

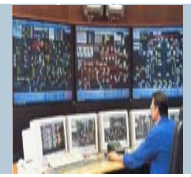

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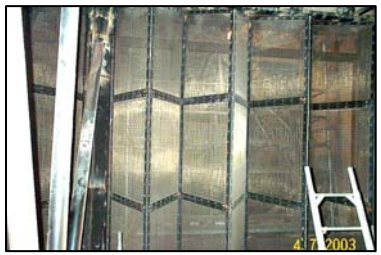

STEAG LPA Screens –

Our operating experience makes a world of difference

Steag Group

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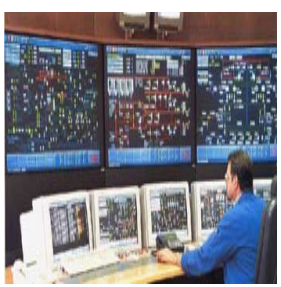
Power Generation and District Heating

Engineering and IT Solutions



Operation & Maintenance

Steag Group Facts:

- Steag is a wholly owned subsidiary of RAG, Europe‘s largest bituminous coal mining company.
- Steag is one of Europe‘s largest power generator from bituminous coal.
- Steag owns and operates more than 10,000 MW of electric and steam generating capacity.
- In 2004 Steag:
  - had more than 5,000 employees worldwide.
  - had revenues of more than $ 6 billion worldwide.
  - operated 28 electric generating units with 24 SCRs.
  - had 3 electric generating units under construction.
  - operated 9 waste-to-energy plants (all with SCRs).
  - operated 20 electric generating units for third parties.
- For more info go to [www.steag.com.](http://www.steag.com)

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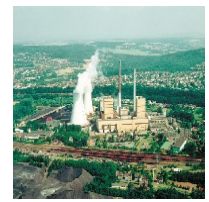
Germany

Bergkamen
750 MW

Bexbach
775 MW

Cologne-Godorf
215 $MW_{el + eq.}$



Fenne
500 MW

Herne
1,180 MW
750 MW
COD 2012

Leuna
158 $MW_{el + eq.}$

Lünen
500 MW

Voerde
2,220 MW

Walsum
600 MW
750 MW
COD 2010

Weiher
710 MW

International

Iskenderun, Turkey
1.320 MW

Mindanao, Philippines
260 MW
COD 2006

Termopaipa, Columbia
165 MW

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The Culprit

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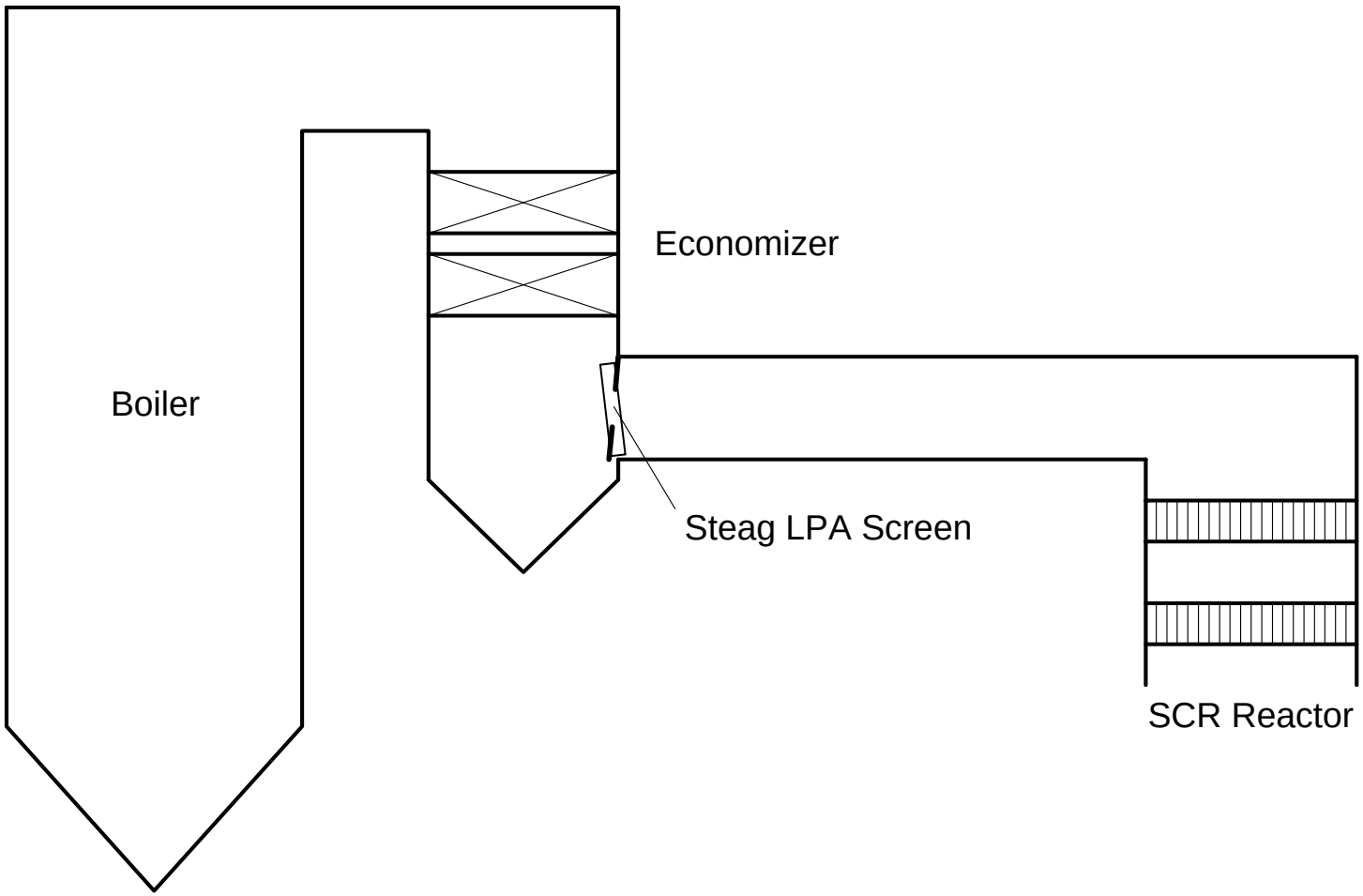
LPA Screens – Location of Installation



