WE CONVEY QUALITY

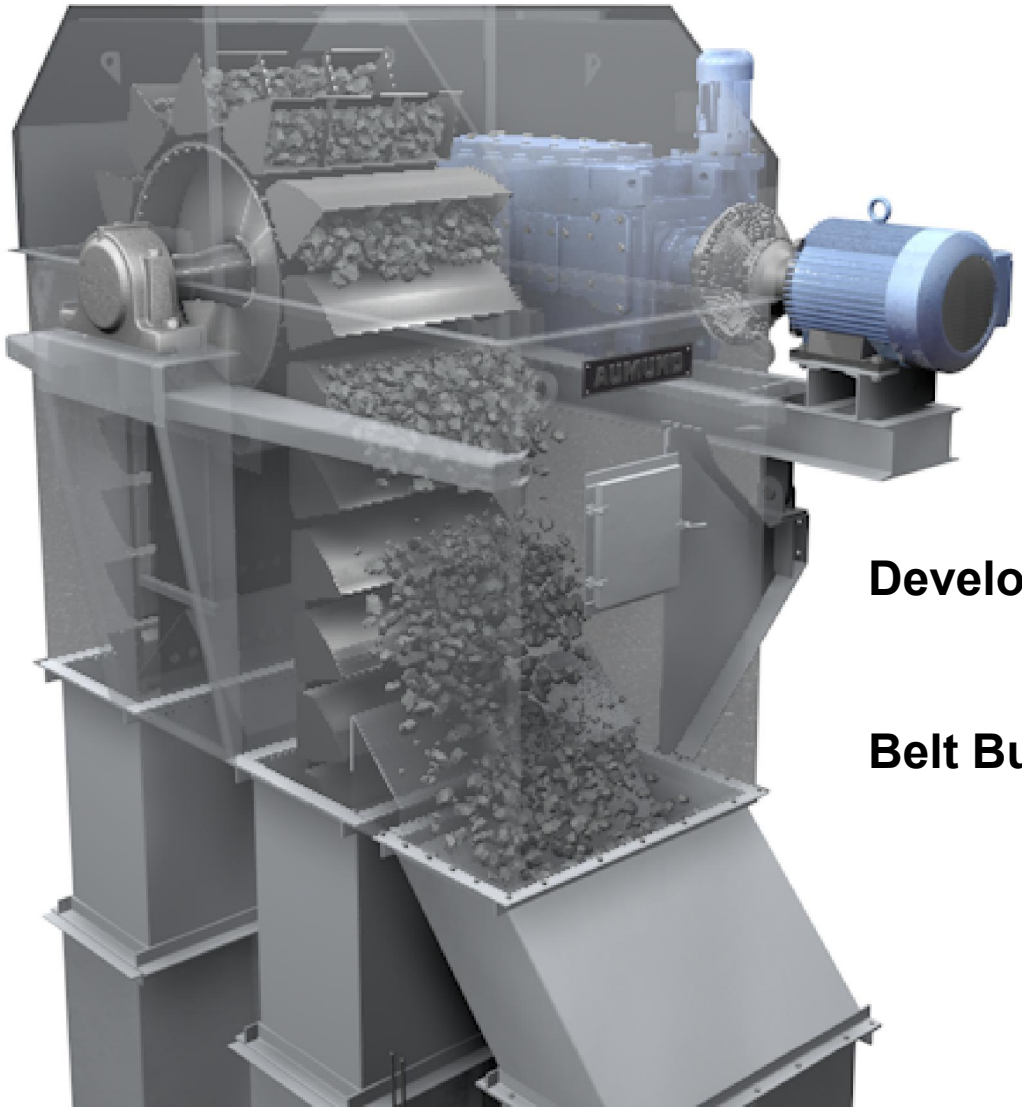
AUMUND

Aumund‘s latest bucket elevator design

“BWG-GK“

Tim Burden
23.04.2015

New Aumund Belt Bucket Elevator for Coarse Material



Objective:

Develop a Cost Effective and Reliable

Belt Bucket Elevator for Coarse Grains

100mm Grain Size ?

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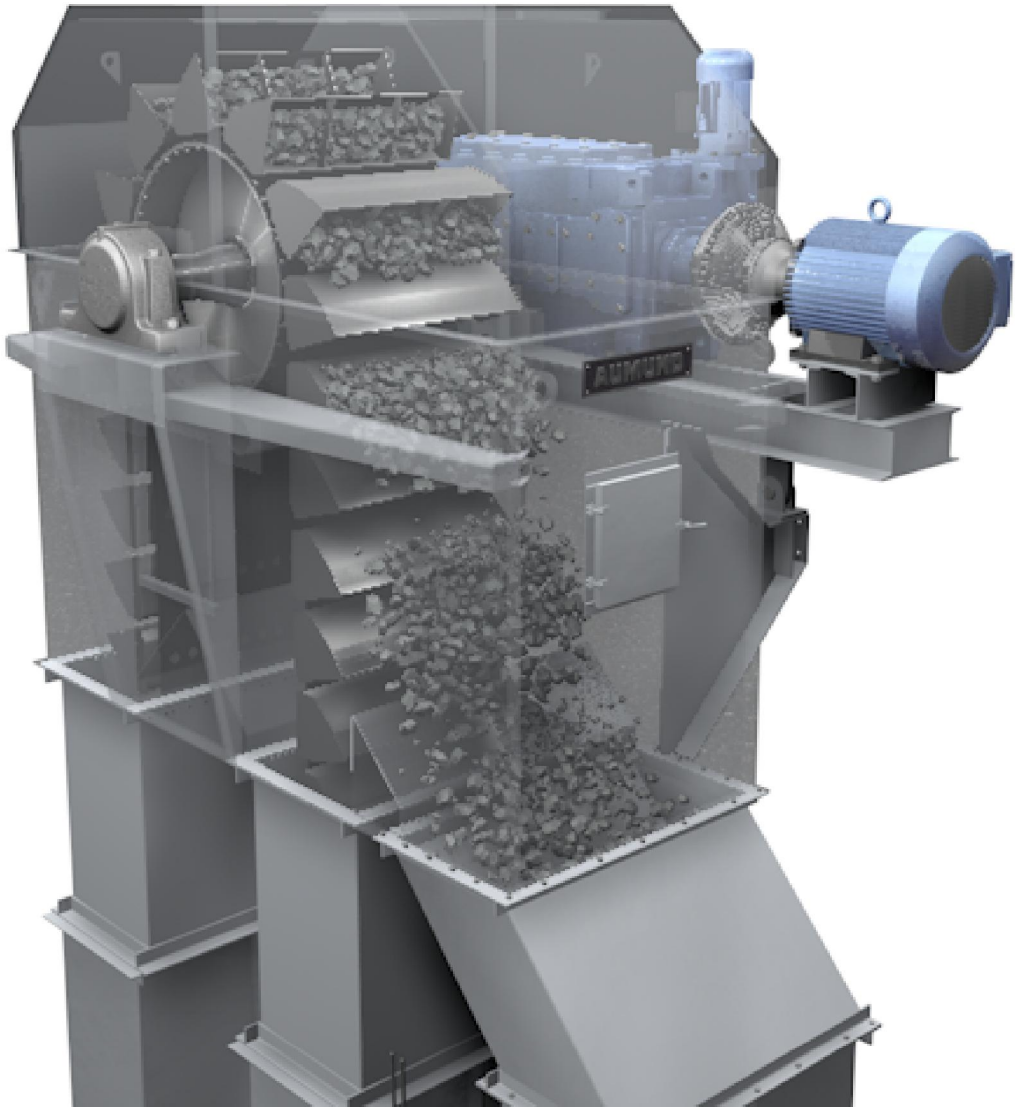
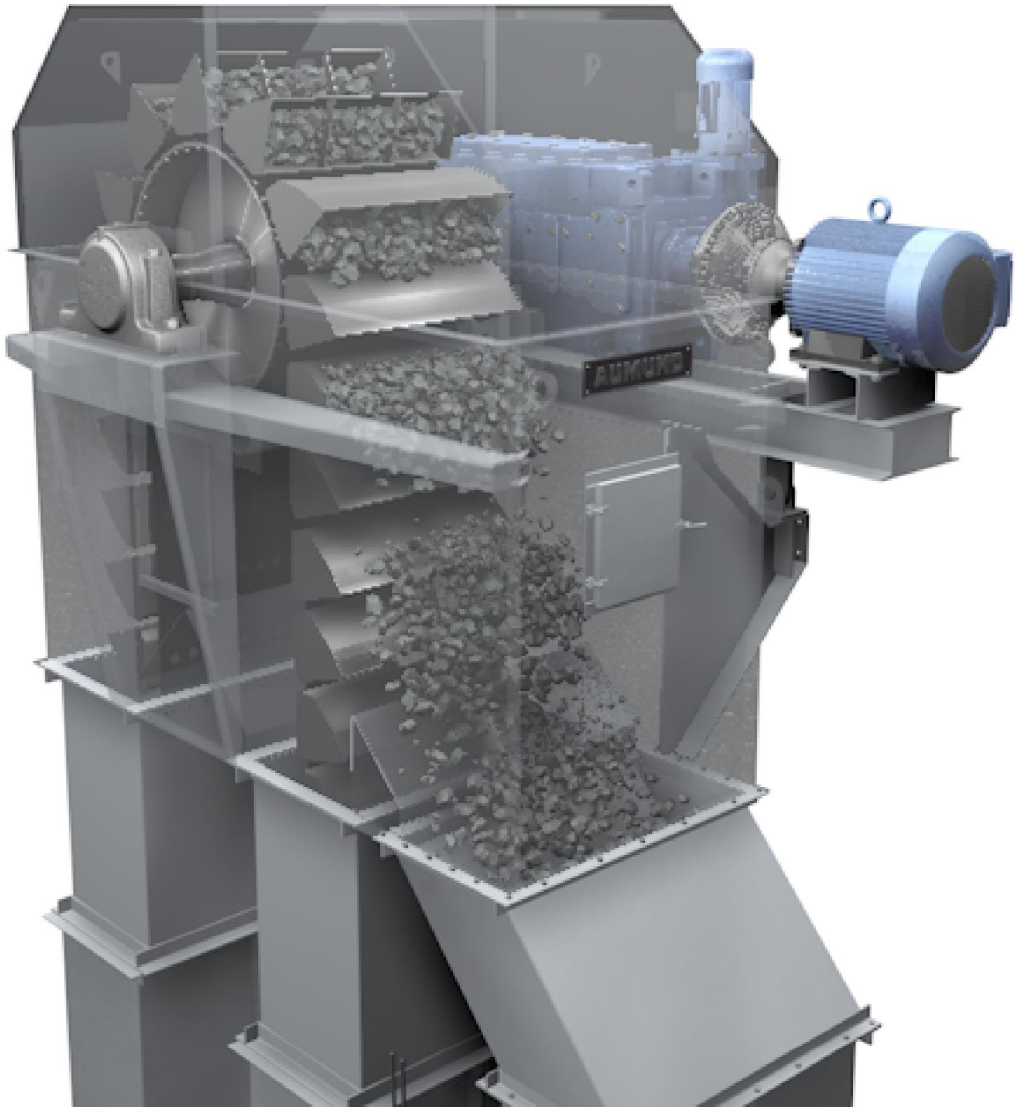


