

Efficient and secure:

# Vaccine Production with GEA pharma separators

DCVMN ANNUAL GENERAL MEETING

NOVEMBER 3<sup>RD</sup> TO 5<sup>TH</sup>, 2020

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DIRECTOR BUSINESS LINE CHEMICAL & PHARMA



# GEA – engineering for a better world



GEA is one of the largest technology suppliers for food processing and of related industries.



**18,490**

employees (FTEs)



**4,880**

EUR million revenue

The company is listed on the German MDAX (G1A, WKN 660 200), DAX 50 ESG, the STOXX® Europe 600 Index and selected MSCI Global Sustainability Indexes.



**0.85**

EUR per share  
dividend proposal

The global group specializes in machinery, plants, as well as process technology and components.

GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.



**4,931**

EUR million order intake



**9.8**

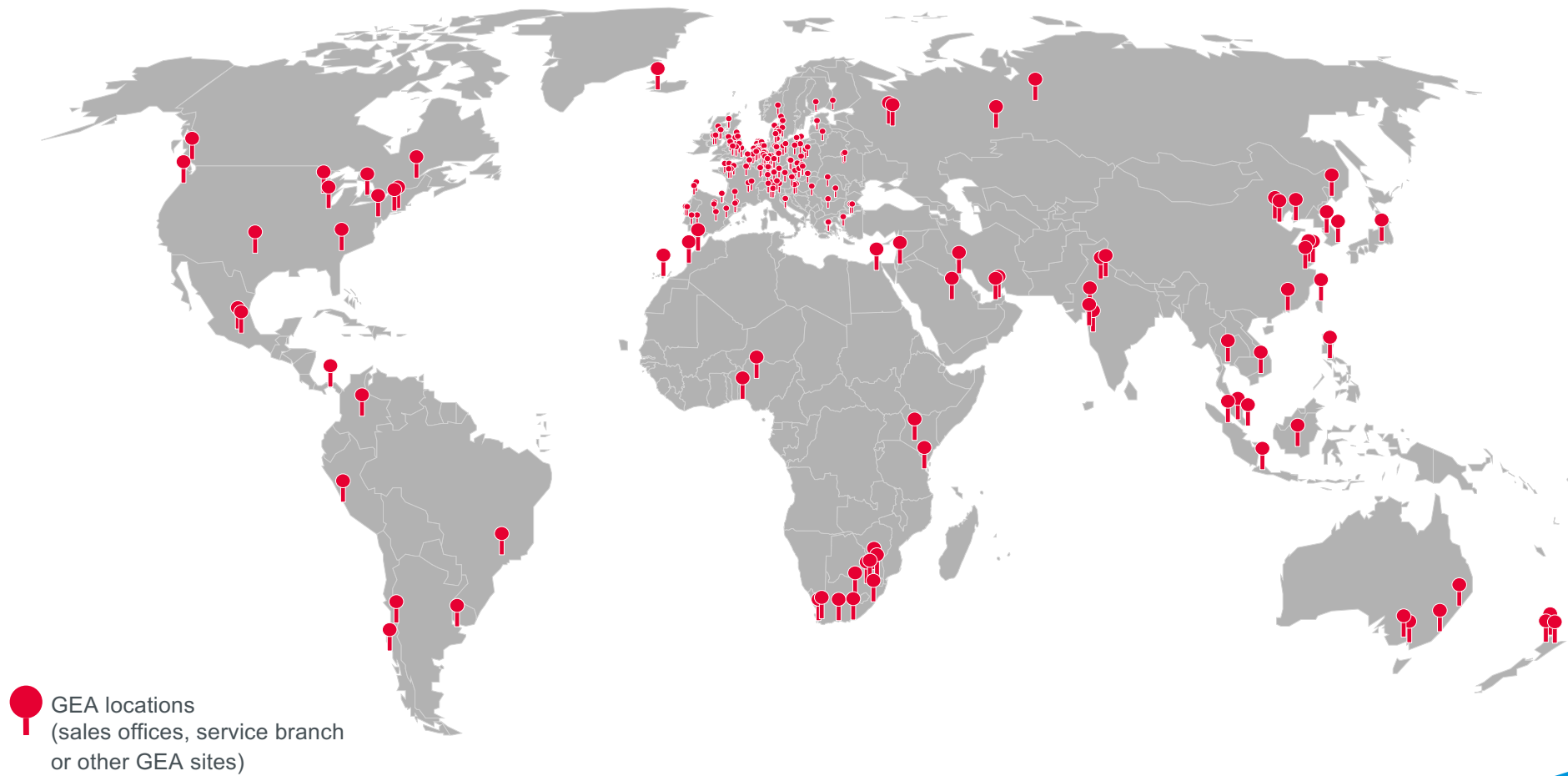
(EBITDA before  
restructuring measures)