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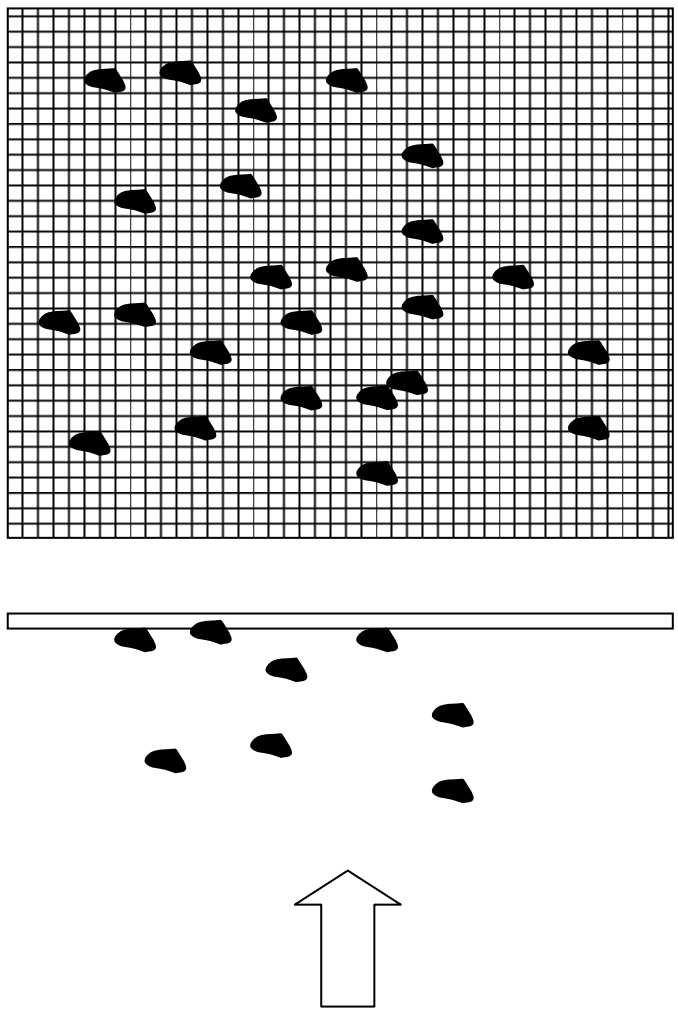
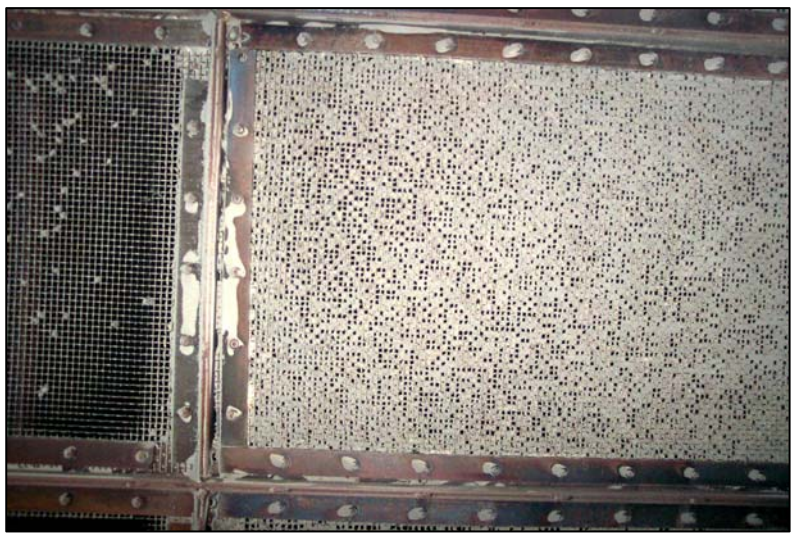
Typical Flat LPA Screen





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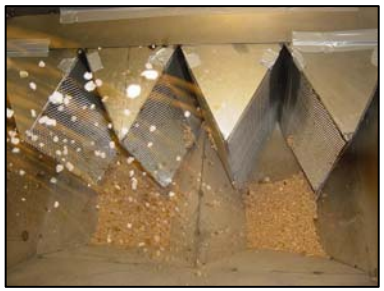

Steag‘s Pleated LPA Screen Design

The pleated design ensures an open area of the LPA screen, wich is equal or greater than the cross sectional area of the economizer outlet duct for the lowest possible flow velocity.

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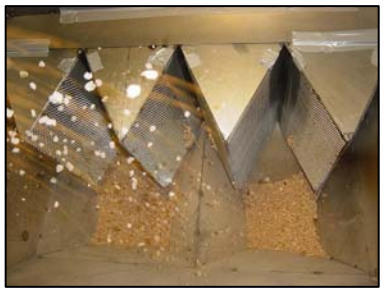
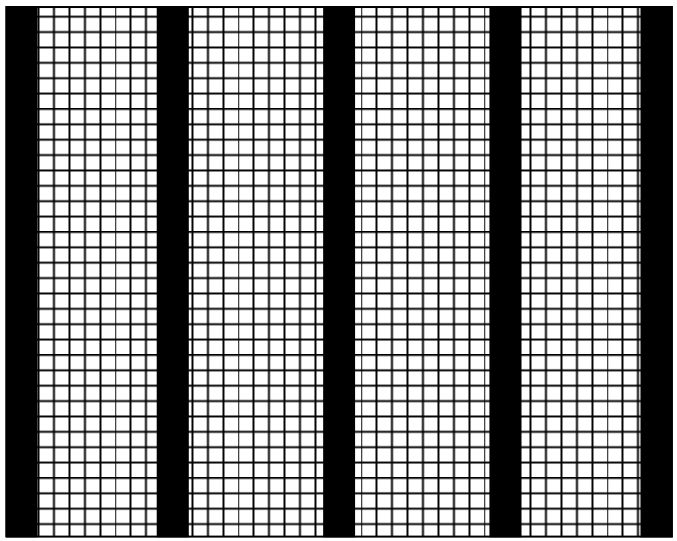
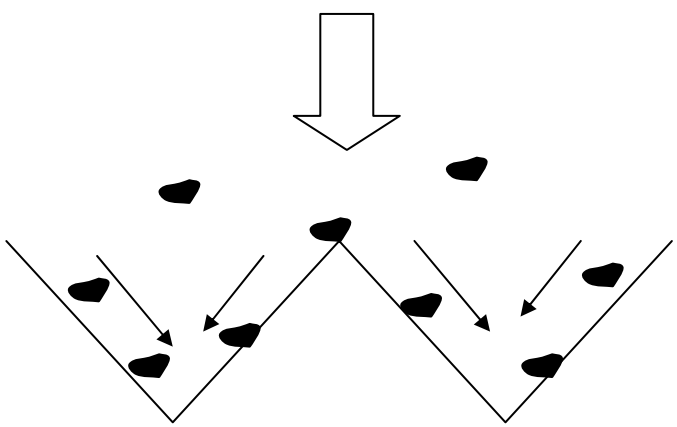
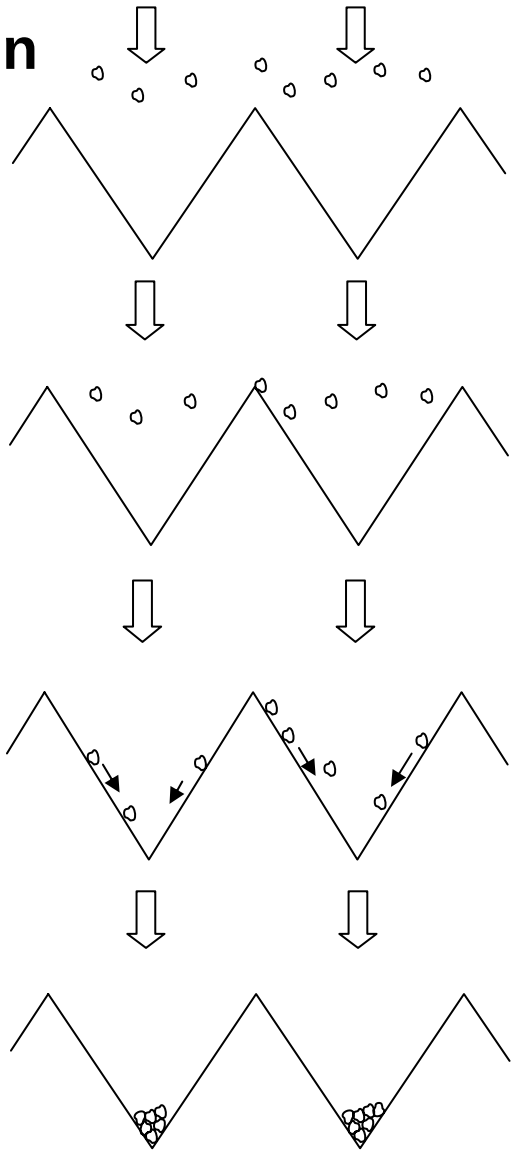