- **Investigation**
- **Results**
- **Conclusion**

New Aumund Belt Bucket Elevator for Coarse Material



- **Investigation**
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New Aumund Belt Bucket Elevator for Coarse Material

- **Investigation**

1. **DEM Analysis**
2. **Test Elevator**
3. **Fatigue Testing**

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New Aumund Belt Bucket Elevator for Coarse Material

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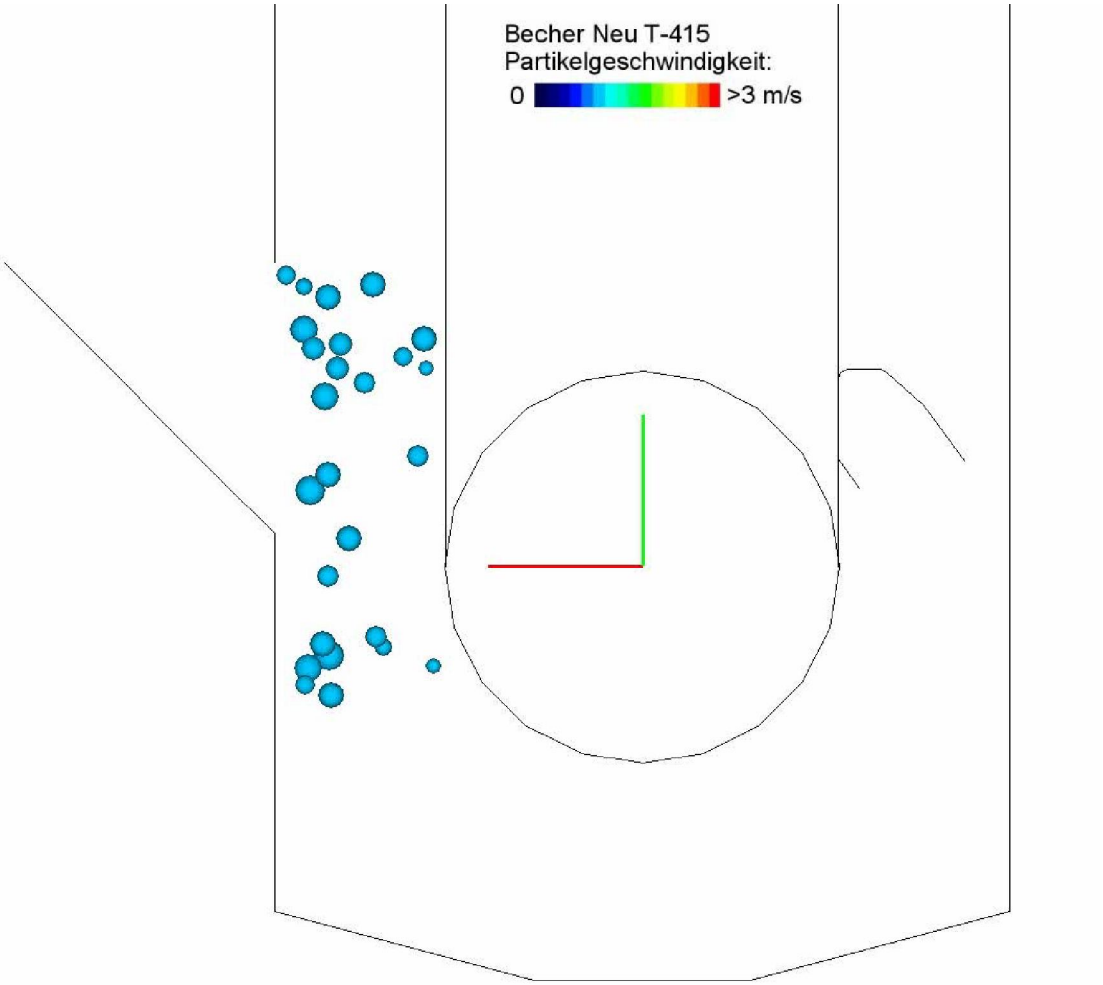

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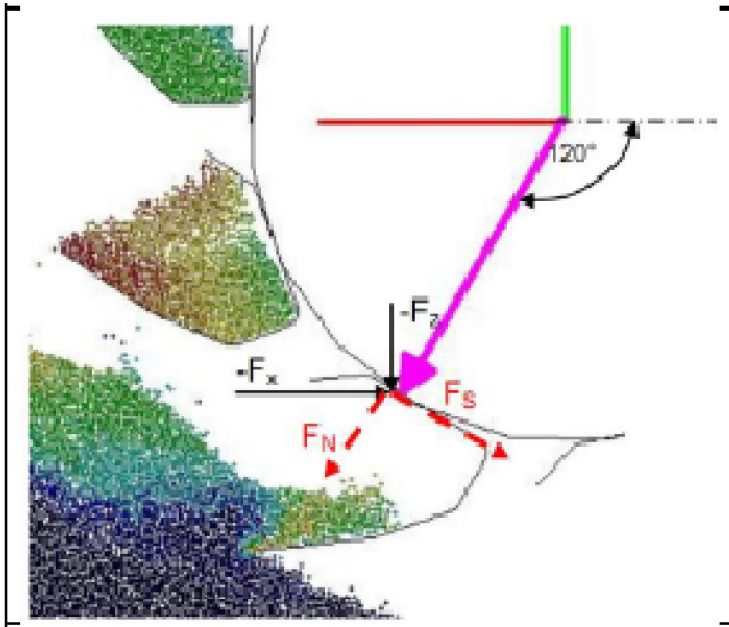
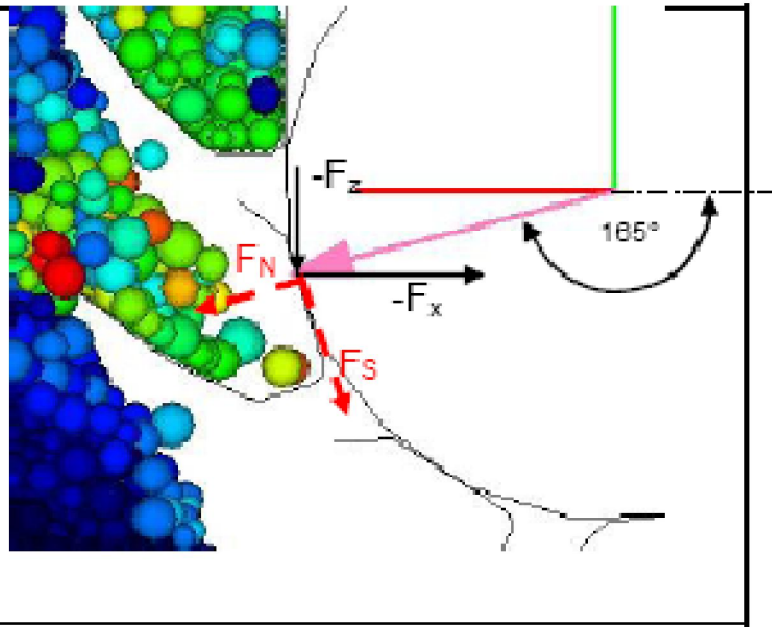
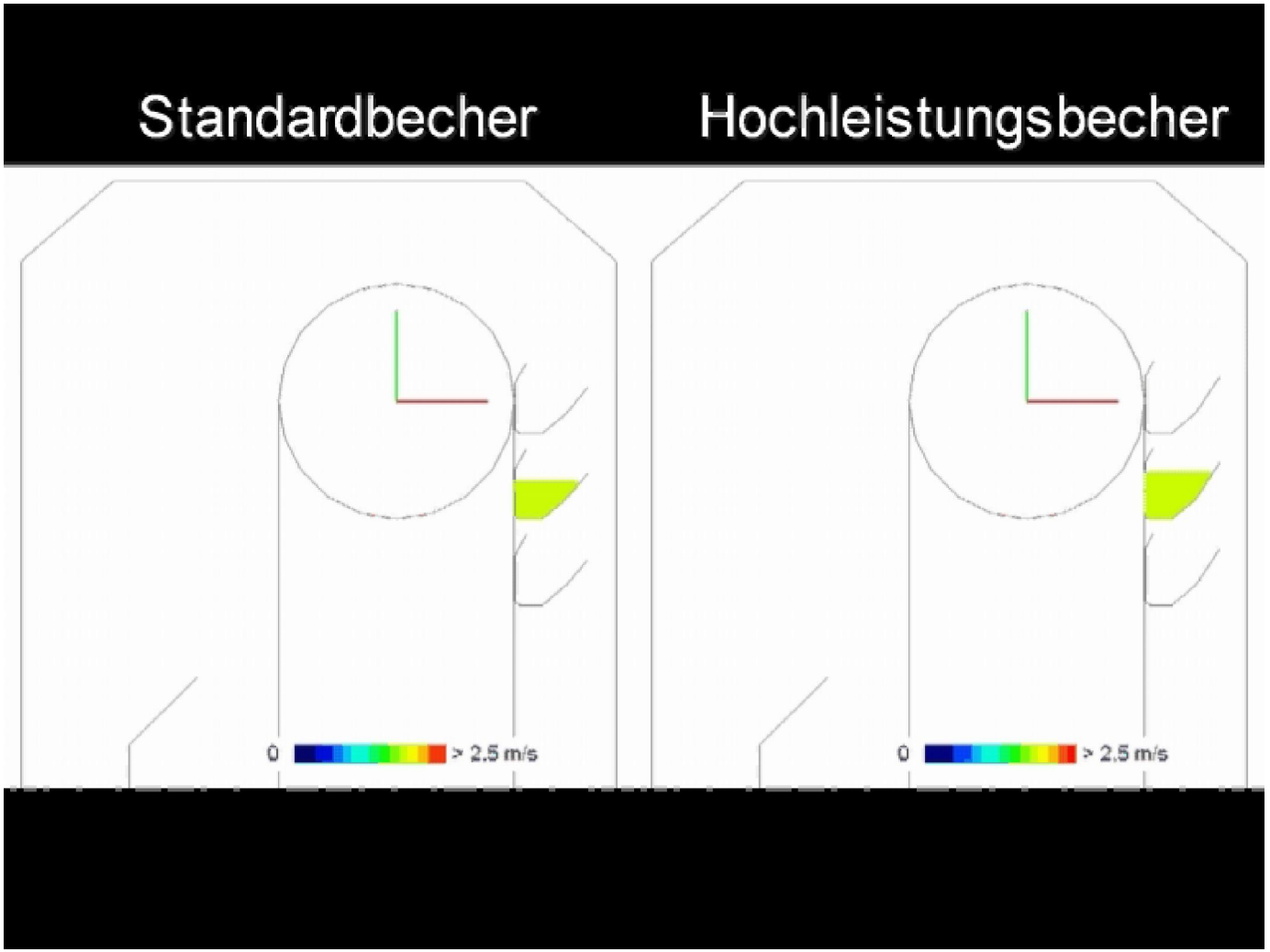




