

# Any resin, any application, any size

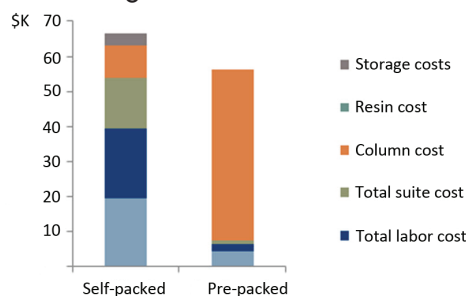


OPUS® Pre-packed Chromatography Columns offer unparalleled flexibility in media choice, application and size.

Applying the most advanced pre-packed chromatography column technology available today, OPUS® columns are ready-to-use and disposable alternatives to traditional self-packed columns. Manufactured following ISO 9001 quality manufacturing guidelines, each column comes with complete documentation for GMP use.

- Open platform, user-specified pre-packed chromatography columns
- Enables disposable downstream manufacturing
- In 34 Phase 1-3 campaigns
- 800 columns since 2012 and 20+ 45 cm columns since April 2014

## Cost Savings



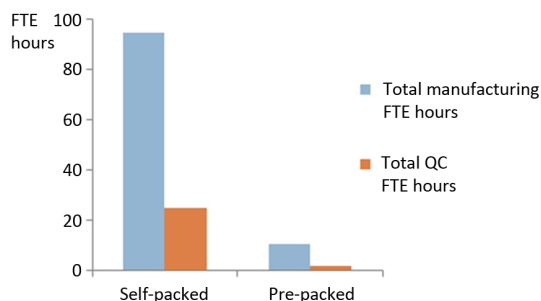
Case study: Using OPUS® 45 cm pre-packed columns generated over \$10,000 savings compared to self-packed columns.

Product Identification		QC Release Data	
Cellula	Description: GMP Run Ready	Cellula	Specification: Result
GMP Level:	GMP Run Ready	Column Efficiency: (Plate/Inch)	> 1800 2892
Catalog Number:	BC-900-CPB-120-G	Column Asymmetry:	0.8 - 1.6 1.0
Lot Number:	OC131594	Microbial Retention (CFU/mL)	Resort: 13
Serial Number:	0002	Endotoxin Level (EU/mL)	Report: < 0.1

QA Information		Test Conditions	
Quality Standard	Manufactured	Condition	10F IMC7
Quality Manager	Quality Manager	Mobile Phase	PBS
All materials to requirements		Flow Rate	100 mL/hr
Material Cert. All materials to requirements			
Resin Type:	CaptoA™ PIMAB		
Resin Lot Number:	6111074, 6121121, 6131019		
Shipping Buffer:	20% Ethanol		
Packing Date:	11/2013		

OPUS® columns are packed in ISO 7 Classified Clean Rooms, and come with Certificates of Analysis from an auditable Quality System that is ISO 9001 Certified.

## Labor Savings



Case study: Using OPUS® pre-packed columns helped reduce labor usage by over 100 hours, an 89% reduction, compared to self-packed columns.

# First and only pre-packed columns for 1000L - 2000L bioreactor harvests



OPUS® 45cm and 60cm columns purify feed streams from production-scale bioreactors.

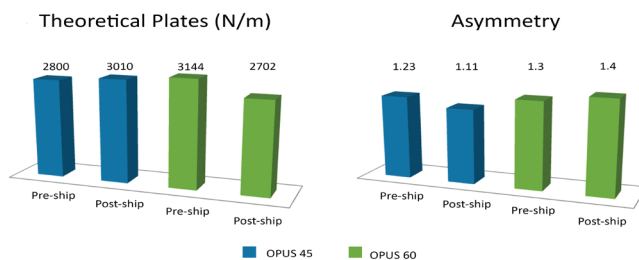
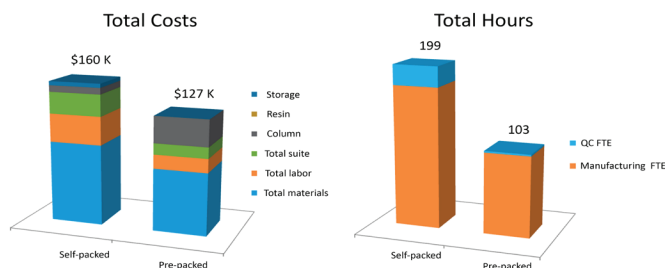
Specifically engineered to meet the requirements of large-scale bioreactors, OPUS® 45cm and 60cm columns match the performance of traditional self-packed columns while delivering the cost and labor savings expected from ready-to-use pre-packed columns.

## Cost and labor savings

Over 19% cost savings and up to 50% labor savings were achieved when using OPUS® columns compared to traditional self-packed columns.

## Performance maintained after shipping

OPUS® columns are tested rigorously and shipped in crates that pass the International Safe Transit Authority's (ISTA) Procedure 2B.



Assumptions: Glass column amortized over 20 campaigns, OPUS® 60 cm columns over 3 campaigns; 3 batches/campaign; 2 cycles/batch; 0 column repacks.

Shipping tests include high temperature (38° C) and high humidity for 36 hours, low temperature (4° C) and low humidity for 36 hours, compression testing (381 kgs on top of crate), 2 hours of random vibrational testing, multiple drop tests.

Physical Attributes		
	OPUS® 45	OPUS® 60
Internal diameter	45.7 cm	59.9 cm
Column body pressure rating	3 bar	3 bar
Bed height range	5-30 cm	5-30 cm
Column volume: 20 cm bed height	33 L	56 L
Assembled column height	~ 90 cm	~ 92 cm
Outer diameter (including caps)	54 cm	61 cm
Inlet/Outlet flow path internal diameter	12.7mm (0.5 inches)	19.05 mm (0.75 inches)
Inlet/ Outlet port connectors Per ASME BPE Standards, current ed.	Fractional tri-Clamp	1 inch tri-Clamp
Estimated weight @ 20 cm BH	68 kg (150 lbs)	160 kg (350 lbs)

Product Contact Materials and Certifications				
Component	Material	USP <88> Class	CFR 21 177	Animal Origin
Column tube	70% w/w E-Glass/ PP engineered composite structure	Class VI	177.1520	Animal-free
Flow distributors	Polypropylene	Class VI	177.1520	Animal-free
Inlet & Outlet	Polypropylene	Class VI	177.1520	Animal-free
Big support screens	Polypropylene	Class VI	177.1520	EMEA 410/01
O-rings	Platinum-cured Silicone	Class VI	77.2600	Animal-free
Return line	Platinum-cured Silicone	Class VI	77.2600	Animal-free