Steag‘s Pleated LPA Screen Design







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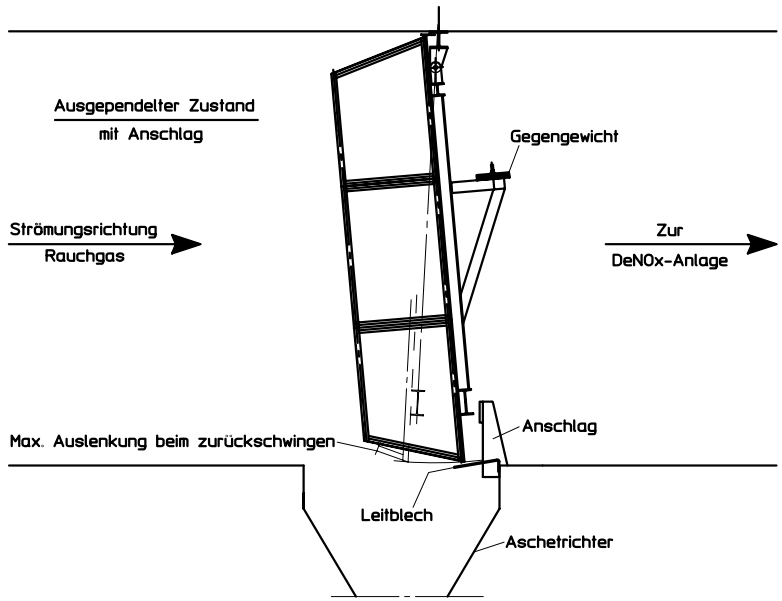
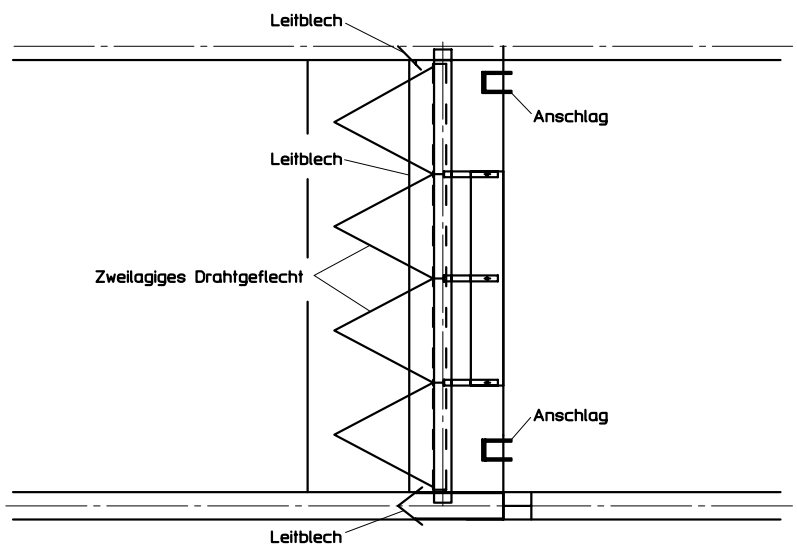
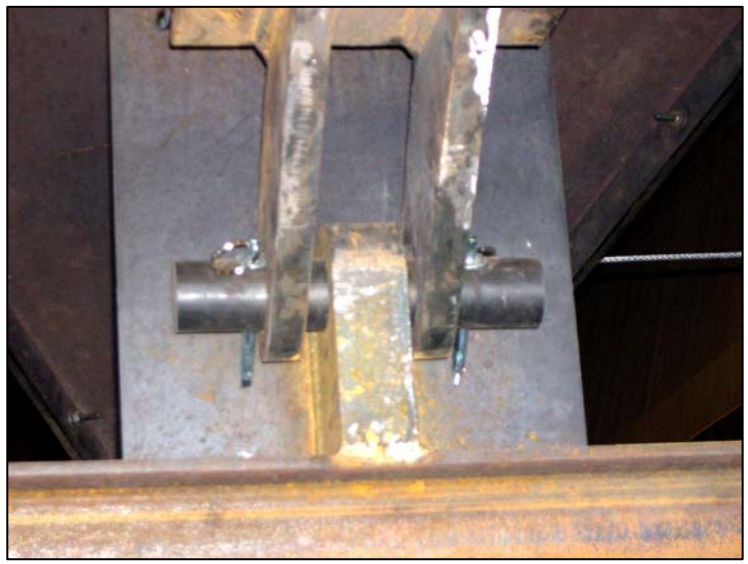




LPA Screens – Hinged Design



Screens are free swinging for self cleaning motion.

