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# Chemical dosing and fresh water reduction

Conditions, advantages and  
limits

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# Structure

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- > Introduction
- > Potential for reducing fresh water during chemical dosing
  - > Examples
    - > Paper production
    - > Waste water and sludge treatment facilities
- > Summary

# Challenges - today and tomorrow...in terms of fresh water

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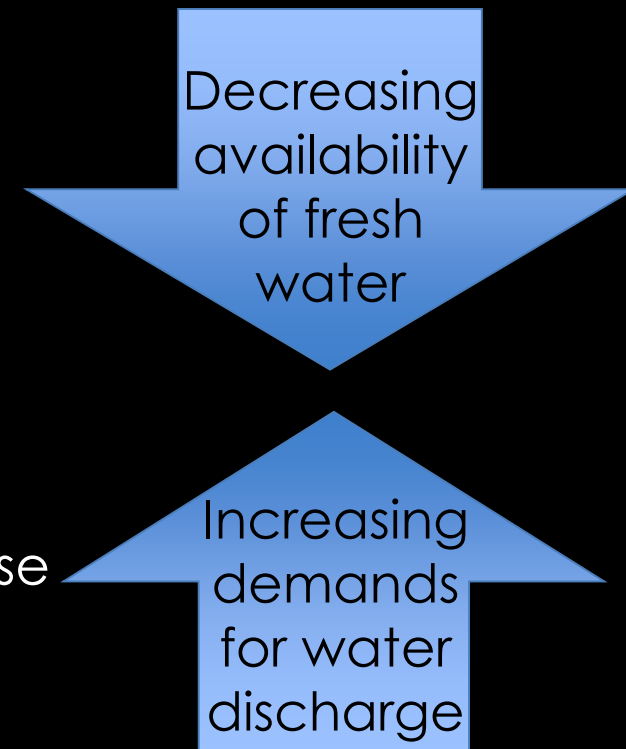


## > Fresh water sources for paper production

- > Surface water
- > Well water
- > Municipal water

## > Obstacles for water disposal:

- > Waste water treatment capacities
- > Limited volume to receiving water course
- > Temperature
- > Water treatment quality



# Fresh water consumption during chemical dosing

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> Preparation

> Dilution

> Transportation

# Polymer preparation - powder

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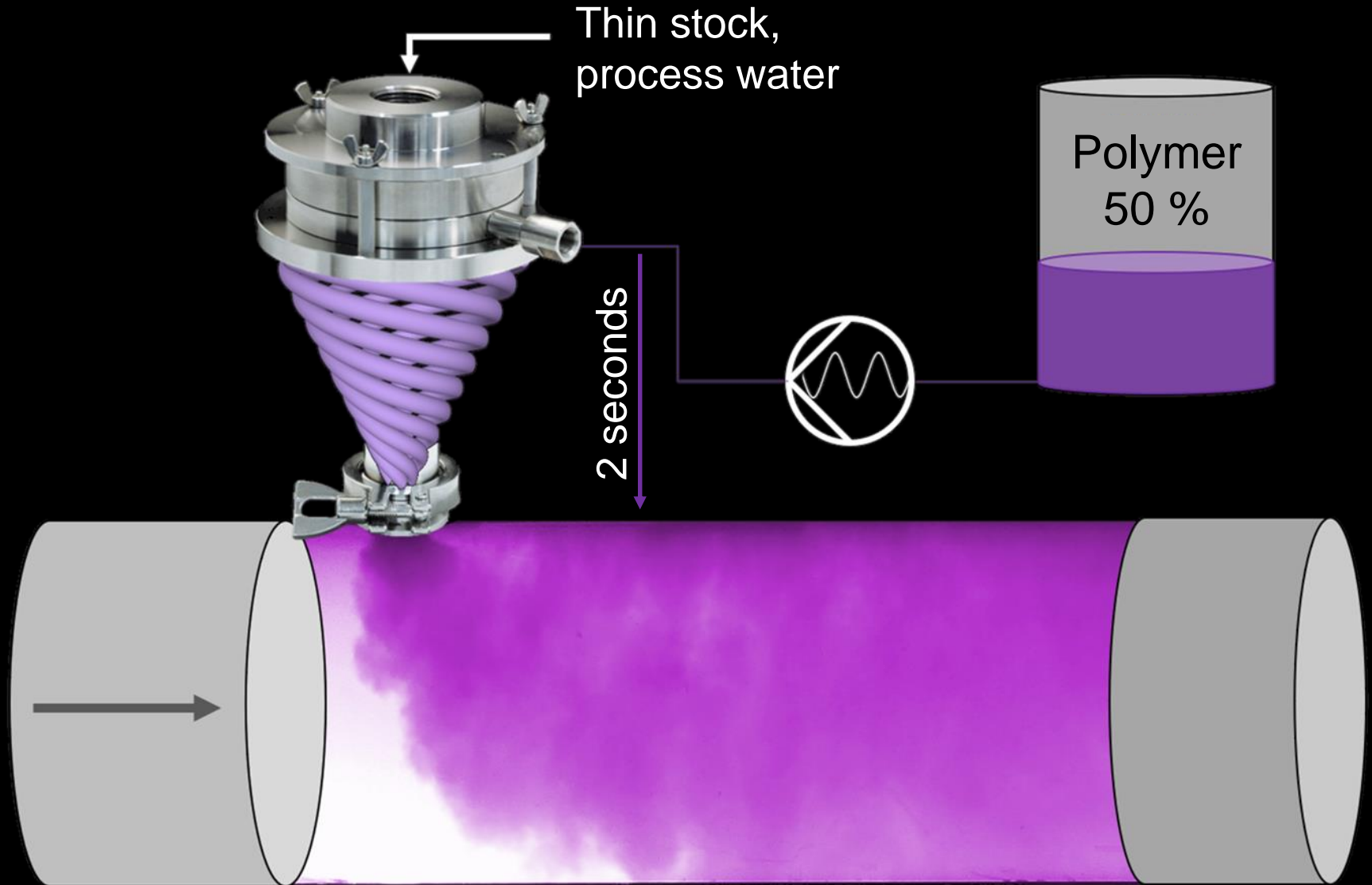
- > Increase of polymer concentration (up to 2%)
  
