



eDART | BACK PRESSURE SOLUTION



The eDART Back Pressure Solution is installed on the final flotation cell discharge end to improve the slurry level control.

Typically banks of flotation cells are designed to have a standard step height from cell to cell to facilitate the gravity flow of slurry downstream. In the final flotation cell the step height increases by an order of magnitude often resulting in severe instability and total loss of slurry level control.

To improve level control performance in the final cell and to reduce the pressure drop across the final dart valve, a back pressure join with a dart valve incorporated, is used to artificially reduce the step height resulting in dramatically improved level control and mass pull in the final float cell.

Other features and benefits of the eDART Back Pressure Solution:

- Enables common valve size to be specified for the entire flotation bank
 - Reduces wear of the final valve
-

INTRODUCING eDART'S COMPREHENSIVE DESIGN PROCESS

Our innovative approach to flotation bypass is designed to optimise your operations without compromising on simplicity and cost-effectiveness.

Here's a brief overview of our key principles:

- 1. Streamlined Control Valve:** We use the same control valve for both Normal and Bypass modes to simplify the control system and enhance operational efficiency
- 2. Dual External Dart Valves:** We recommend the use of dual external dart valves to reduce costs compared to single external valves and overcome the limitations of internal dart valves
- 3. Strategic Dart Valve Placement:** By staggering the dart valves down the bank, we ensure smooth rotor operation, minimising the risk of slurry bypassing the rotor



- 4. Bypass-Ready Dual Valves:** Our valves come pre-equipped with two outlets for normal and bypass modes, essential for a Flotation Bypass Solution (FBS)
- 5. Pneumatic Actuators:** All valves are fitted with pneumatic actuators to reduce manual operation time, encouraging practical use of the FBS
- 6. Feedback Potentiometers:** Potentiometers with 4-20 mA output regulate valve opening for a smooth transition, enhancing plant stability
- 7. CFD Modelling:** Every bypass pipe undergoes Computational Fluid Dynamics (CFD) modelling to ensure optimal slurry flow, preventing choking or blockages
- 8. Automatic Purge and Drain Valves:** These valves prevent slurry from settling in bypass pipes, ensuring the FBS remains operational and efficient
- 9. Back Pressure Solutions:** Installing back pressure solutions improves cell level control and extends the life of control valves
- 10. Automation:** Automating the bypass system enhances safety, speeds up actions, and provides valuable data for equipment maintenance
- 11. Cost-Effective Solutions:** For capital projects, we offer a “Bypass-Ready” option, minimizing initial costs and allowing for easy future FBS installation

Our approach prioritizes simplicity, cost-effectiveness, and adaptability, ensuring that your flotation process remains efficient and reliable.





TALK TO US ABOUT SOLVING YOUR SLURRY-RELATED CHALLENGES

eDART designs and manufactures slurry equipment to improve recovery rates for metallurgical plants. We combine our Computational Fluid Dynamics (CFD) expertise with extensive site experience to reliably solve your complex slurry challenges.

How can we help you?

eDART GROUP SA (PTY) LTD

7 Industrial Road, Kya Sand, Gauteng, South Africa.

OFFICE HRS: Mon to Thur: 7am - 5pm | Fri: 7am - 2pm | Sat to Sun: Closed

E: info@edart.group | T: +27 11 791 1411

www.edart.group



***ISO 9001 is the internationally recognised standard
for the quality management of businesses.***