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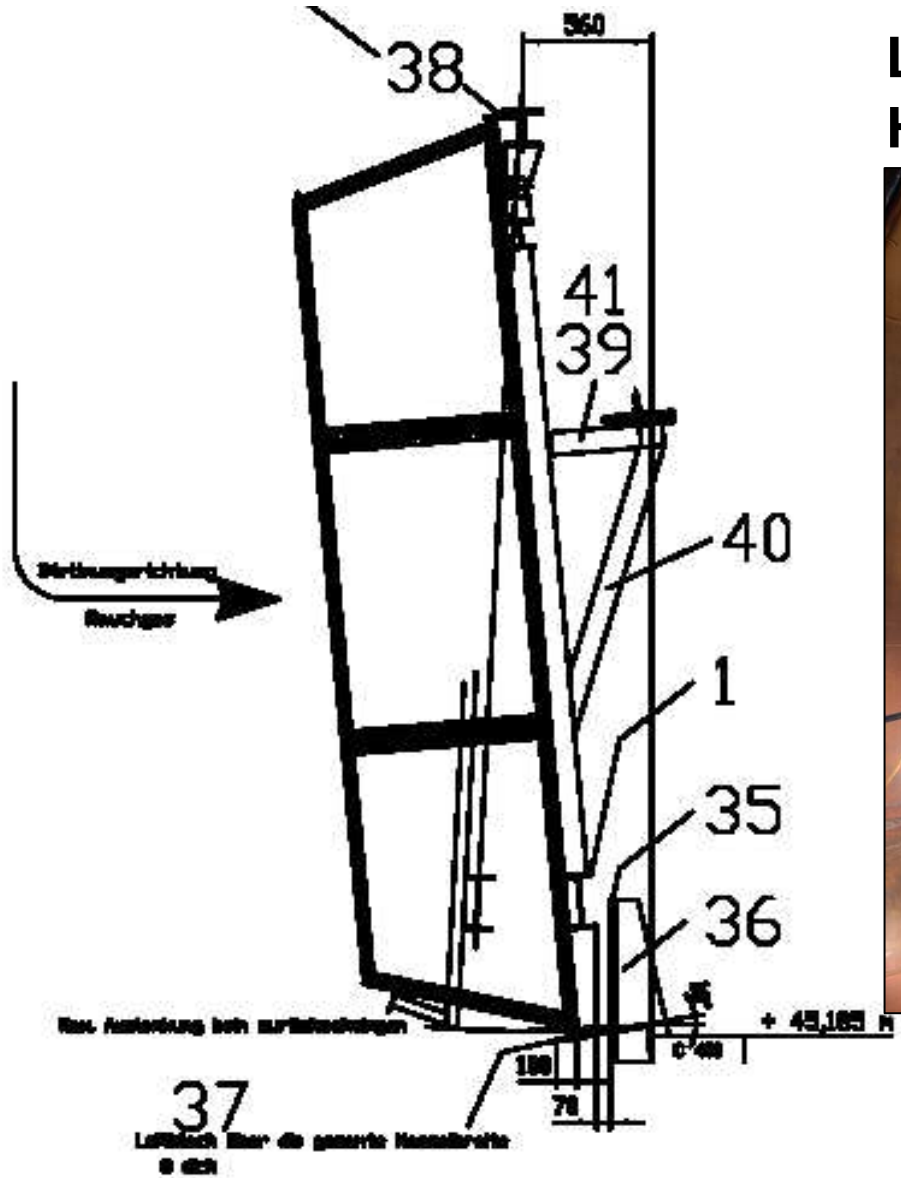

LPA Screens – Hinged Design

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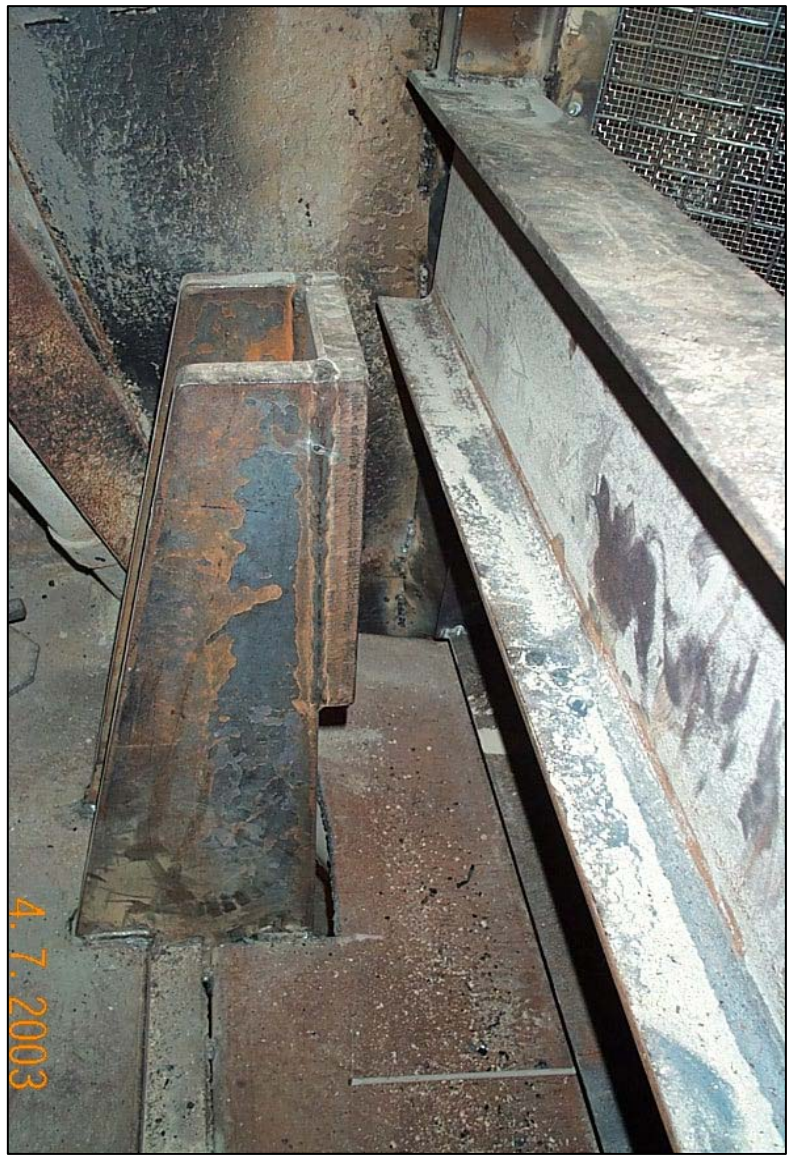

LPA Screens – Stops

Step 1:
Free swinging screen gets pulled away by a rapper.

Step 2:
When released from the rapper, screen swings back against the stop (anvil).

Step 3:
Hitting the stop induces a strong impulse and vibrating motion in the screen. LPA caught in the screen gets released and drops down.