$d_{max} = 10$ mm	$d_{max} = 100$ mm
Druckbeanspruchung: $F_N = F_z \sin 60° + F_x \cos 60° = 33{,}7$ N	Druckbeanspruchung: $F_N = F_z \sin 15° + F_x \cos 15° = 22{,}7$ N
Scherbeanspruchung: $F_S = F_z \cos 60° + F_x \sin 60° = 37{,}4$ N	Scherbeanspruchung: $F_S = F_z \cos 15° + F_x \sin 15° = 26{,}3$ N

New Aumund Belt Bucket Elevator for Coarse Material



New Aumund Belt Bucket Elevator for Coarse Material

- **Investigation**

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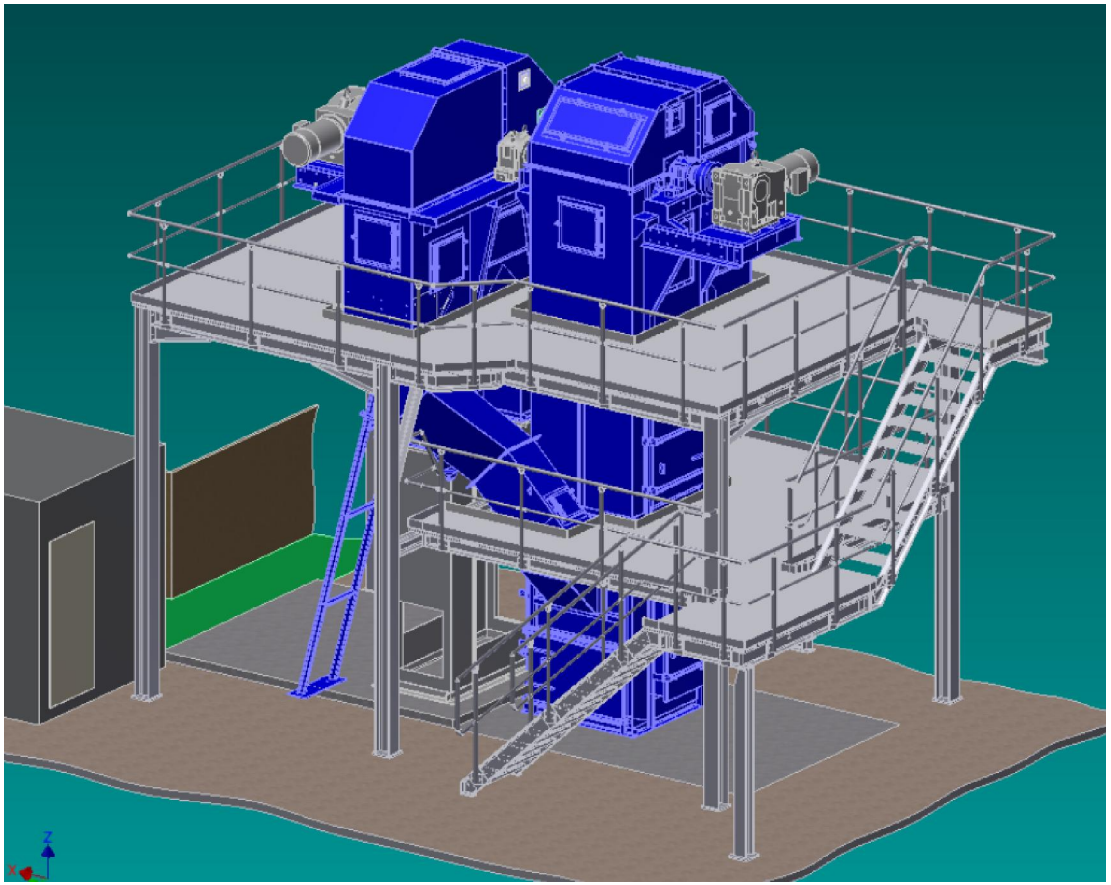
2. **Test Elevator**
3. Fatigue Testing



New Aumund Belt Bucket Elevator for Coarse Material

Test Elevator

Aggregates with Grain Size

(in mm)

20 , 40 , 60 , 80 , 100

Hydraulic Cylinders on Tail Drum

Simulate 100m Lift Height

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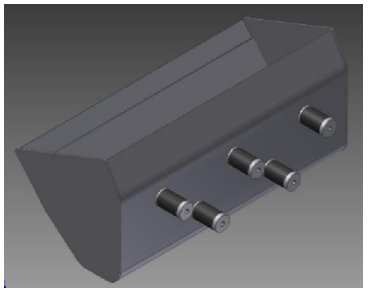
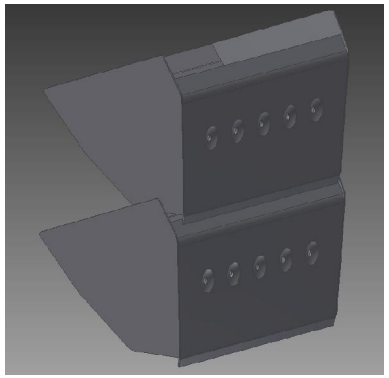
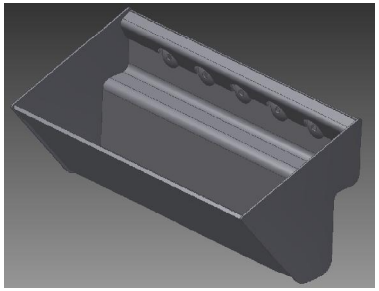
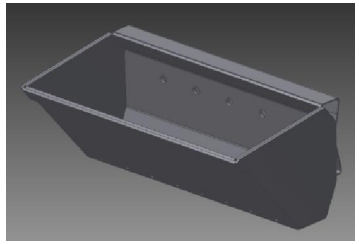
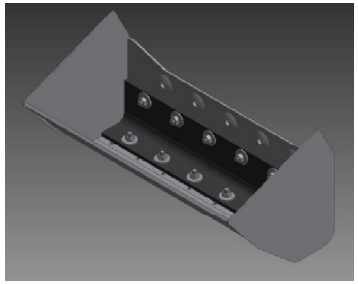
New Aumund Belt Bucket Elevator for Coarse Material

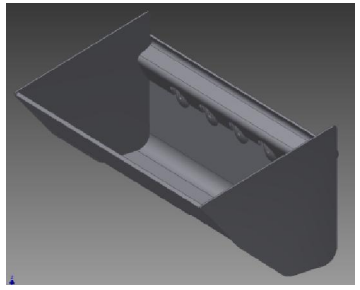












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New Aumund Belt Bucket Elevator for Coarse Material