- > Advantages
  - Less potential for hydrolysis
  - Usually better hygienic situation
  - Less fresh water consumption
  - Less reaction potential



## > Requirements

- Suitable stirred tank for proper polymer preparation without gel agglomerates
- Appropriate short distance from preparation stage to dosing point
- Appropriate diameter of transportation hose/pipe for high flow velocities ( $> 2\text{m/s}$ )
- Appropriate filters regarding size, construction and mesh size, shortly before dosing point
- Suitable mixing and dosing technology for fast distribution of polymer solution

# Polymer preparation - liquids





# Polymer direct dosing - liquids

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## > Advantages

- No hydrolysis
- Insitu preparation of polymer with process water
- Better hygienic situation in pipes an/or hoses due to last second preping and mixing of sterile polymer with water
- No fresh water consumption/less waste water
- No cooling of water circuit

## > Requirements

- Ecowirl for polymer direct dosing and for distribution in full stream
- Polymer storage tank nearby preparation and dosing point

# Advantages and Limits

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## Advantages

- > Circuit warming
- > No „shock situations“ regarding e. g. temperature therefore:
  - > Less potential for precipitation in low pressure areas
- > Less potential for hydrolysis, if suitable fast mixing devices are installed

## Limits

- > Higher degree of salination
- > Microbial situation

# Influence of dosing position

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- > Choice of a suitable dosing point on the pipe can decrease consumption of chemicals and fresh water
- > Point of dosing depends on sort of chemical (reactivity, order of dosing within chemicals) and production but:
  - > Position with regard to flow on pipe (flow velocity, change of direction) should be chosen carefully
  - > Dosing technique for proper and quick distribution
  - > Flocculation and formation are influenced by screen and distance of dosing point to headbox