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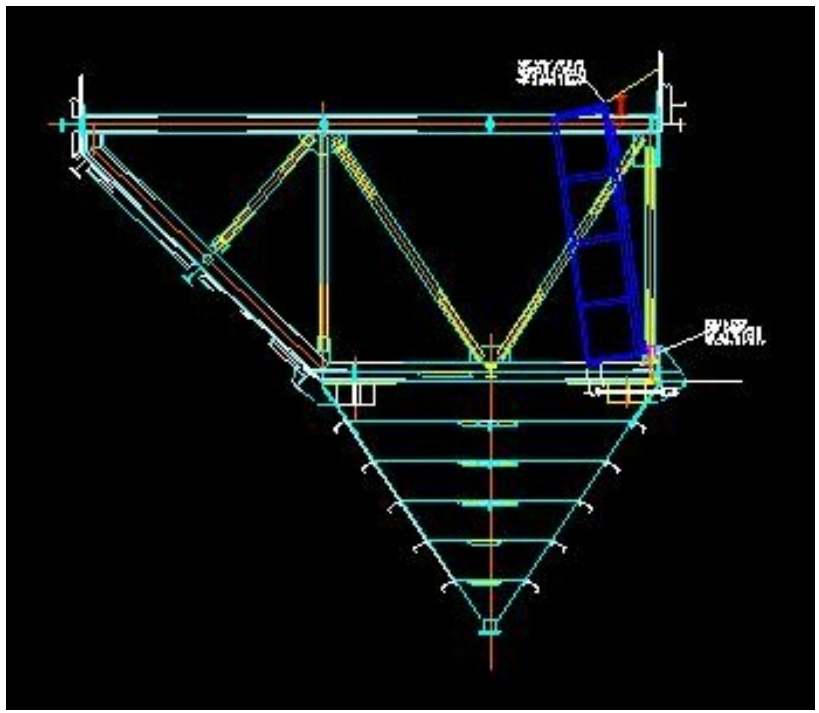
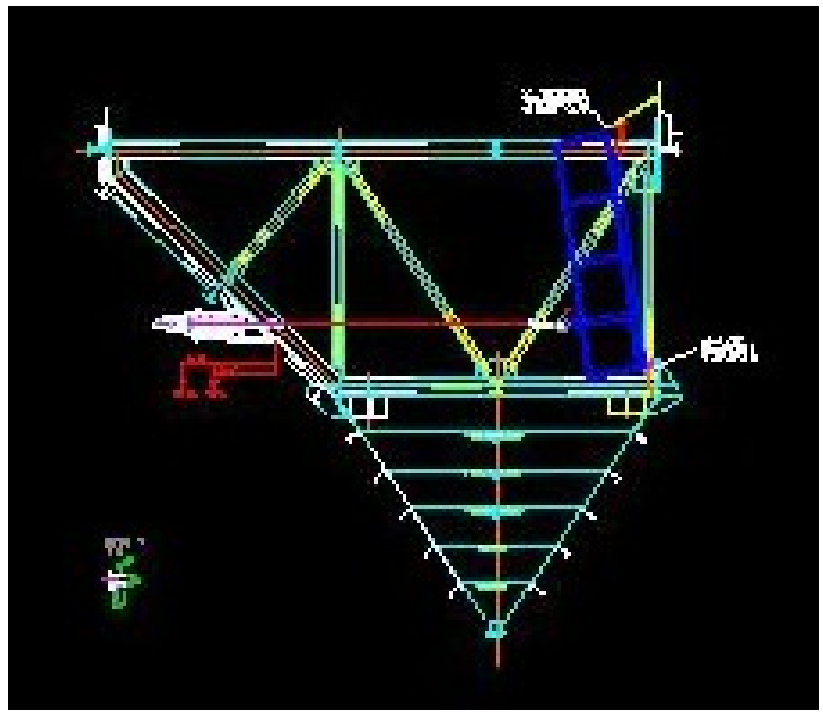
LPA Screens – Fully Automated Rappers





pneumatic rapper
- actuated pneumatic cylinder
- pushes screen from stop
- standard solution
- 100 psig compressed air

camshaft rapper
- gear motor driven camshaft
- pulls screen from stop
- optionally supplied
- 110 VAC or 480 V 3-phase

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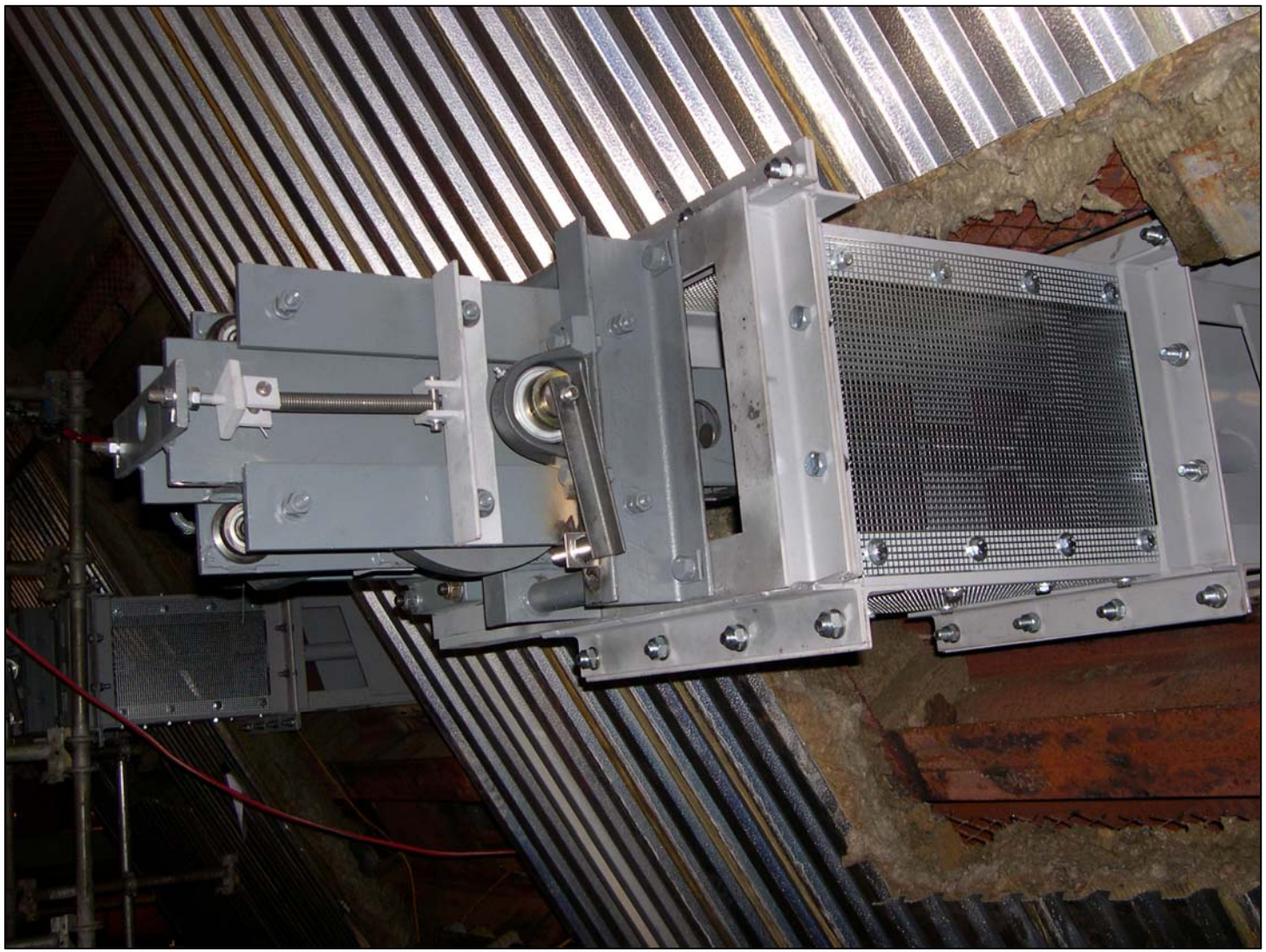
LPA Screens – Fully Automated Rappers