- **Investigation**

1. DEM Analysis
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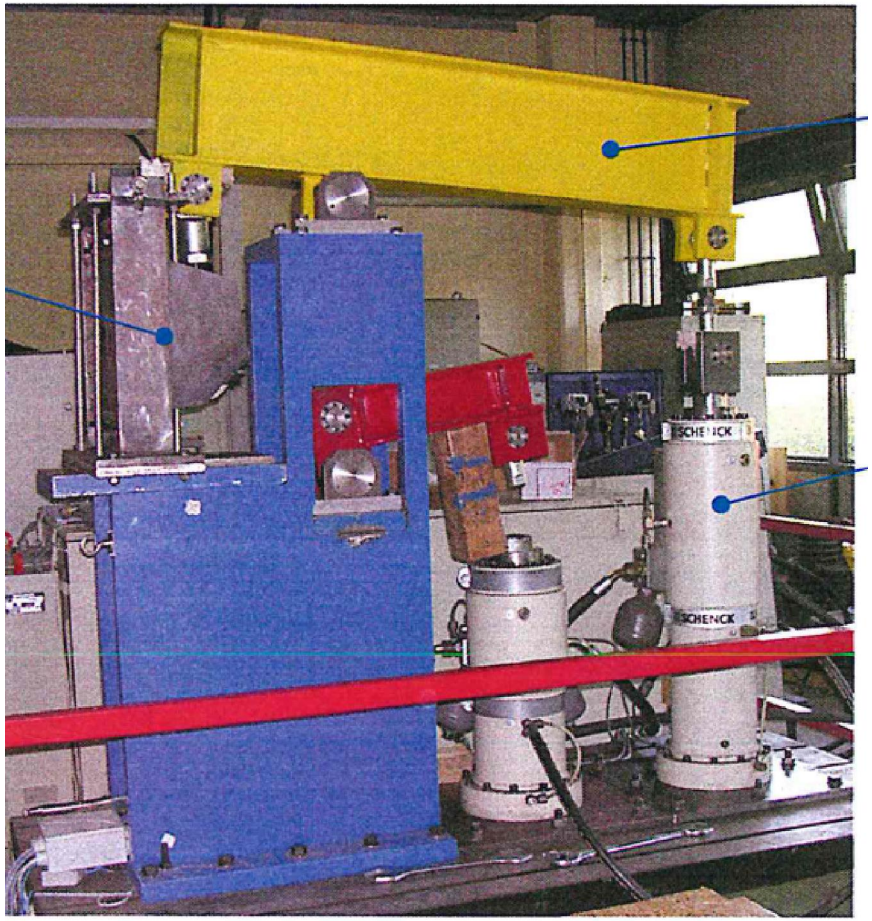
3. **Fatigue Testing**



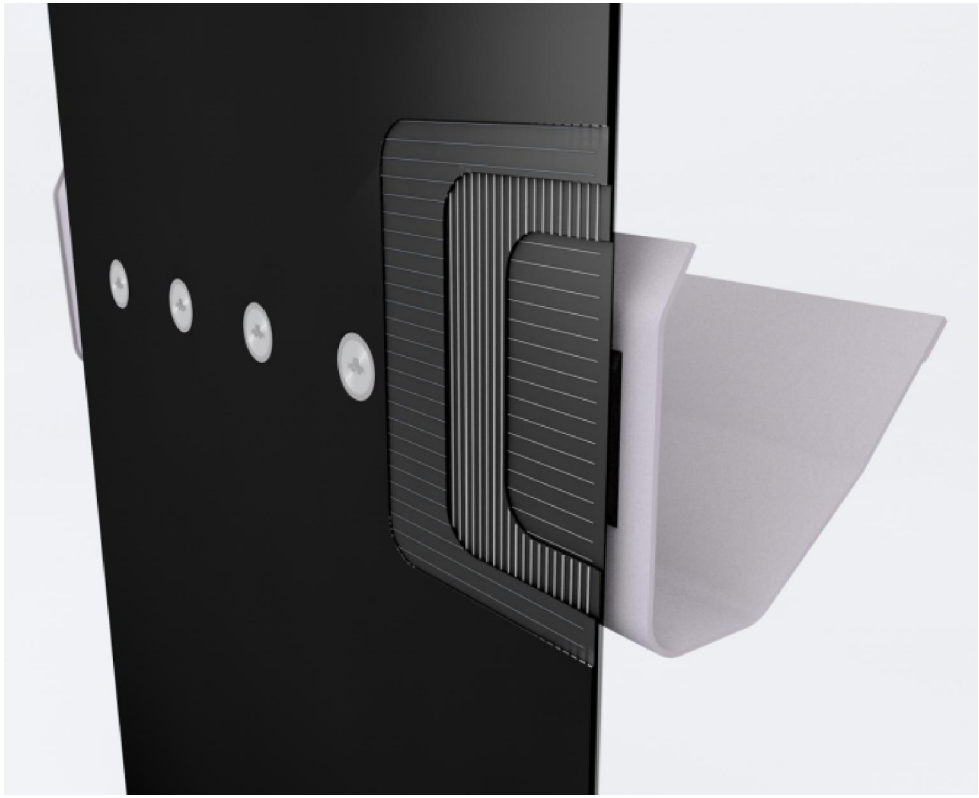
New Aumund Belt Bucket Elevator for Coarse Material

AUMUND Steel Cord Belt

Transversal Steel Cord

Safe Bucket Attachment

Even in Case of Scooping



Dynamic Shock Load - 2 Tonnes per fixing

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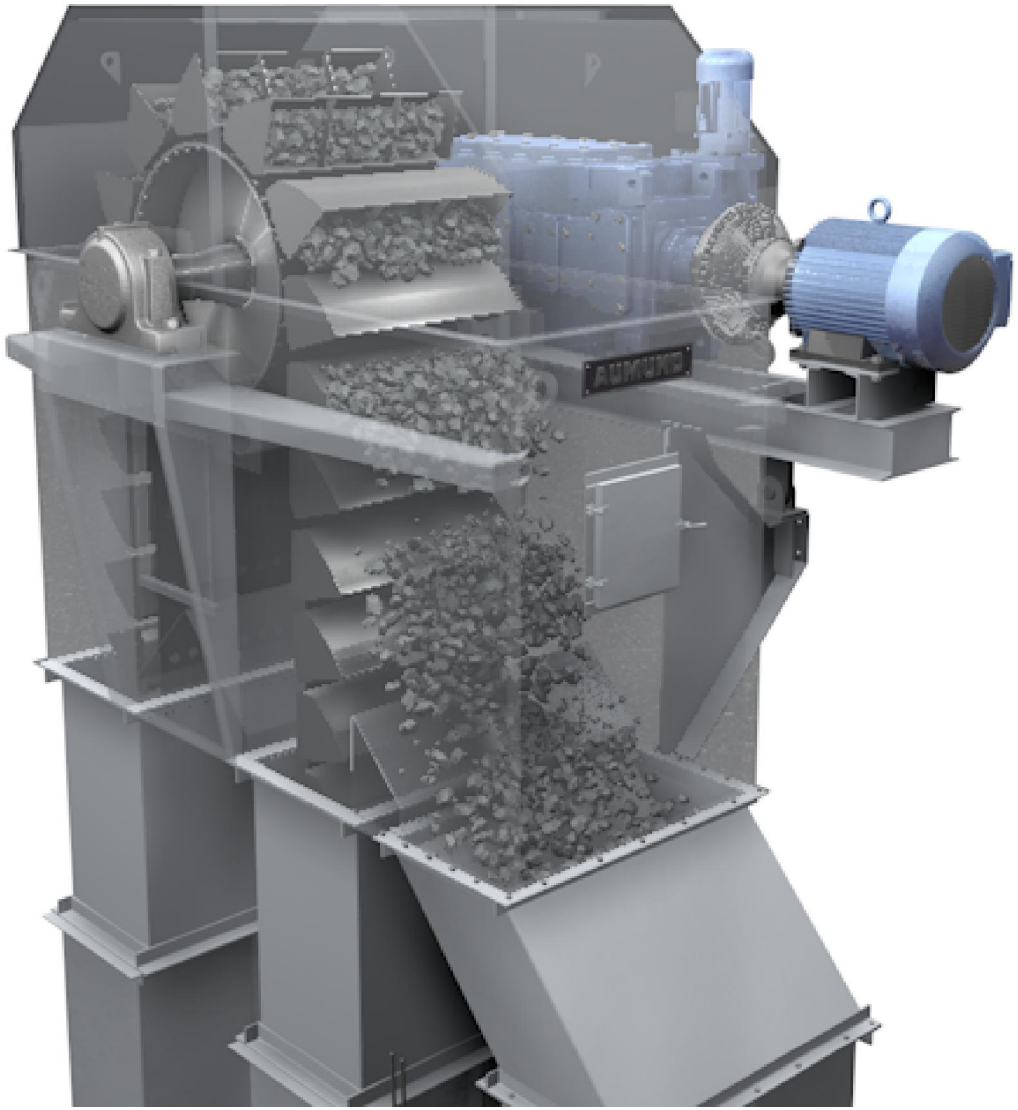
New Aumund Belt Bucket Elevator for Coarse Material