# Influence of dosing position

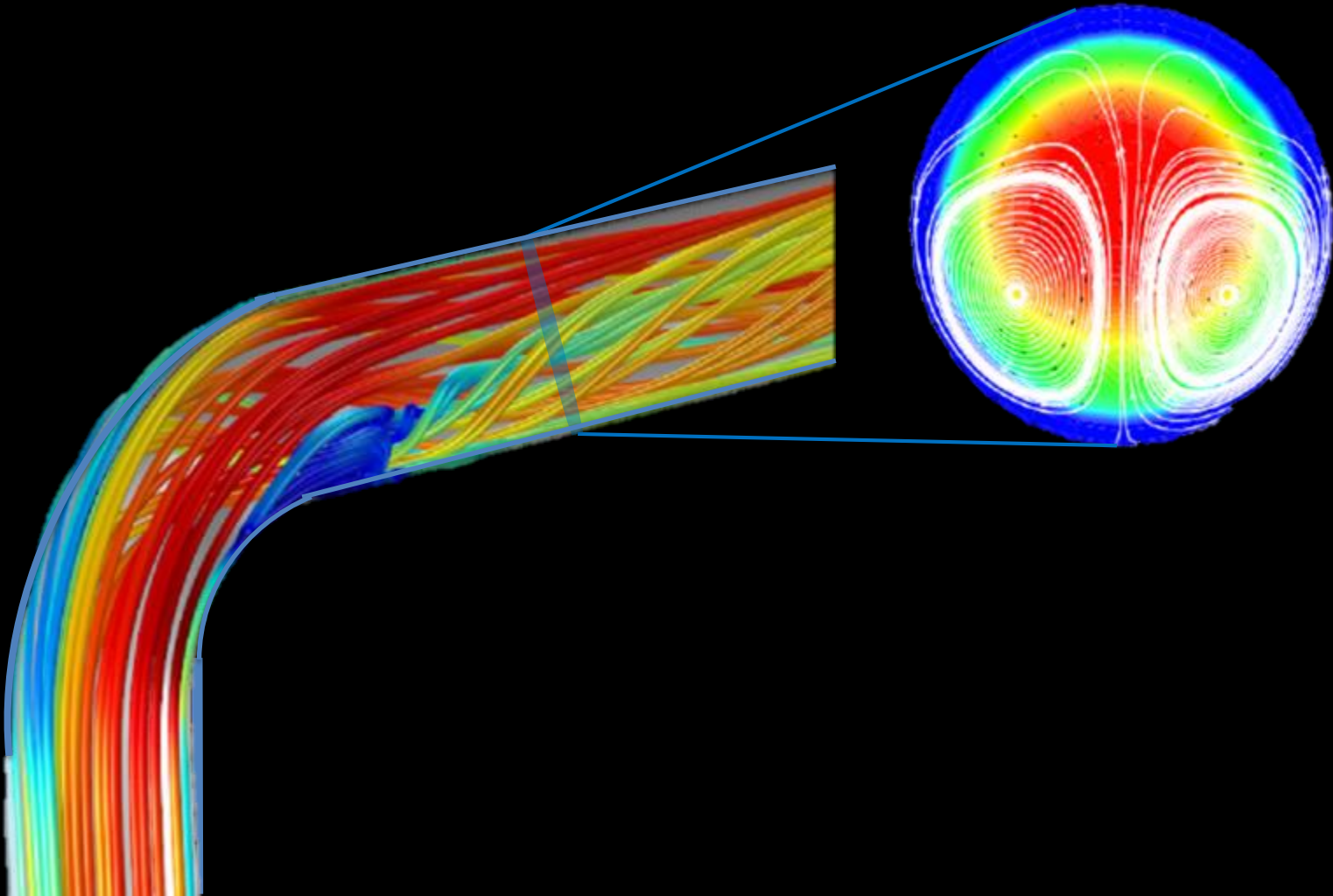
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- > Polymers:
  - > Position before screen will affect flocculation and result in higher consumption of polymer, induced by screen
  - > Position after screen gives potential to reduce chemical/water consumption by 20 to 25 %