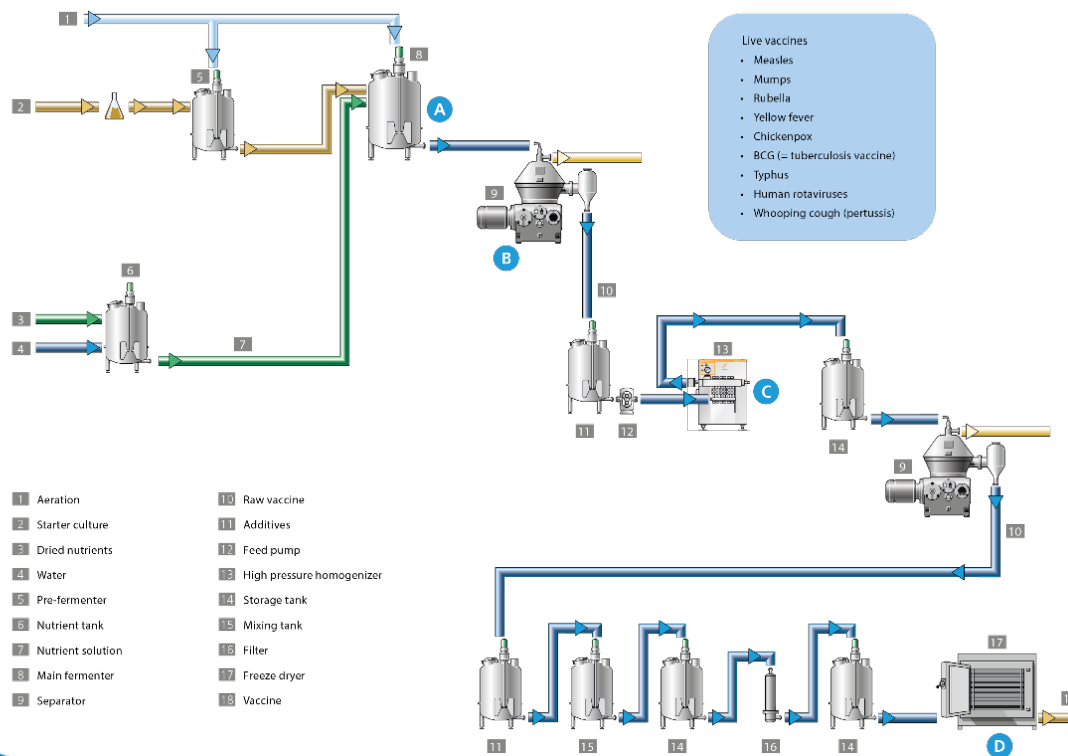
**479**

EUR million EBITDA before  
restructuring measures

## Local presence worldwide

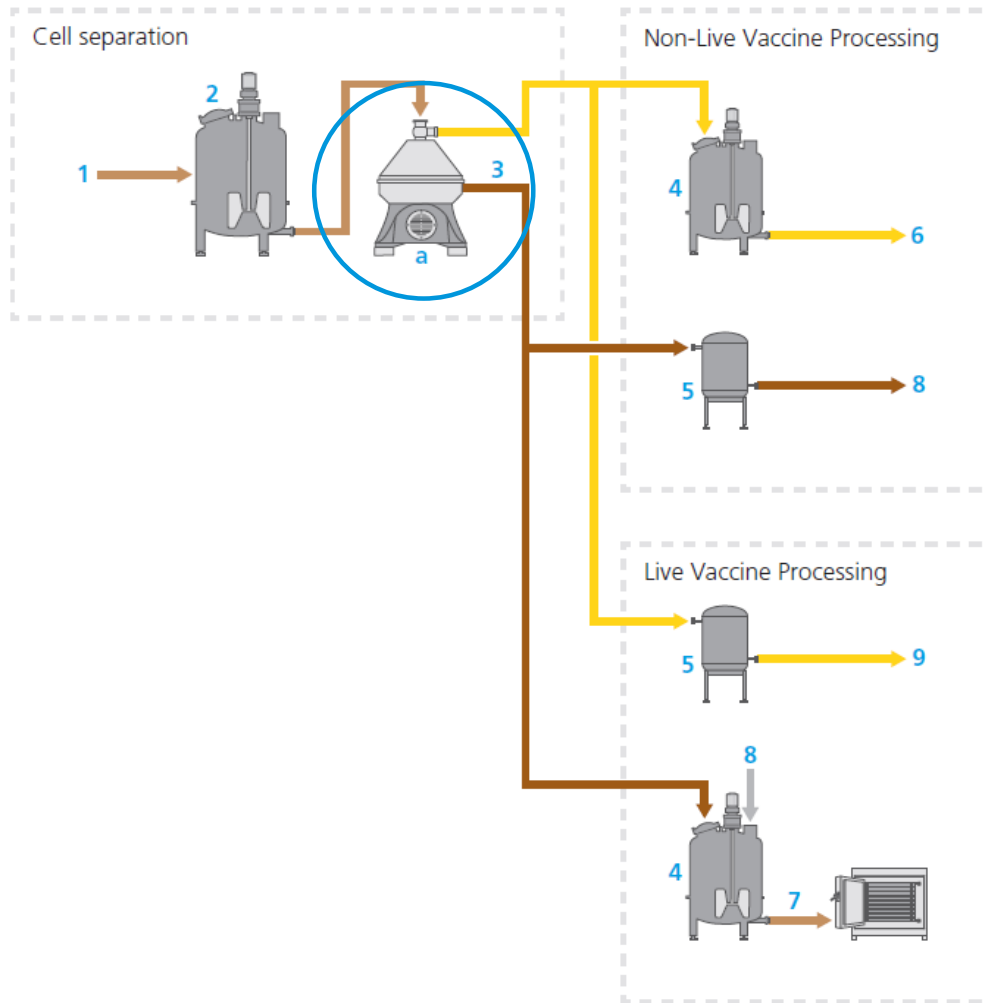


# GEA serves the entire vaccine process





# Separation solutions in human vaccines



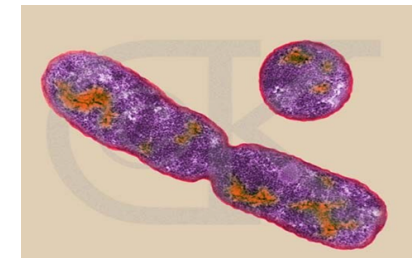
## Non-Live vaccines

- Influenza
- Cholera
- Bubonic plague
- Hepatitis A or hepatitis B
- Whooping cough (pertussis)
- Tetanus
- Diphtheria
- Pneumococcal bug