- Investigation
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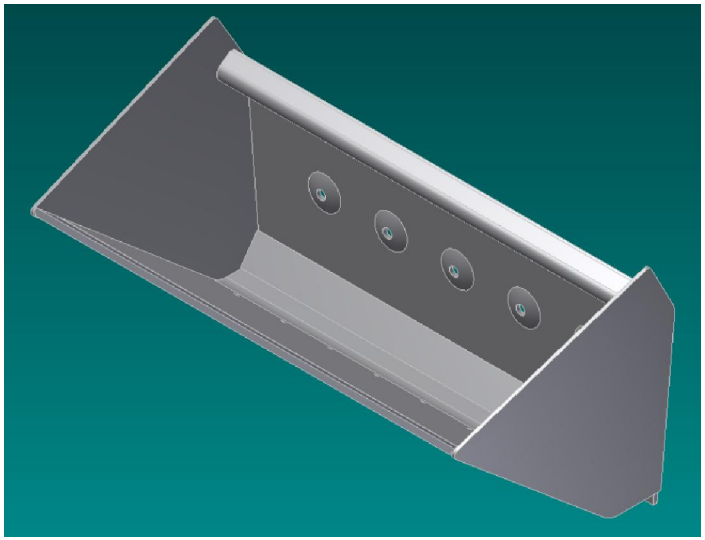
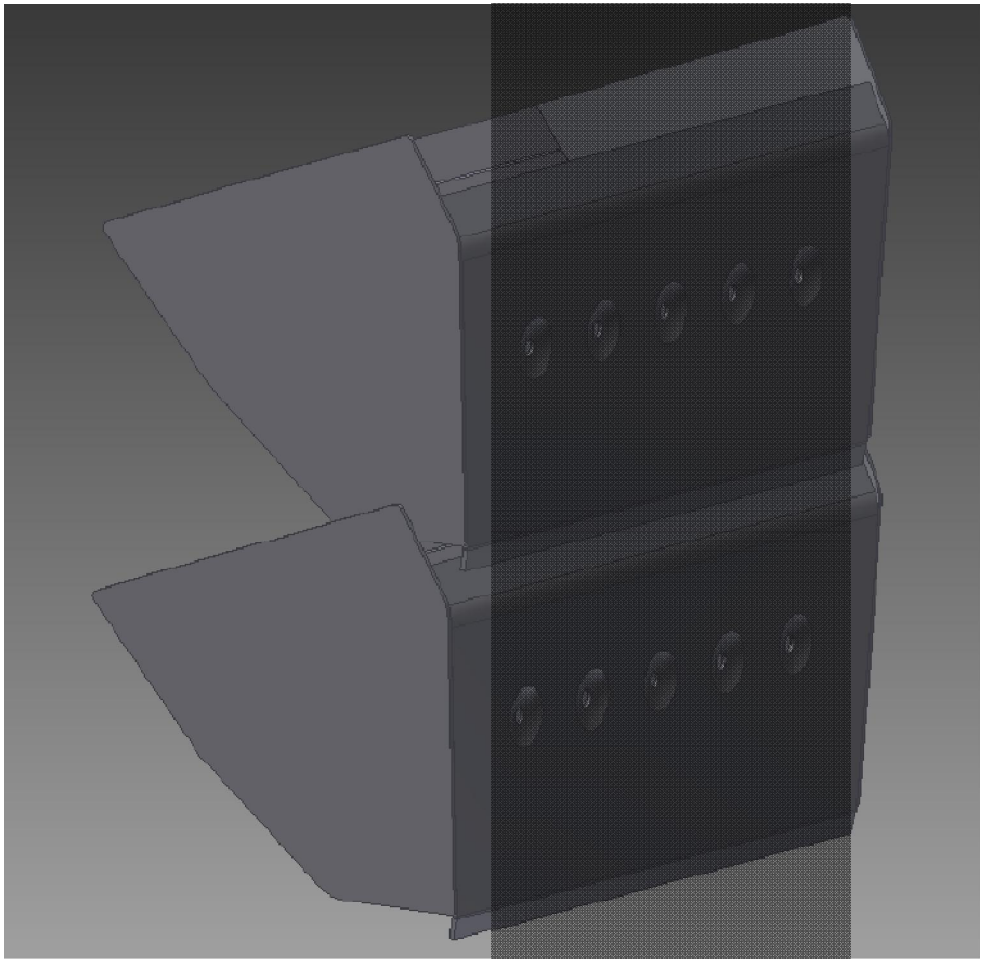
New Aumund Belt Bucket Elevator for Coarse Material





Variant 5: Close Pitch Buckets to Effectively Hide the Belt

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New Aumund Belt Bucket Elevator for Coarse Material

Situation after stoppage with filled buckets

Excessive filling or flushes

130ºC inside bucket = 80ºC on the belt

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New Aumund Belt Bucket Elevator for Coarse Material

(54) Title: BUCKET ELEVATOR WITH BELT PROTECTED BY THE BUCKET SECTION

(54) Bezeichnung : GURTBECHERWERK MIT DURCH DEN BECHERSTRANG GESCHÜTZTEN GURT

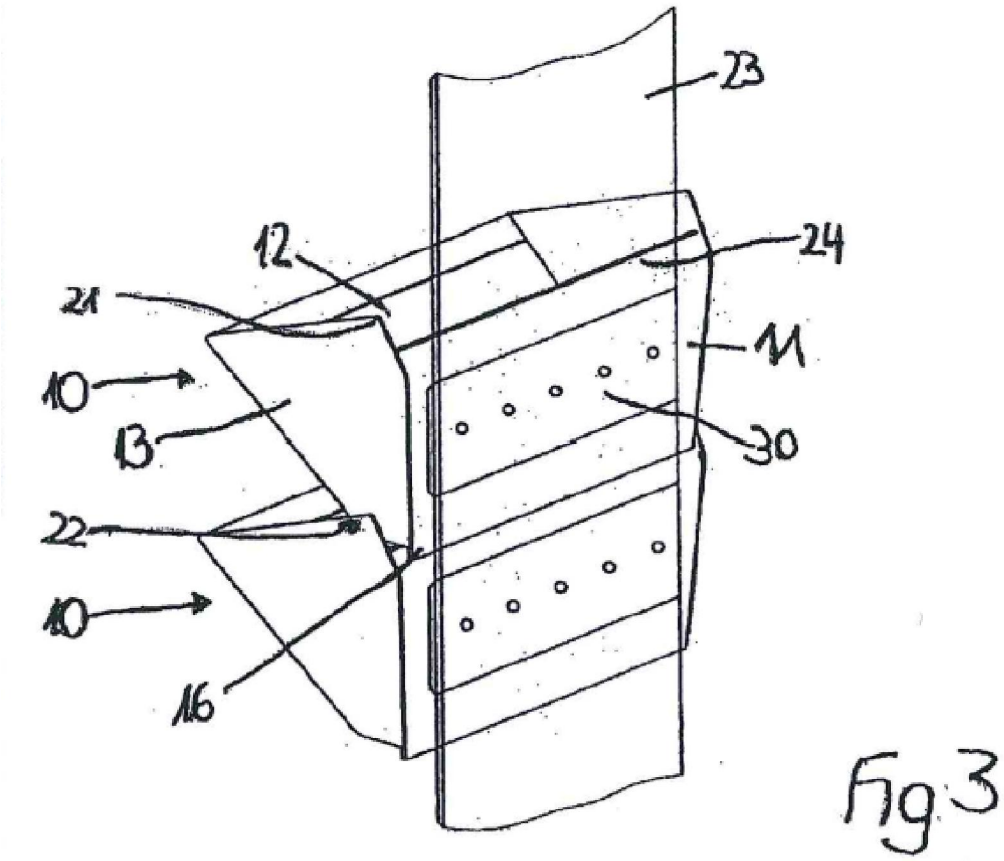


Fig 3

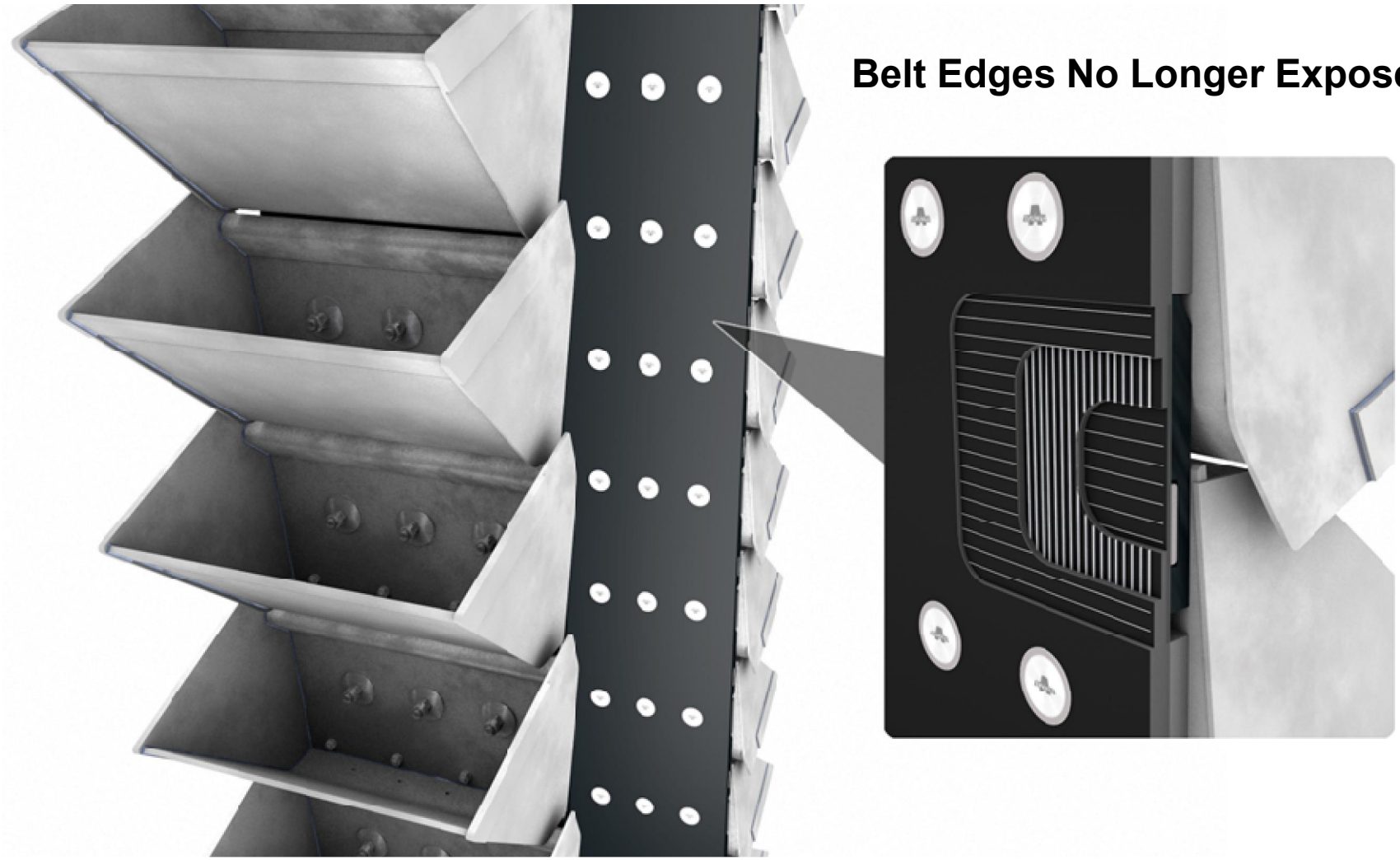
(57) Abstract: The invention relates to a bucket elevator for conveying bulk material, comprising a driven endless belt (23), which is circulated via drums arranged on a bucket elevator head and on a bucket elevator base, and comprising at least one row of buckets (10), each of which is individually fixed to the belt (23) and has a base (15), a rear wall (11), lateral walls (13), and a front wall (12), said row extending in the running direction of the belt (23). The invention is characterized in that each of the buckets (10), which are arranged in close succession relative to one another, in at least one row extending in the running direction of the belt (23) has a smaller width at the base (15) than at the upper ends of the lateral walls (13), which thus extend outwards laterally. The arrangement of the buckets on the belt (23) is designed such that the belt (23), including the outer lateral edges of the belt, is completely covered by the buckets (10) arranged thereon.