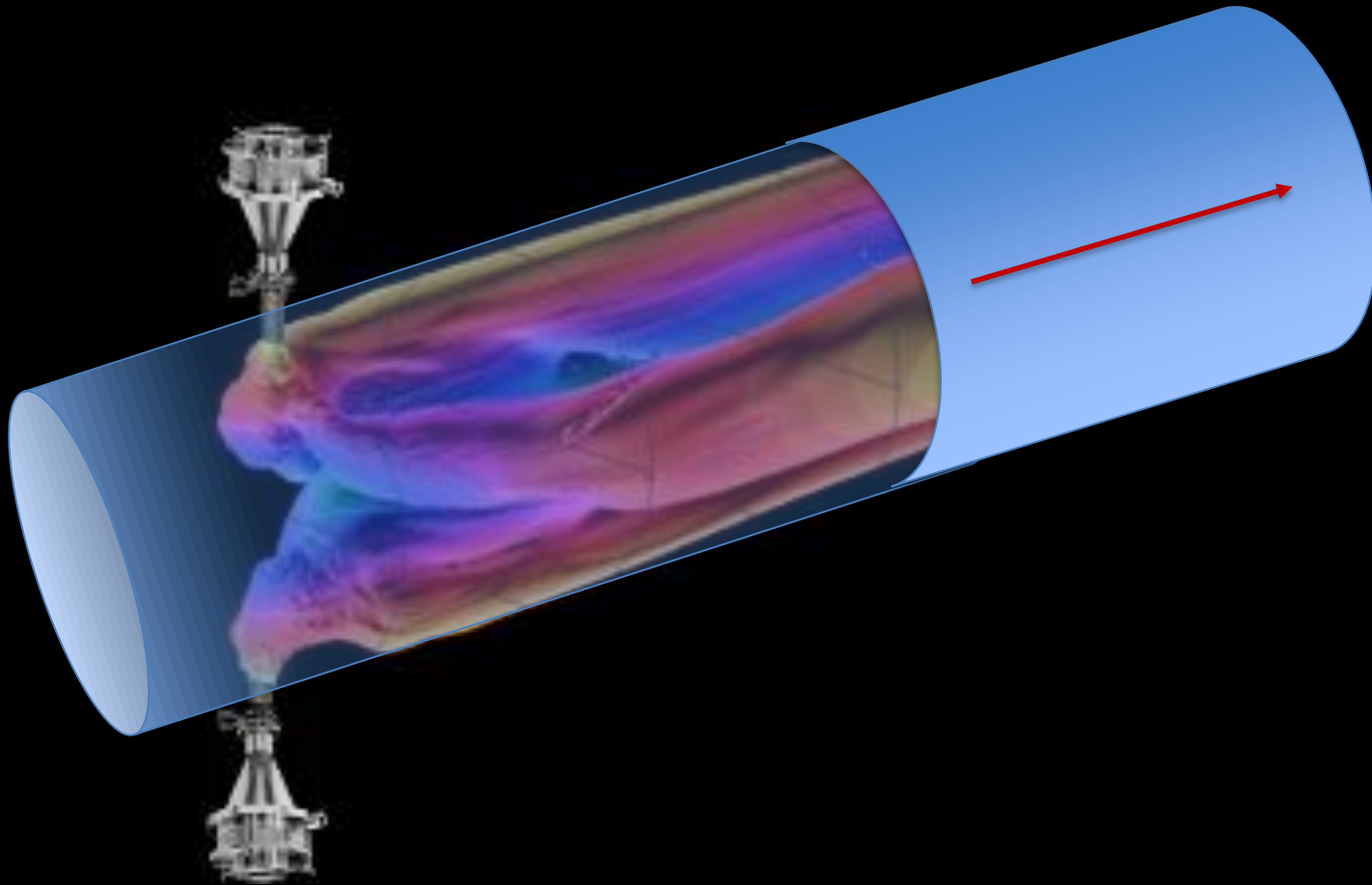
# Flow development in curves

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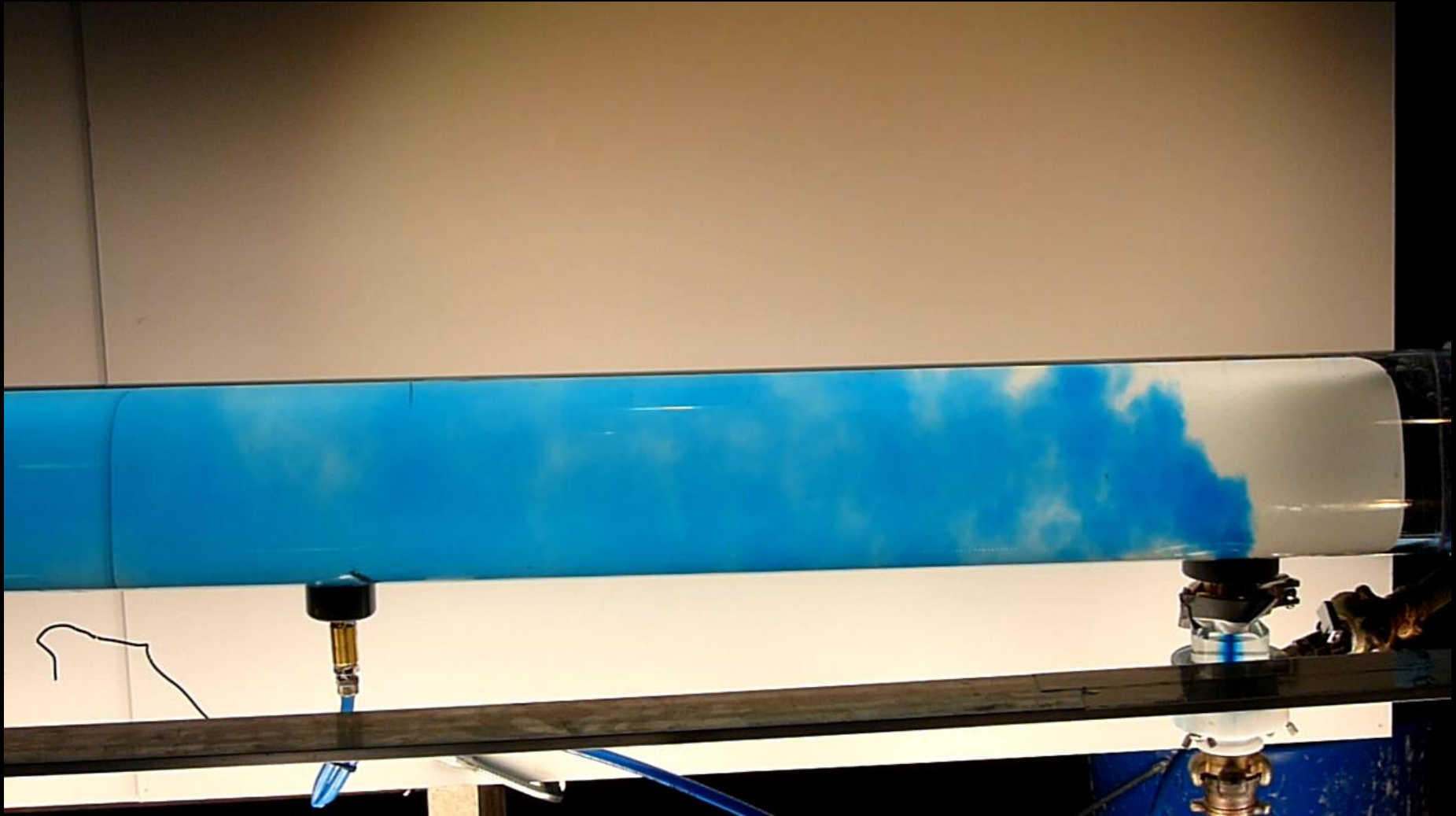


# Whirlfield mixing

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# Whirlfield mixing



# Process water and sludge treatment

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- > Applications: Flotation and Kroftas, sludge presses
- > Fresh water consumption for preparation, dilution and transport of polymers
- > Fresh water reduction via increase of polymer concentration
  - > Similar requirements regarding flow velocities and hose length between preparation and dosing point
- > Complete fresh water replacement by process water for direct dosing



# Example from sludge treatment



## Prior situation

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- > Fresh water consumption:  
73 m<sup>3</sup>/d
- > First preparation to 0,2 % with traditional stirrer (powder polymer)
- > Dilution to 0,08 % for transport to sludge press line
- > Wide transportation distance
- > 4 injection points in sludge line

## After increase of polymer concentration

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- > Fresh water consumption:  
2,7 m<sup>3</sup>/d
- > Preparation to 2 % with desintegration stirrer (powder polymer)
  - > No further dilution
- > Short distance of preparation to dosing point
- > Ecowirl for polymer injection in sludge line
- > Polymer consumption: -25%

# Summary

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- > Chemical dosing offers potential for fresh water optimisation, in both production and process water/sludge treatment
- > Careful check of given situation for:
  - > Dosing points in relation to pipe and in pipe conditions
  - > Distances of transportation, course of pipes and hoses for chemicals
  - > Dosing equipment for suitable mixing
- > Optimization of parameters like flow velocity, pipe/hose diameter should be carried out
- > Optimization can offer not only reduction in fresh water consumption but also in chemical consumption, formation and machine performance

Thank you!

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