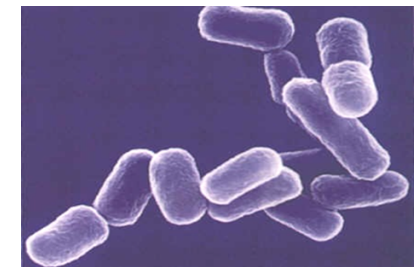
## Live vaccines

- Measles
- Mumps
- Rubella
- Yellow fever
- Chickenpox
- BCG (= tuberculosis vaccine)
- Typhus
- Human rotaviruses
- Whooping cough (pertussis)

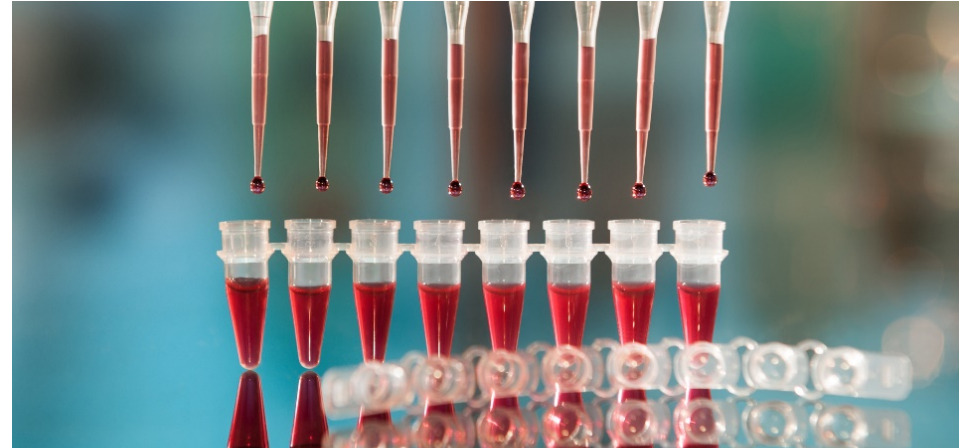
**Culture media**  
⇒ **Valuable phase**



**Culture media**  
⇒ **Waste**



# GEA separation solutions in human vaccines





## Unique: GEA Pharma test bay for pre-qualification

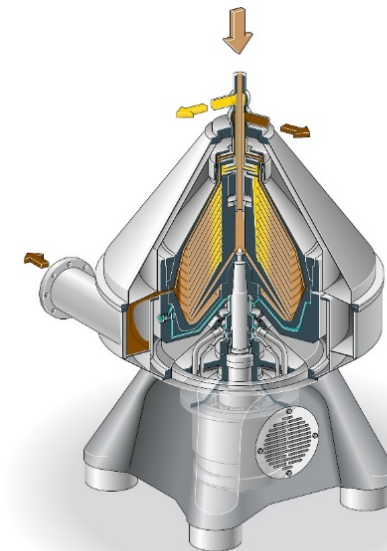
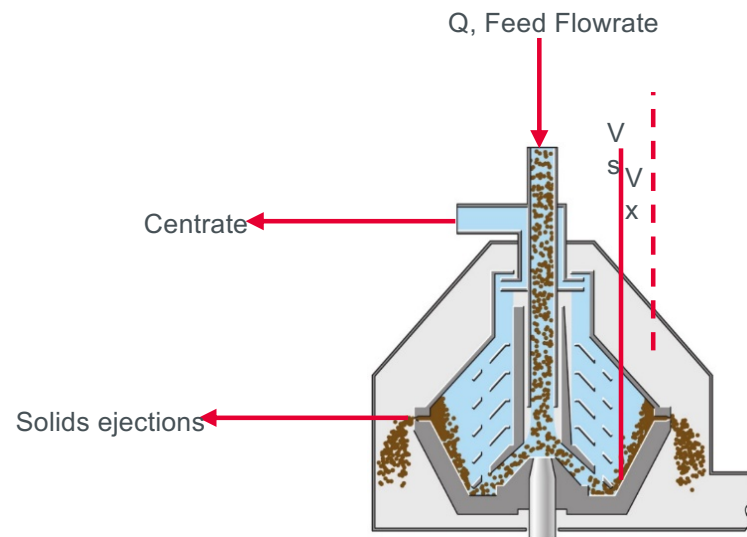


**Pre-qualification  
of separator  
centrifuge skids**

Flexibly and safely  
on the GEA pharma  
test bay.