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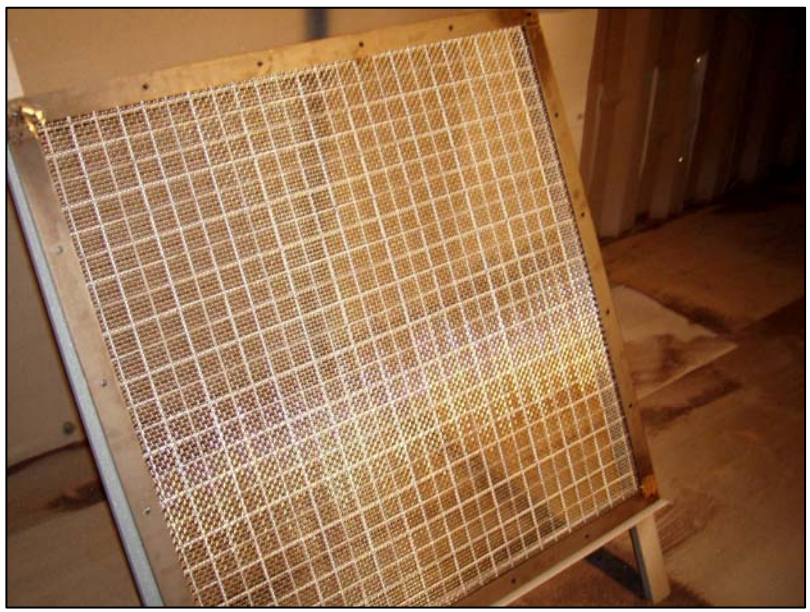
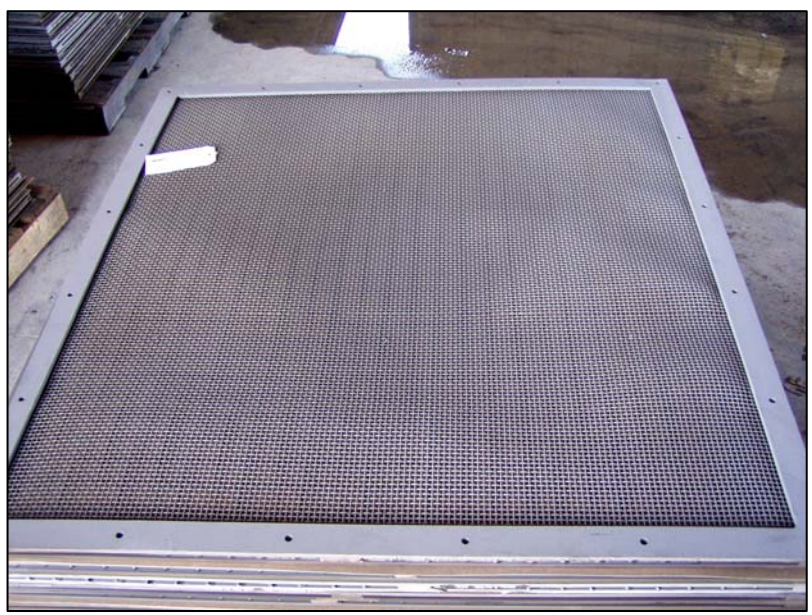
LPA Screen Inlays – Double Wire Mesh Screen Design



uncoated double wire mesh
- suitable up to 60 fps

coated double wire mesh
– suitable for up to 75 fps



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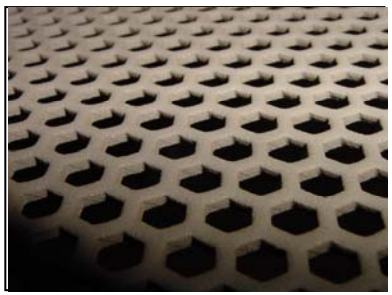
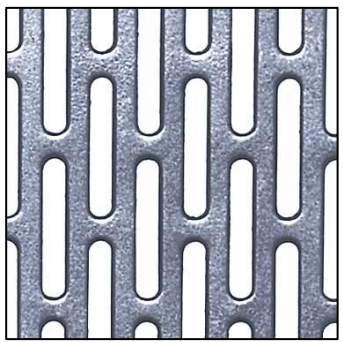


LPA Screen Inlays – Perforated Plate Design

uncoated perforated plate
– suitable for up to 70 fps



slotted, square or hexagonal holes

coated perforated plate wit
– suitable for up to 80 fps

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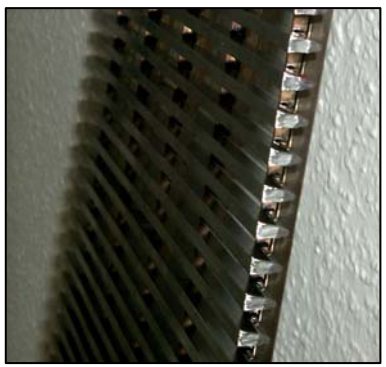
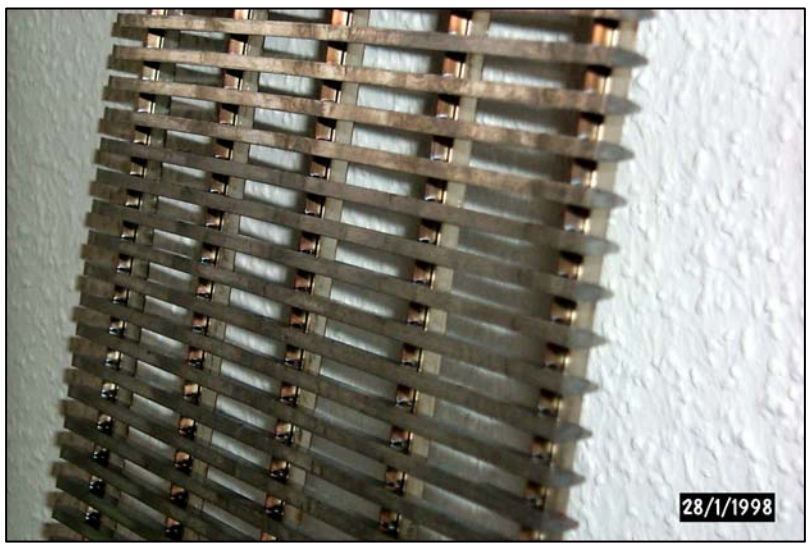