(57) Zusammenfassung: Ein Gurtbecherwerk

[Fortsetzung auf der nächsten Seite]

Abstract AUMUND Patent

New Aumund Belt Bucket Elevator for Coarse Material



Belt Edges No Longer Exposed

Belt strengths up to 4,200 N/mm for lift heights to 200 meters

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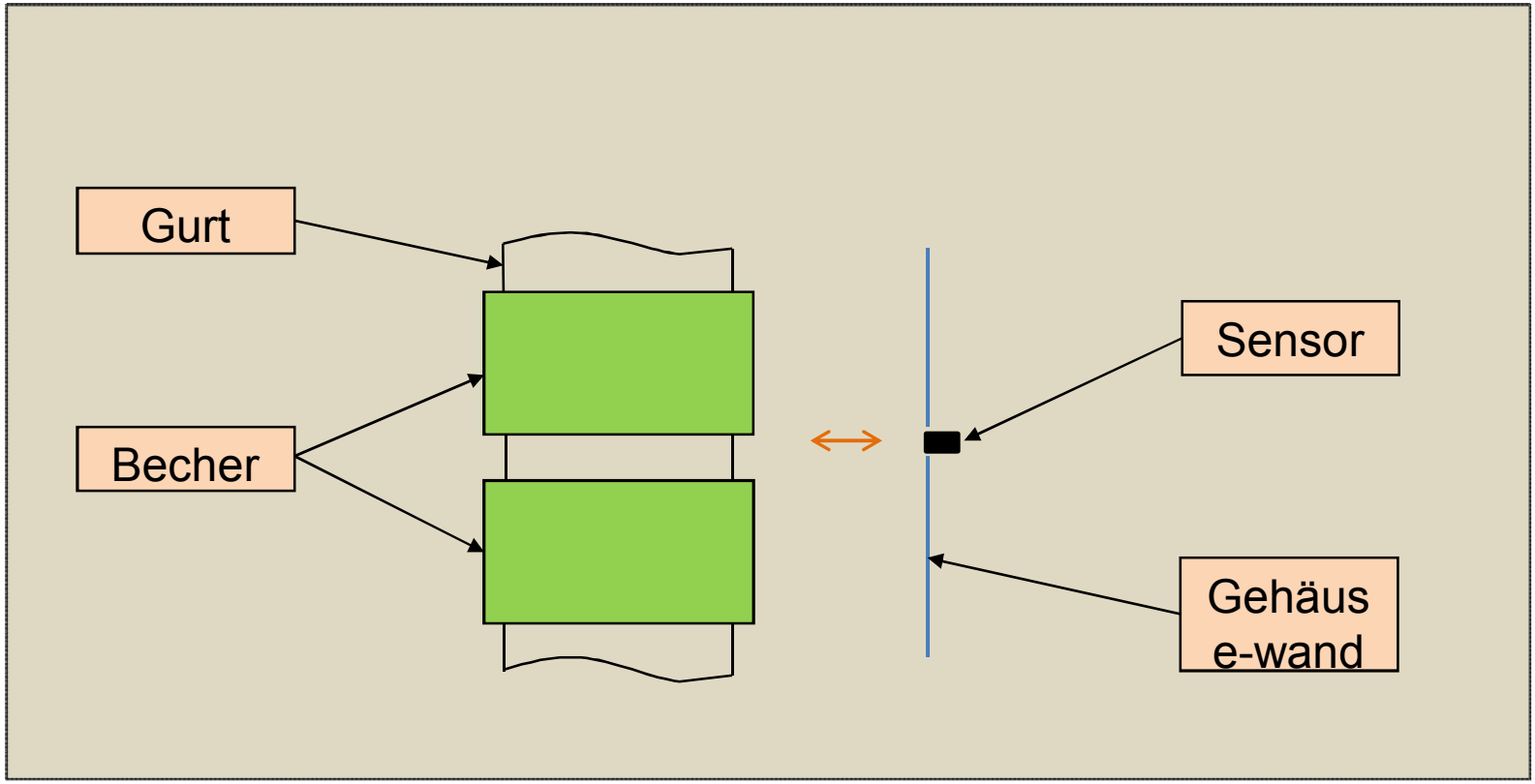
New Aumund Belt Bucket Elevator for Coarse Material

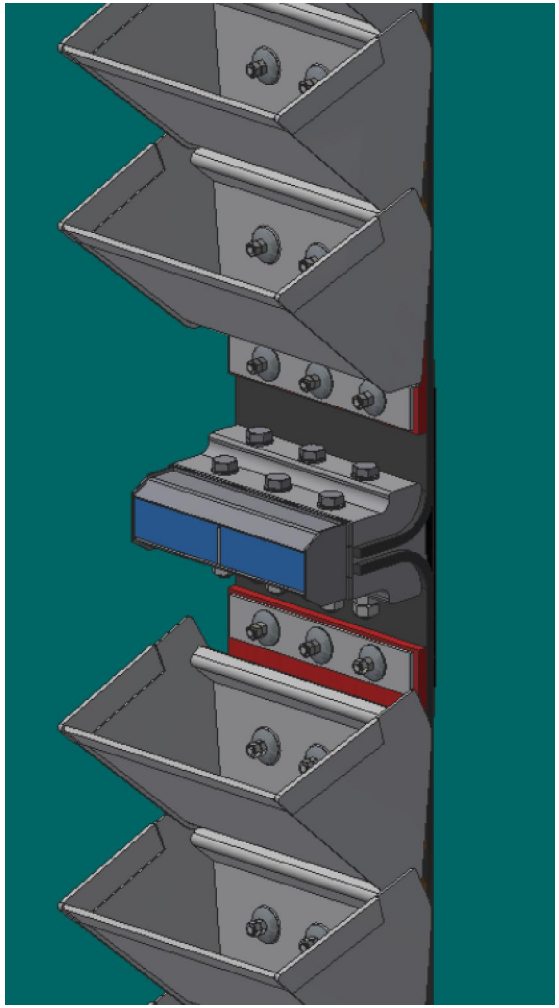
Belt Drift Control



Inductive sensors at boot and head monitor belt drift at bucket!

60mm = warning signal! **90mm = stop!**

New Aumund Belt Bucket Elevator for Coarse Material



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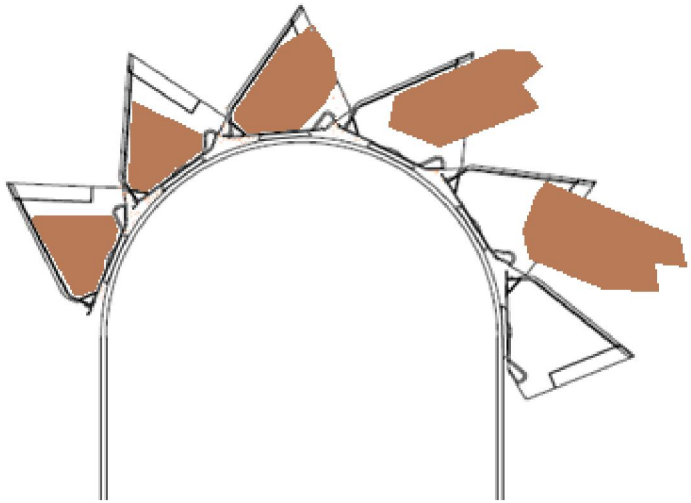
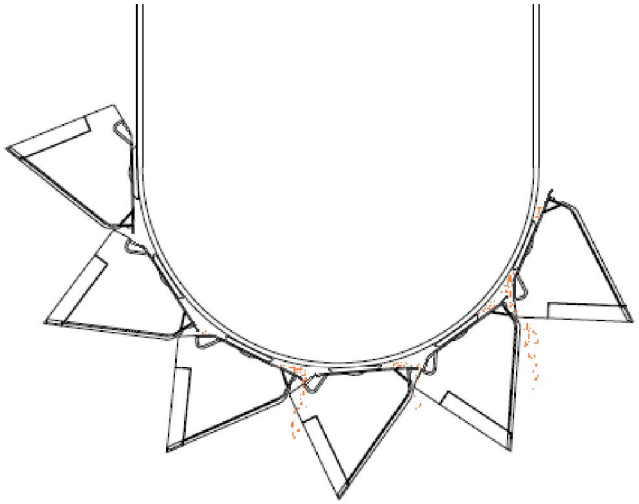


Tight bucket spacing

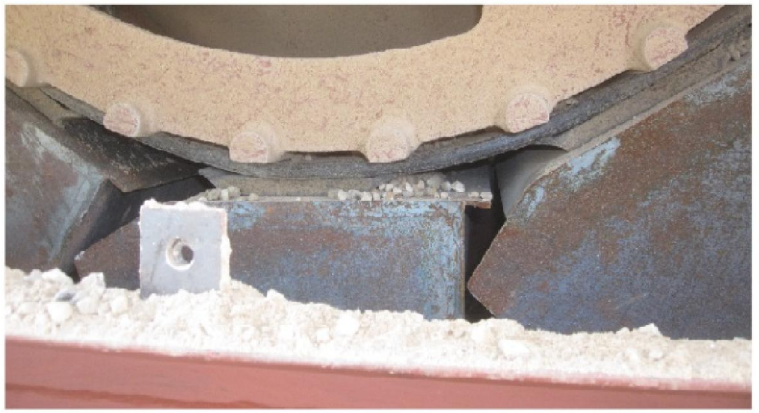
Only 12…15mm gap between buckets at the drive pulley!