# Maximum yield thanks to high precision desludging

GEA self-desludging centrifuges



## Typical feed conditions in vaccine productions:

3-5 % solids in volume, depending on vaccine

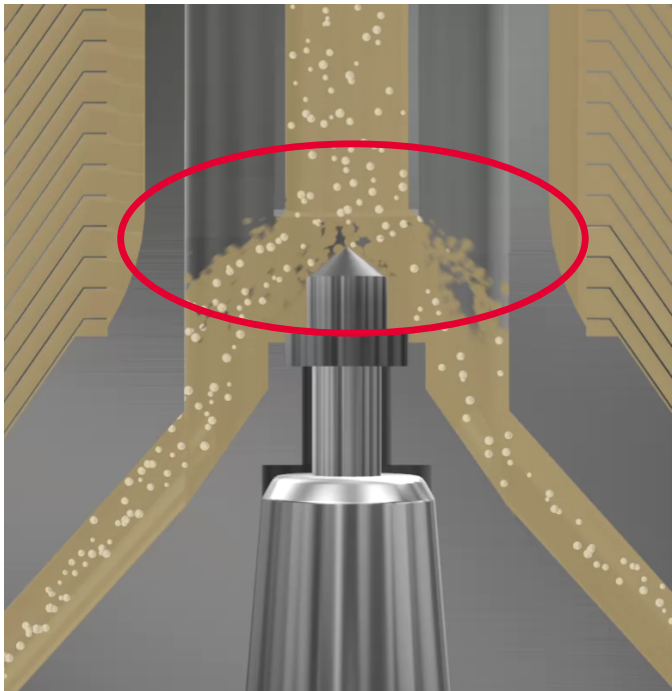
30 -1000 l/h, up to 7000 l/h possible for larger machines

Gentle product handling, higher viability of cells,  
more efficient clarification

