



Water Recovery & Reuse in Garment Manufacturing



Presentation Overview

- **Industrial Wastewater Treatment Challenges**
- **UOP XCeed™ Immobilized Cell Bioreactor technology**
- **Garment Manufacturing Case Study Data**

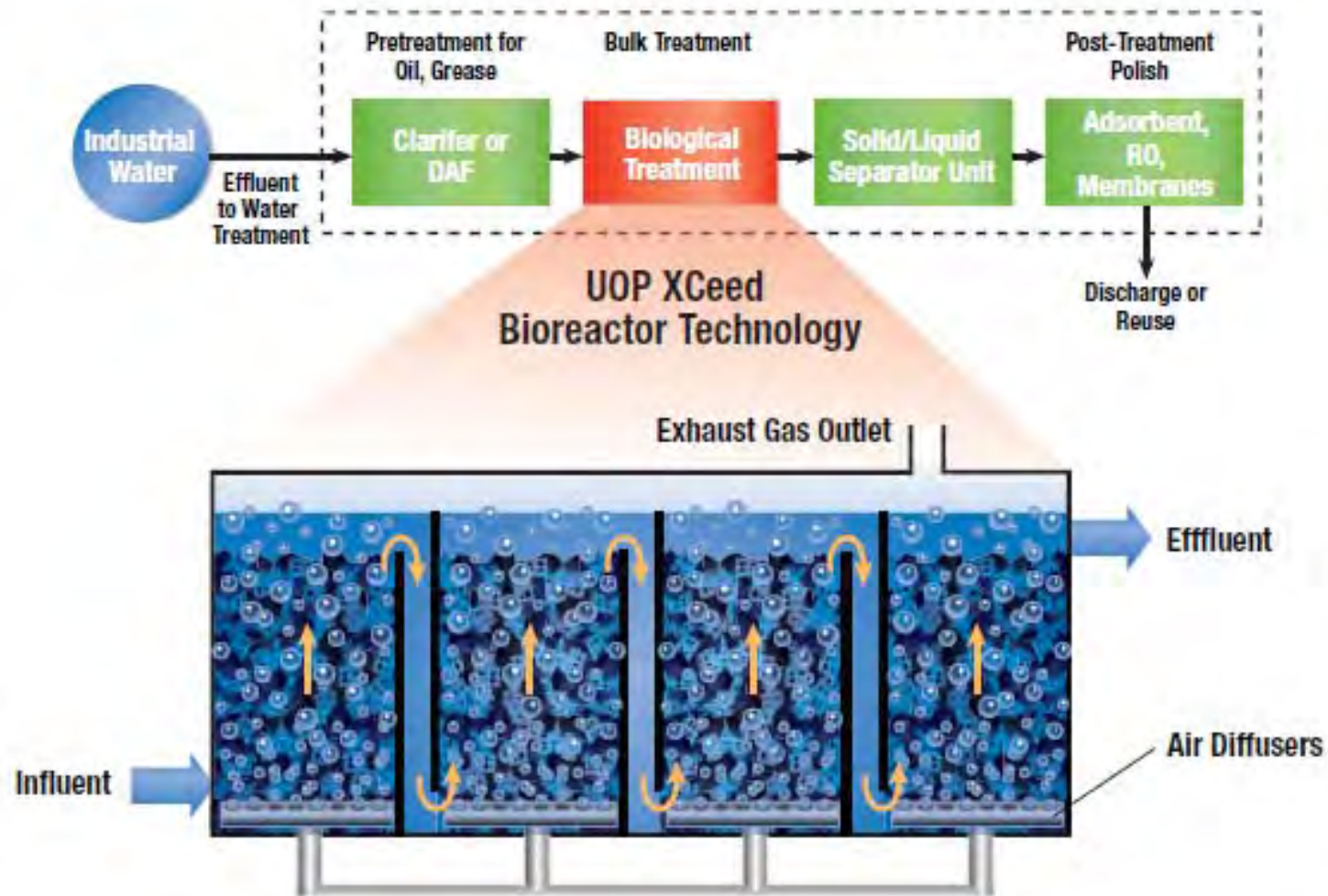
Production Challenges

- **Textile production requires significant volumes of water**
- **Availability and cost of fresh water can limit production**
- **Wastewater contains high levels of BOD and COD that must be removed for internal reuse**
- **Operational cost to treat wastewater for internal reuse can be prohibitive**

Production and cost challenges drive need for advanced, efficient biological wastewater treatment