Only after E-Stop with full buckets,

Fines got trapped behind the buckets.



Easily discharged at elevator boot



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New Aumund Belt Bucket Elevator for Coarse Material

Additional rubber strip for improved sealing and longer life time of the belt

Standard sealing

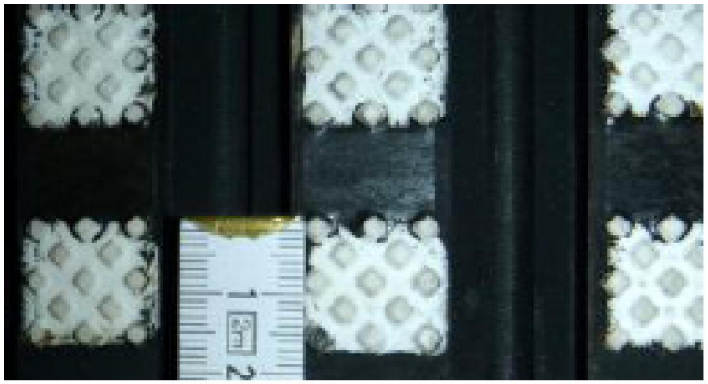
Improved sealing

Recommended:

1. **Frequent start/stop operation with filled buckets**
2. **Sticky material that could accumulate behind the buckets**

New Aumund Belt Bucket Elevator for Coarse Material

Ceramic friction liners



=> better grip in case of wet materials

New Aumund Belt Bucket Elevator for Coarse Material

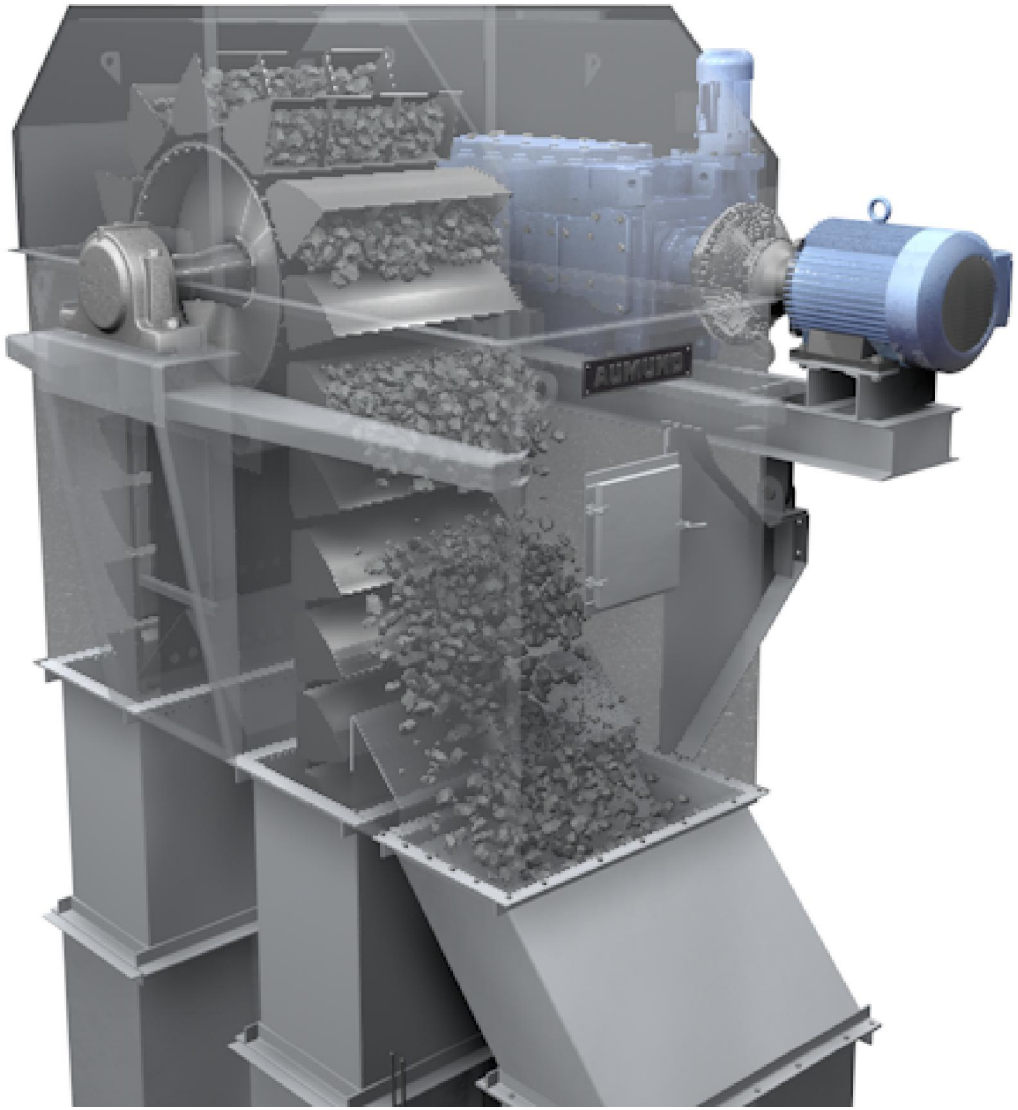
Drive drum and outlet

Drive Drum

Sealing at Drive Drum

Outlet

New Aumund Belt Bucket Elevator for Coarse Material



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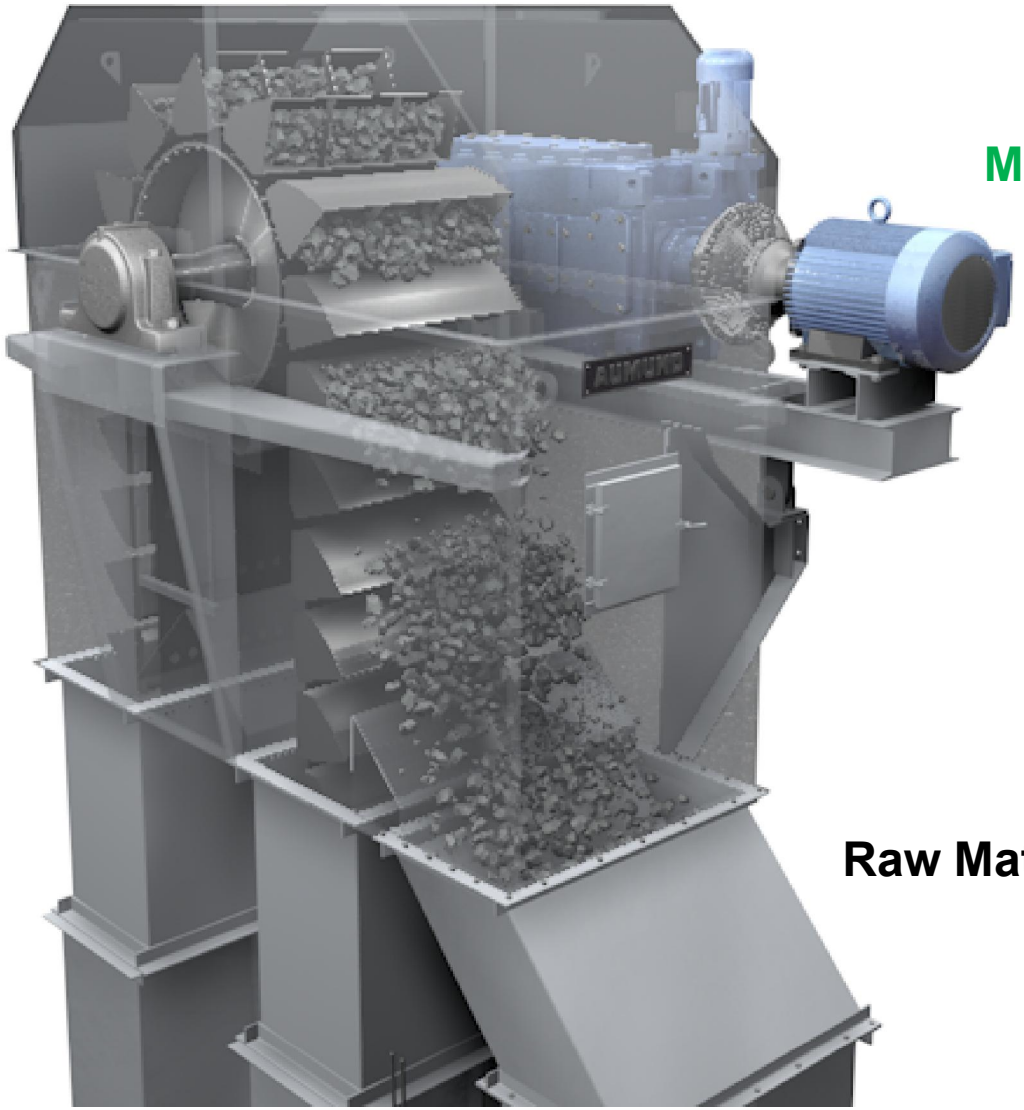

Majority (95%) Grain Size ≤ 80mm
APPROVED

90% of Recirculation Cases

With 20% Saving Over Chain

Majority Grain Size ≥ 80mm
NOT APPROVED
Excessive bucket deformation

Raw Material Feed with majority ≥ 80mm
Should be Chain!