**Hydrohermetic Feed patented by GEA Westfalia Separator Group**

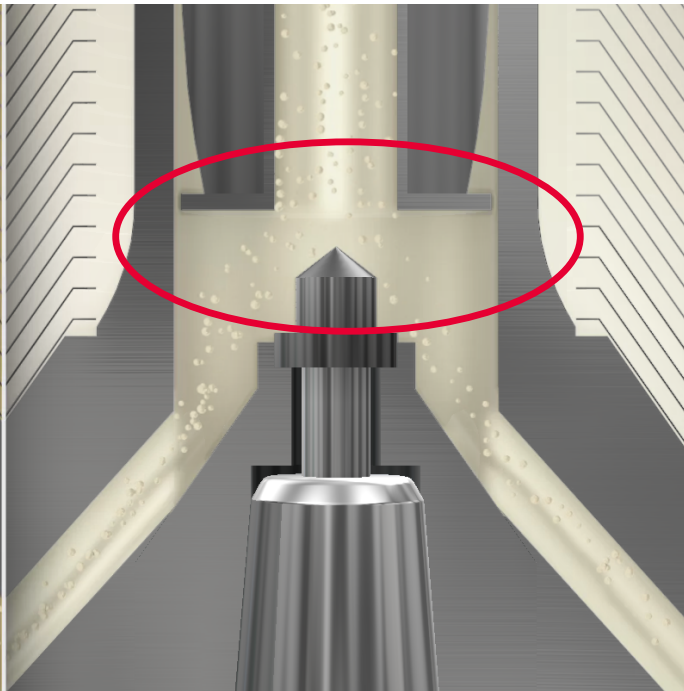
Common Feed

Product accelerated freely



Hydrohermetic Feed –

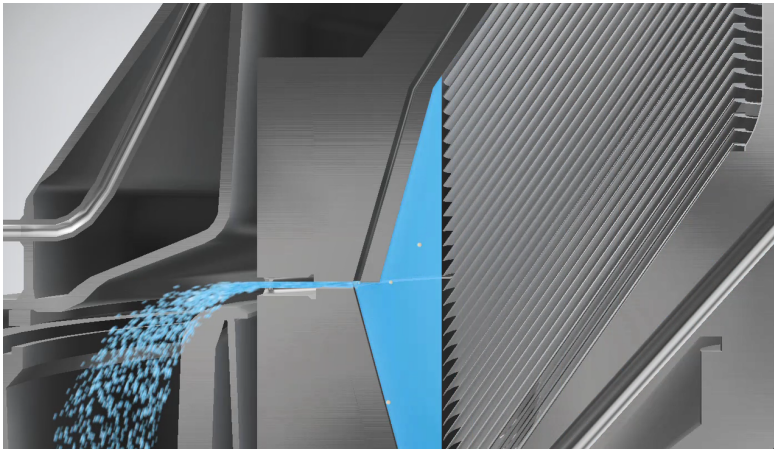
Product accelerated within the liquid, underneath the disk





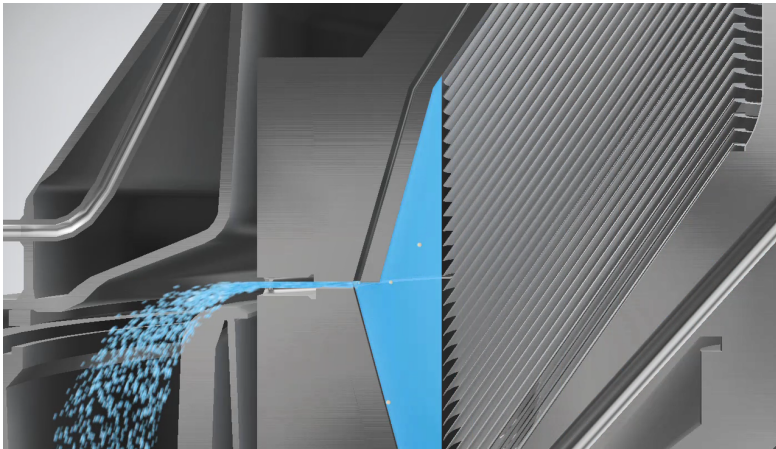
# Cleanability – CIP and SIP

Total bowl ejections –  
possible with hydrohermetic feed system



# Cleanability – CIP and SIP

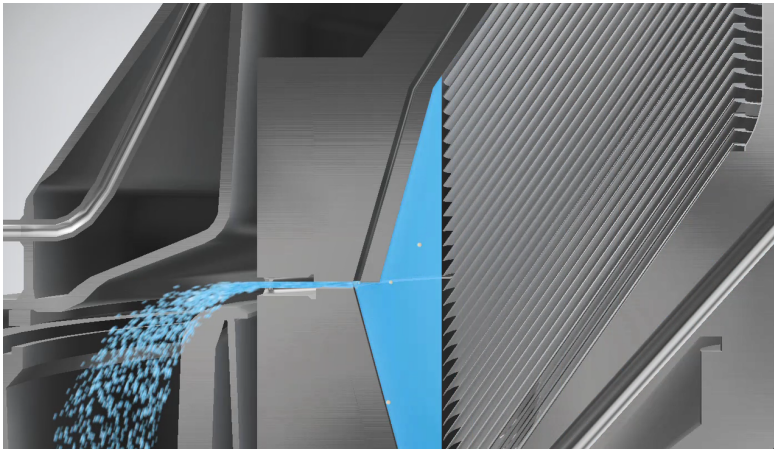
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Spray Nozzles

# Cleanability – CIP and SIP

Total bowl ejections –  
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Spray Nozzles



Steam Sterilization

## The next level of pharmaceutical cleanability: Patented gap-free welded disc spacers



GEA's **patented laser-welded** disk spacers lead you to the next level of pharmaceutical cleanability.