XCeed™ Bioreactor Technology

COMPARTMENTALIZED, PLUG-FLOW DESIGN



High efficiency in a compact design

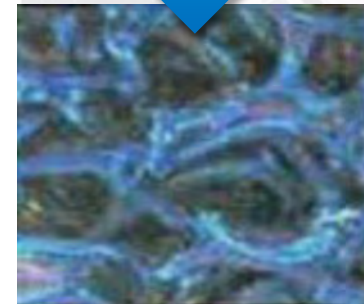
Key Components



*Bioreactor
Contains...*



**Proprietary
mixed-media
packing**



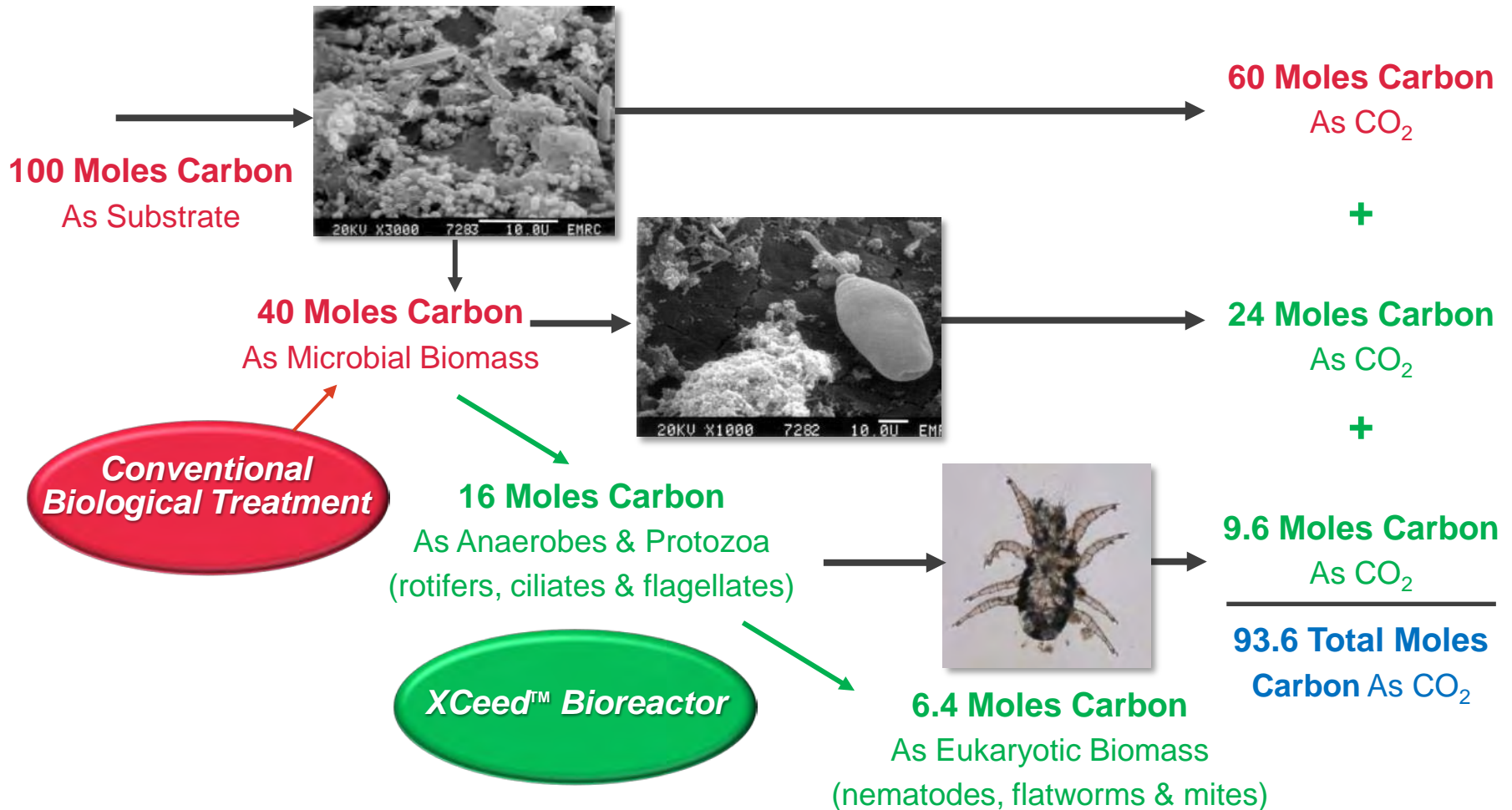
**Bio-catalyst Support
(Close-up of mixed-
media foam)**