LPA Screen Inlays – Wedge Wire Design



uncoated wedge wire – suitable for up to 75 fps

coated wedge wire – suitable for more than 75 fps

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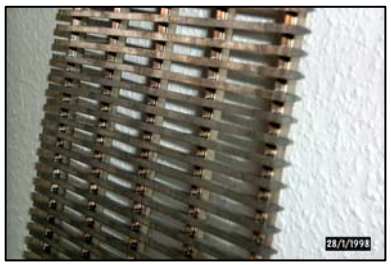
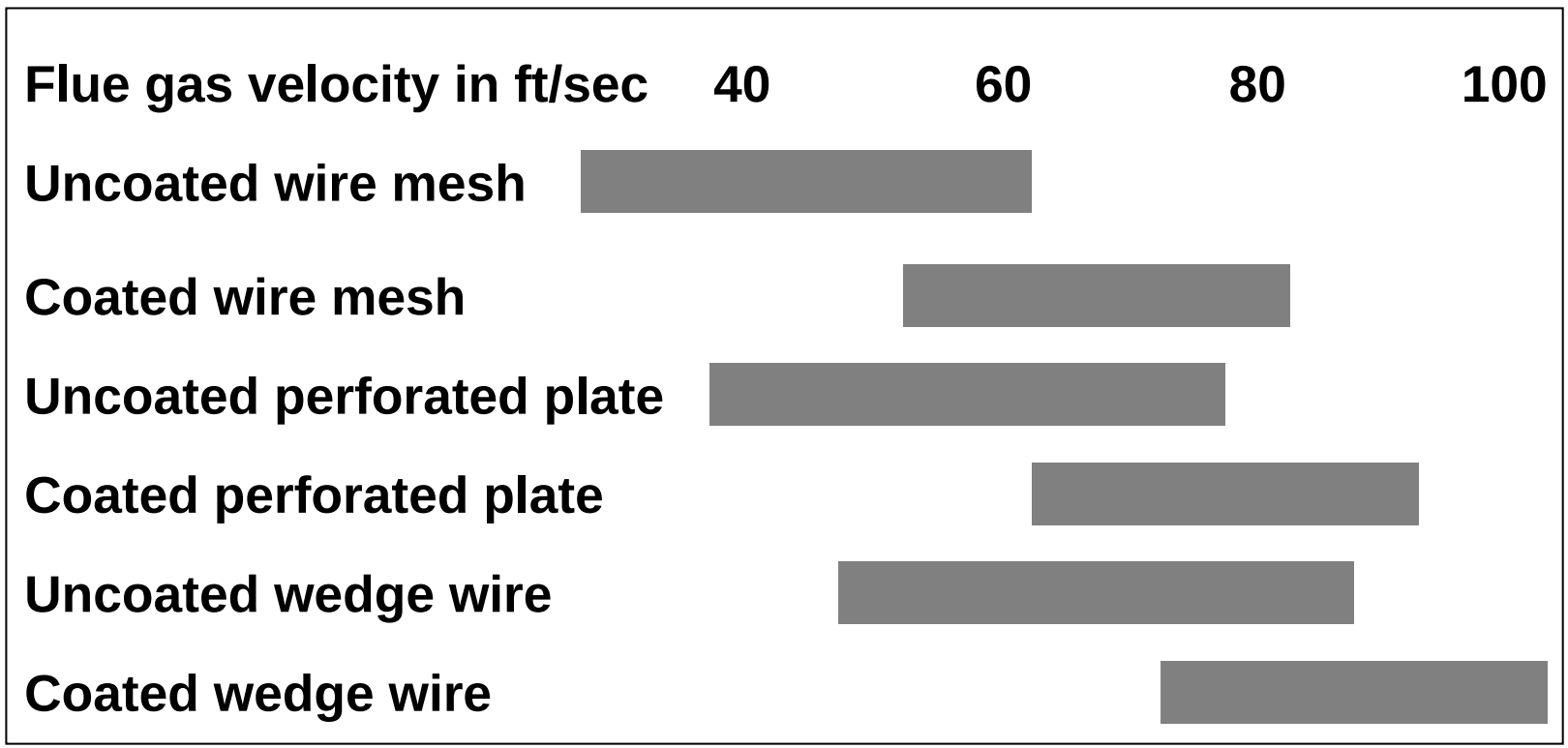


Suitability of various screen inlay materials depending on the average flue gas velocity in the economizer outlet duct:



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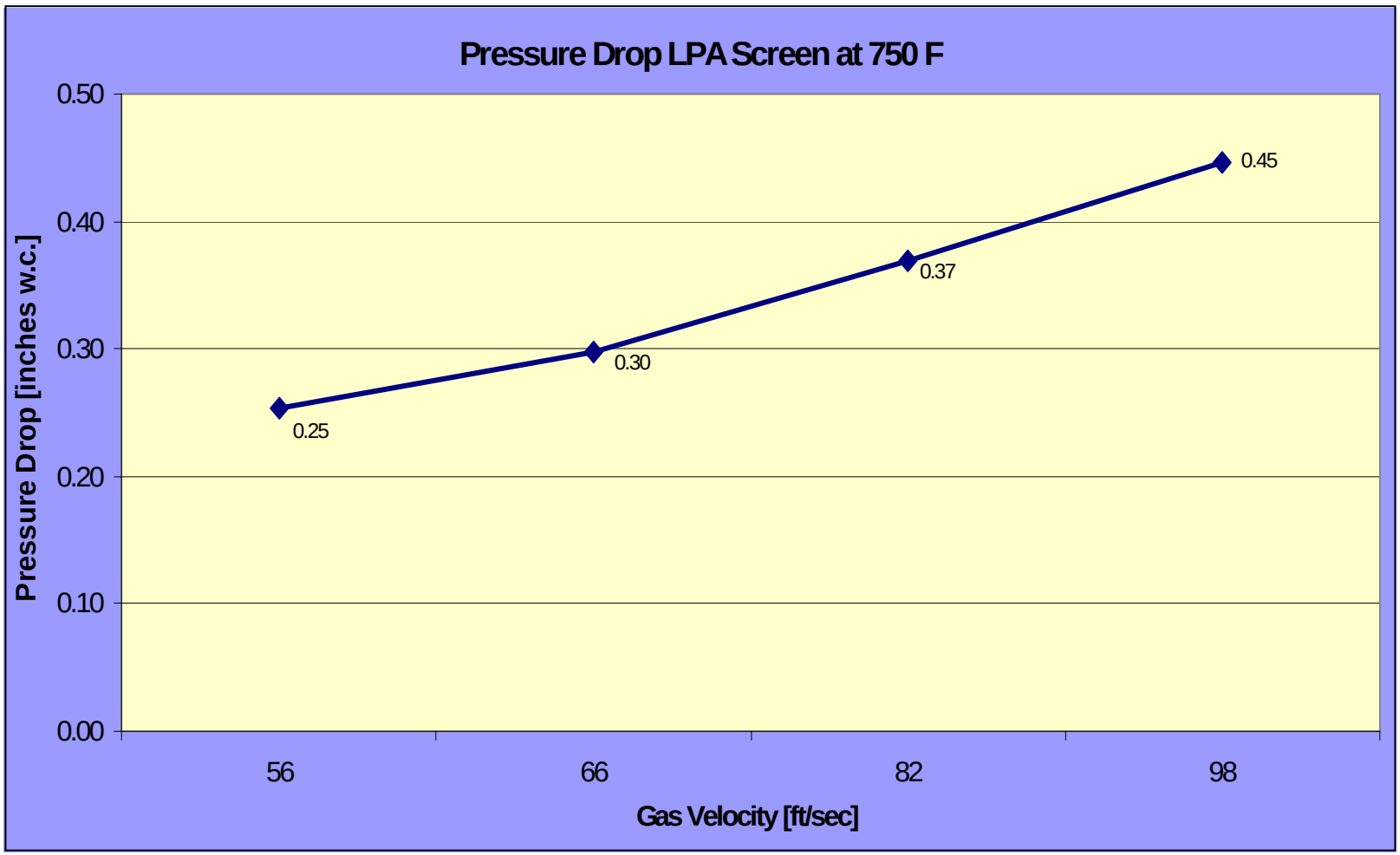
Large open surface area and slow flue gas velocity through the screen ensure a low pressure drop across the LPA screen



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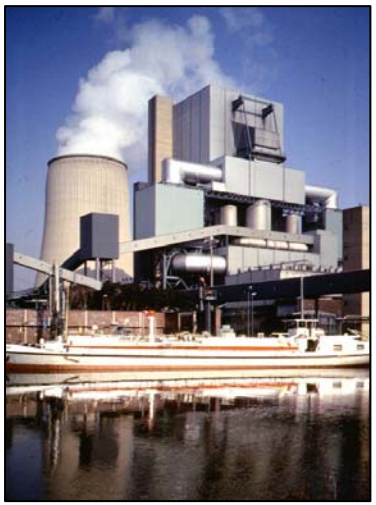

LPA Screens – Schedule

Design incl. site investigation	**4 – 6 weeks**
Manufacturing	**12 – 14 weeks**
Installation	**2 – 4 weeks**

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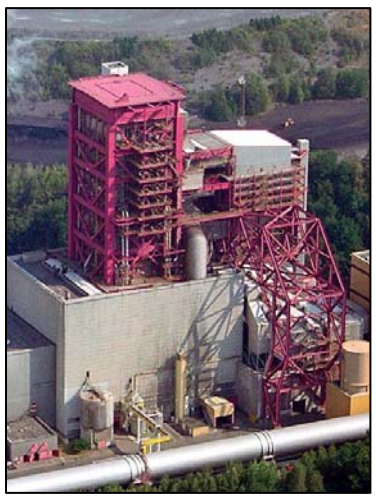

LPA Screens – Steag's LPA Screen Patent Covers:

- the pleated design
- the hinged design and self cleaning rapping motion.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

(43) Internationales Veröffentlichungsdatum
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PCT

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(72) Erfinder; und

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(81) Bestimmungsstaat (national): DE

(84) Bestimmungsstaaten (regional): europäisches Patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR).

Veröffentlicht:
— mit internationalem Recherchenbericht

(Fortsetzung auf der nächsten Seite)

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Steag's Voerde Power Station Unit 3 and 4 (Germany)

2 units, 760 MW each,
coal ash content up to 15%,
flue gas velocity up to 45 ft/sec,
uncoated wire mesh screen inlays,
installed in winter 1995,
25% of the screen inlays replaced in 2004.

Essent's Amercentrale Unit 8 (The Netherlands)

1 unit, 600 MW,
coal ash content up to 25%,
flue gas velocity up to 75 ft/sec,
uncoated wire mesh and wedge wire screen inlays,
(only locally in high velocity areas),
installed in spring 2003,
5% of the screen inlays replaced in 2005.

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NIPSCo's Bailly Generating Station Unit 8 (Indiana)

1 unit, 320 MW,
coal ash content up to 12%,
flue gas velocity up to 60 ft/sec,
uncoated wire mesh screen inlays,
installed in spring 2005,
no screen inlays replaced.

DP&L's Stuart Generating Station Units 3 and 1 (Ohio)

2 units, 600 MW each,
coal ash content up to 15%,
flue gas velocity up to 80 ft/sec,
Unit 3: installed in spring 2005, coated wire mesh and uncoated wedge wire screen inlays (only locally in high velocity areas),
Unit 1: installation in spring 2006, uncoated wedge wire screen inlays.

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EME Midwest Generation's Homer City Generating Station Unit1 and 2 (Pennsylvania)

2 units, 600 MW each
coal ash content up to 12%,
flue gas velocity up to 60 ft/sec,
uncoated wire mesh screen inlays,
installed in spring 2006.

Alabama Power’s Plant Gorgas Unit 10 (Alabama)

1 unit, 780 MW,
coal ash content up to 15%,
flue gas velocity up to 60 ft/sec,
uncoated wedge wire screen inlays only,
installation in spring 2006.

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Dominion's Mt. Storm Power Plant Unit 3 (West Virginia)

1 unit, 550 MW,
coal ash content up 12%,
flue gas velocity up to 55 ft/sec,
installation delayed due to necessary economizer outlet duct modifications.

Alstom Power, Knoxville

Alstom Power installed LPA screens based on a license from Steag in the following units:

- **TVA, Colbert Fossil Plant Unit 5, 600 MW**
- **TVA, Bull Run Fossil Plant Unit 1, 870 MW**
- **TVA, Paradise Fossil Plant Unit 1, 750 MW**
- **TVA, Cumberland Fossil Plant Unit 2, 1,300 MW**
- **TVA, Kingston Fossil Plant Units 1 – 9, 1,460 MW**

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Questions?