### **Perfectly clean:**

#### **High quality laser-welded spacers**

Maximum welding precision leaves no dead spaces in the disk stack, providing the basis for a highly effective CIP and SIP cleaning.

Optionally available for GEA pharma separator pure.



## The next level of pharmaceutical cleanability: Patented gap-free welded disc spacers



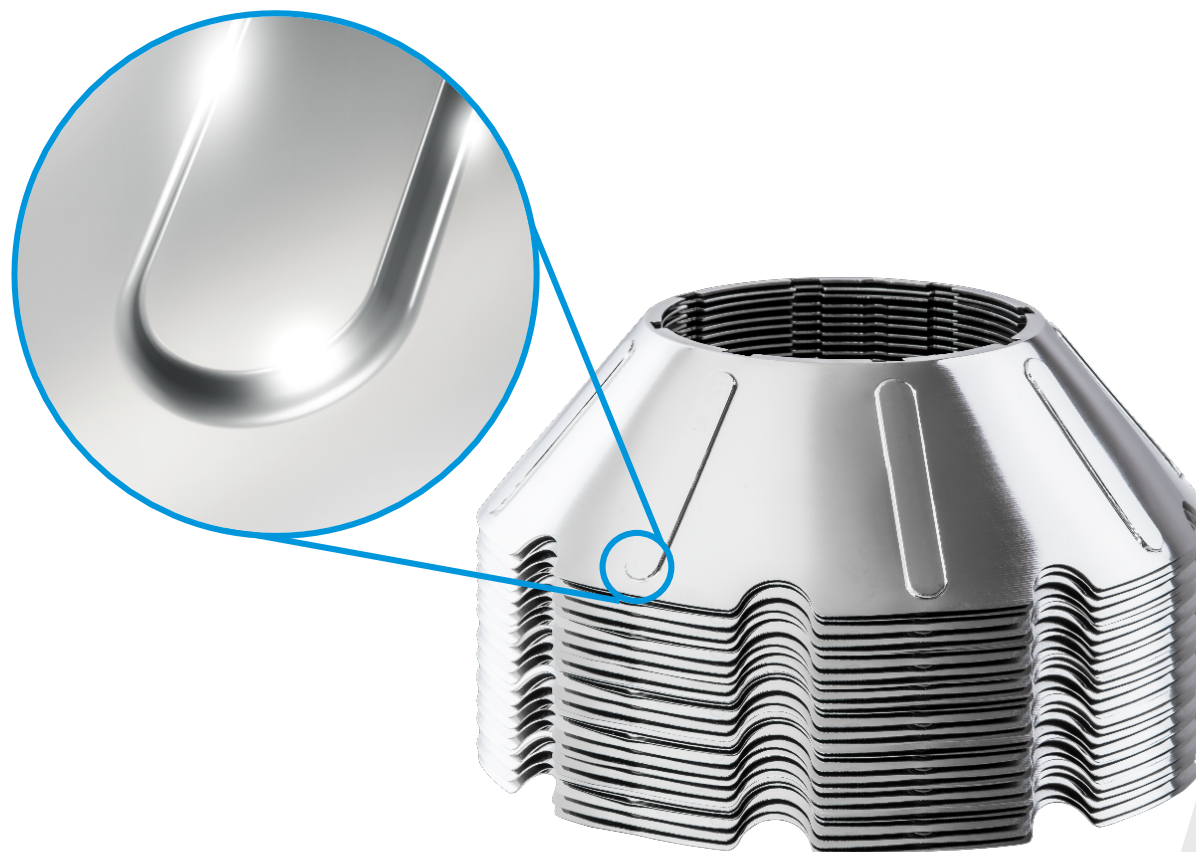
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## Reference Customers Human Vaccines



Sold 160 package units

Until  
2019



50 customers

I am happy to answer your questions:



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