**Bio-catalyst
(Microbes which densely
populate the mixed-media)**



Biological Lifecycle



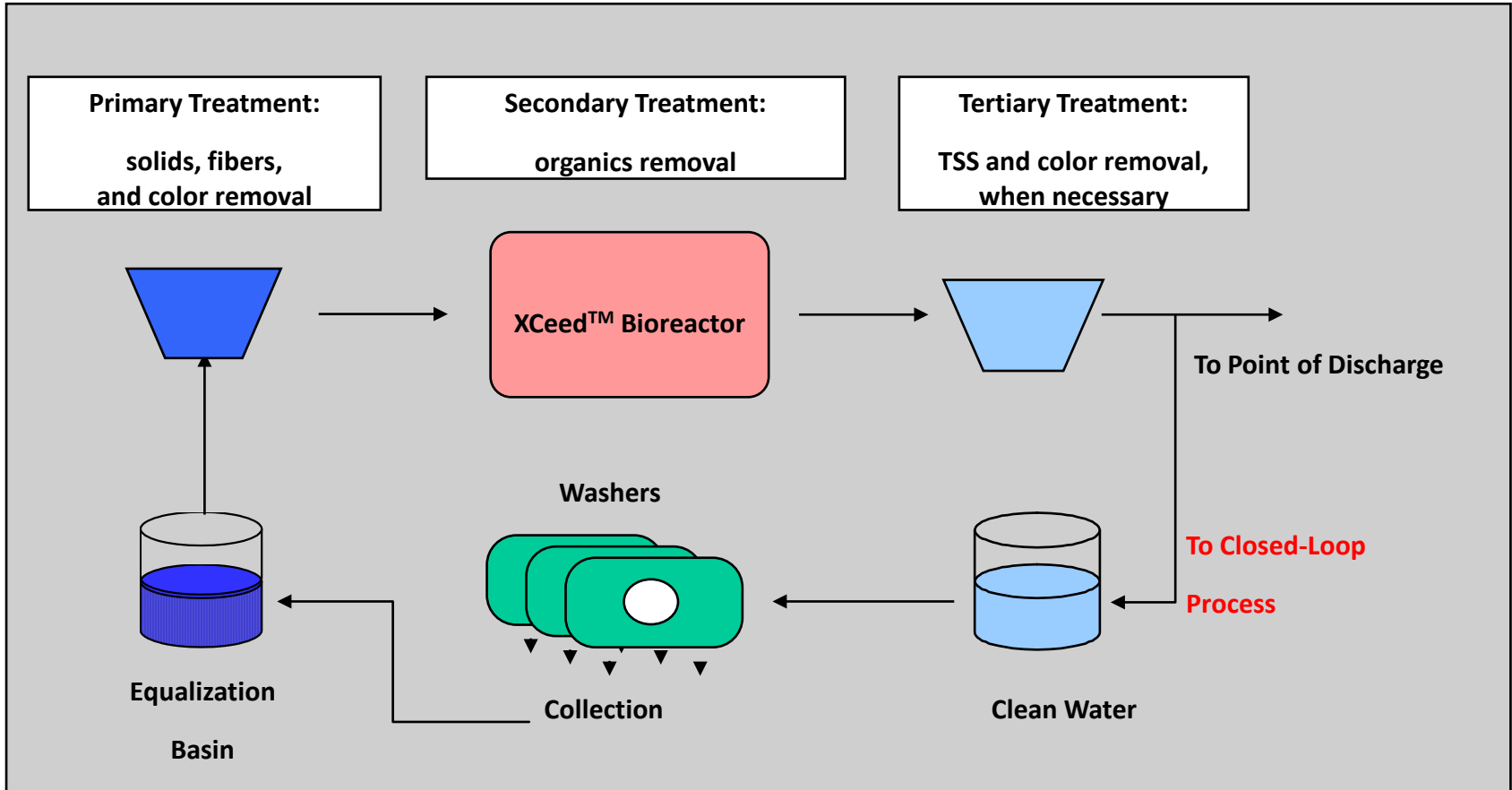
Longer solids retention time promotes:
1) Growth of higher life forms 2) 70-80% less sludge

Garment Manufacturing Case Study

- Operations in water-constrained area in Latin America
- Local community water supply was impacted by manufacturing water demands
 - Facility implemented water reuse system for finishing operations



Water Reuse System



Bioreactor System Parameters

- **MLSS > 10,000 ppm**
- **Biomass retention time > 60 days**
- **Sludge yield: 0.07 – 0.12 kg biomass/kg BOD₅ consumed**
- **Biomass loading: 3.5 – 4.8 kg BOD₅/m³/day**
- **HRT: 3 – 9 hours**
- **Energy consumption: ~ 25 kw/hr**

System Performance

Parameters	Raw Process Effluent	Primary DAF Effluent	Bioreactor Effluent	Secondary DAF Effluent
Flow (gpm)	200-400	200-400	200-400	200-400
COD (mg/L)	800-1,000	300-500	100-150	100-150
BOD (mg/L)	250-350	200-300	0-35	0-25
Turbidity (NTUs)	200-300	50-100	75-125	25-50
Color (PtCo)				
Finishing	300-400	100-150	75-90	40-60
Dyeing & Finish.	1250-3500	500-800	300-600	100-150*
pH (S.U.)	8.0-9.5	7.5-9.0	7.5-8.5	7.5-8.5
TDS (mg/L)	600-1200	600-1200	600-1200	600-1200

* Hypochlorite post-treatment polishing

- **Garment manufacturing facility recovered 80-90% of wastewater for reuse**
- **Product quality maintained following implementation of water reuse**
- **Production bottleneck issues associated with water supply were eliminated**
- **Order backlog was reduced and orders could be filled on demand**

- **Questions**