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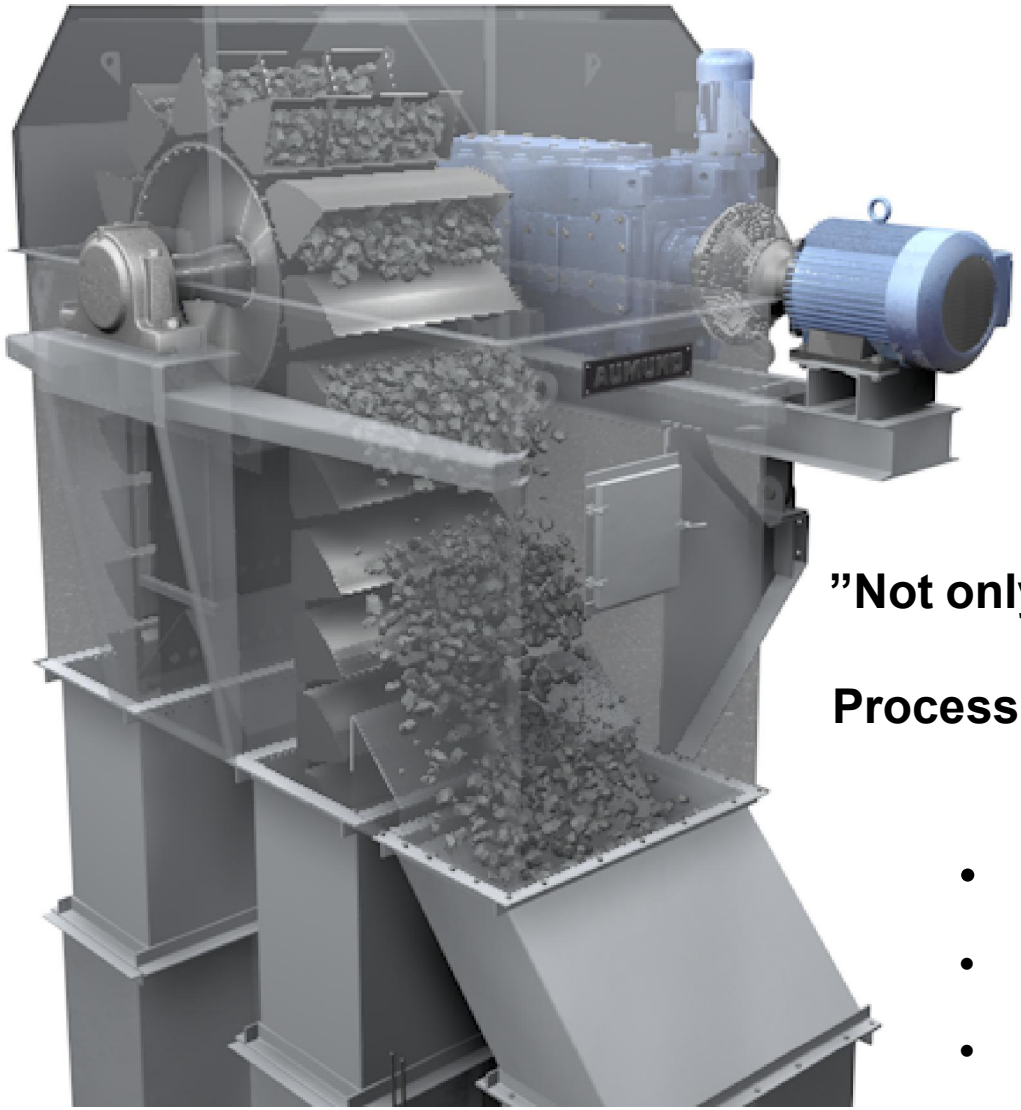
New Aumund Belt Bucket Elevator for Coarse Material



FINAL REMARK

”Not only grain size defines the elevator”

Process Conditions must be considered!

- **Mill Type**
- **Recirculation Rates**
- **Frequency of Flushes**

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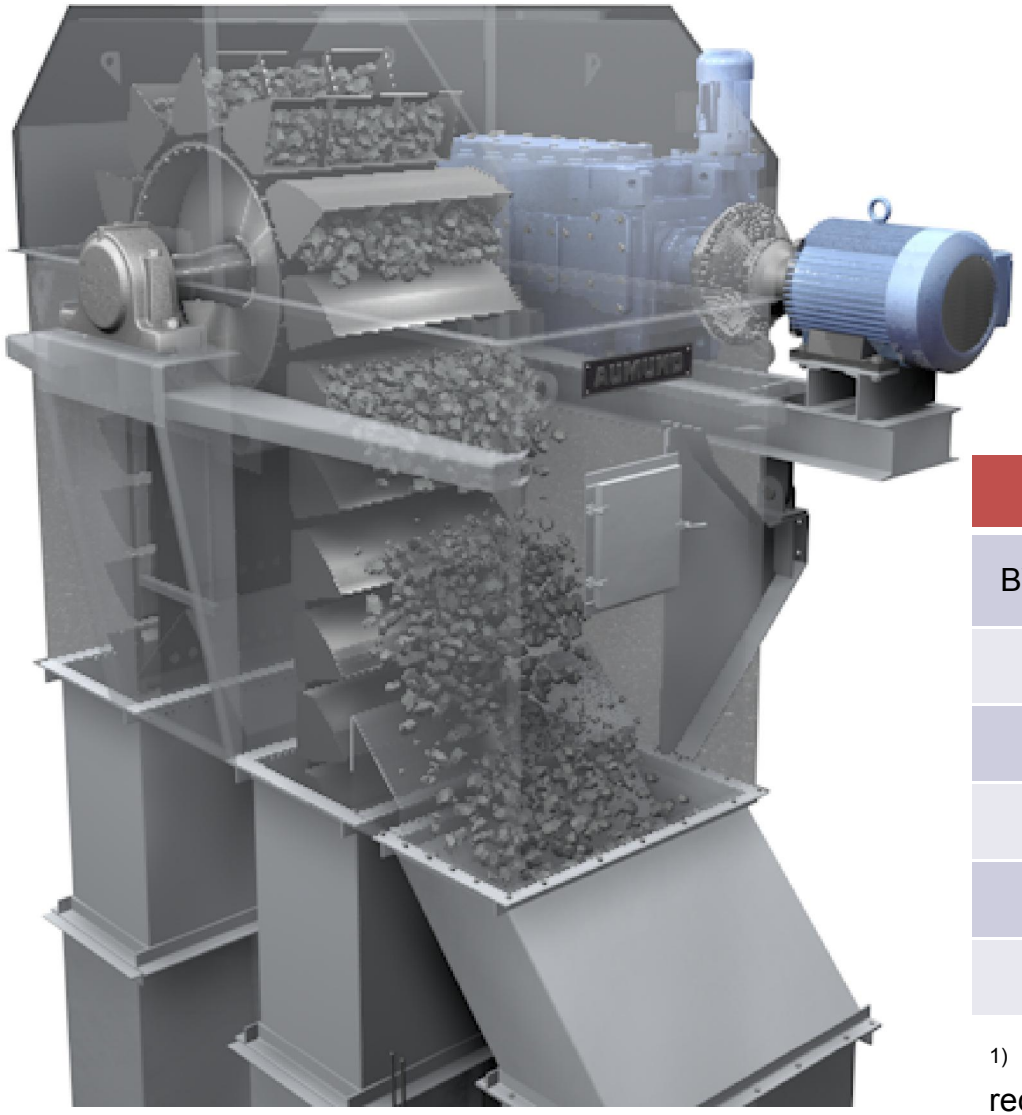
Thank you for Listening!

New Aumund Belt Bucket Elevator for Coarse Material



Conveying Capacity		
BWG-GK	speed [m/s]	Theoreric. capacity [1] [m³/h]
400	1,22 - 1,38	160 - 271
500	1,38 – 1,54	298 – 379
630	1,54 – 1,72	477 – 621
800	1,54 – 1,72	607 – 789
1000	1,72 - 1,91	855 – 1220

[1] at 100 % water level filling
recommended bucket filling = 75 %

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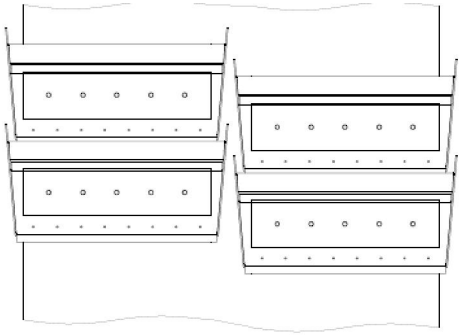
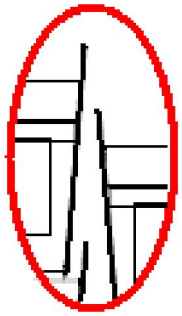
New Aumund Belt Bucket Elevator for Coarse Material

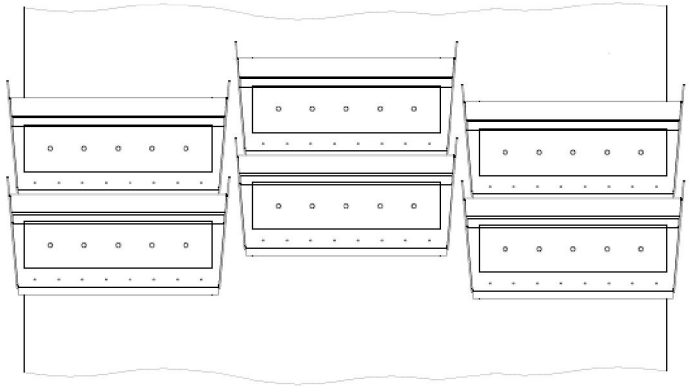
Double and Triple Bucket configuration for capacity increase





BWG-GK
2x630/2x800/2x1000

=> up to 1425m³/h*



BWG-GK
3x800
(limitation because of max. belt width = 2.4m)

=> up to 1730m³/h*

* @ 75% bucket filling