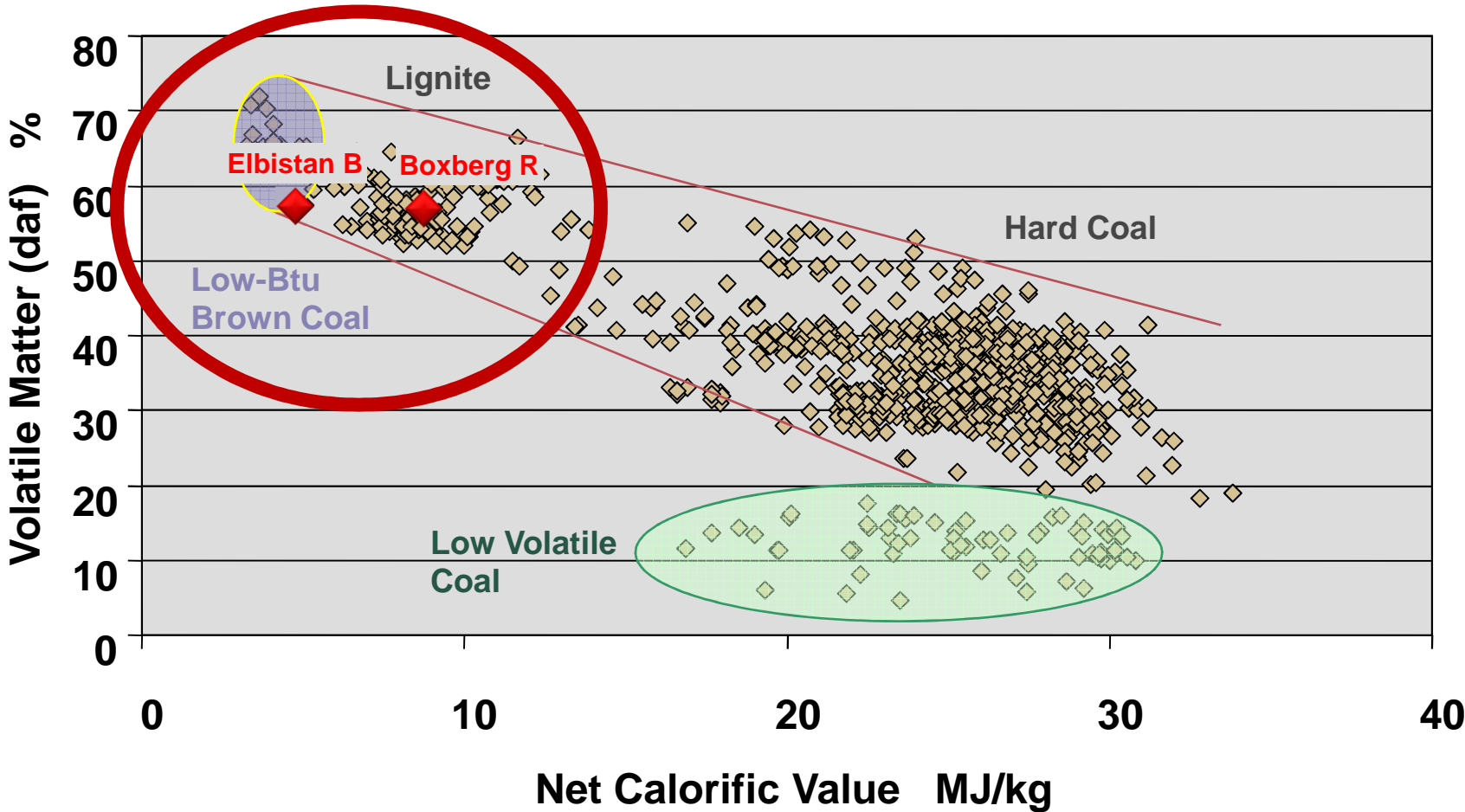


# HPE's Lignite Technology

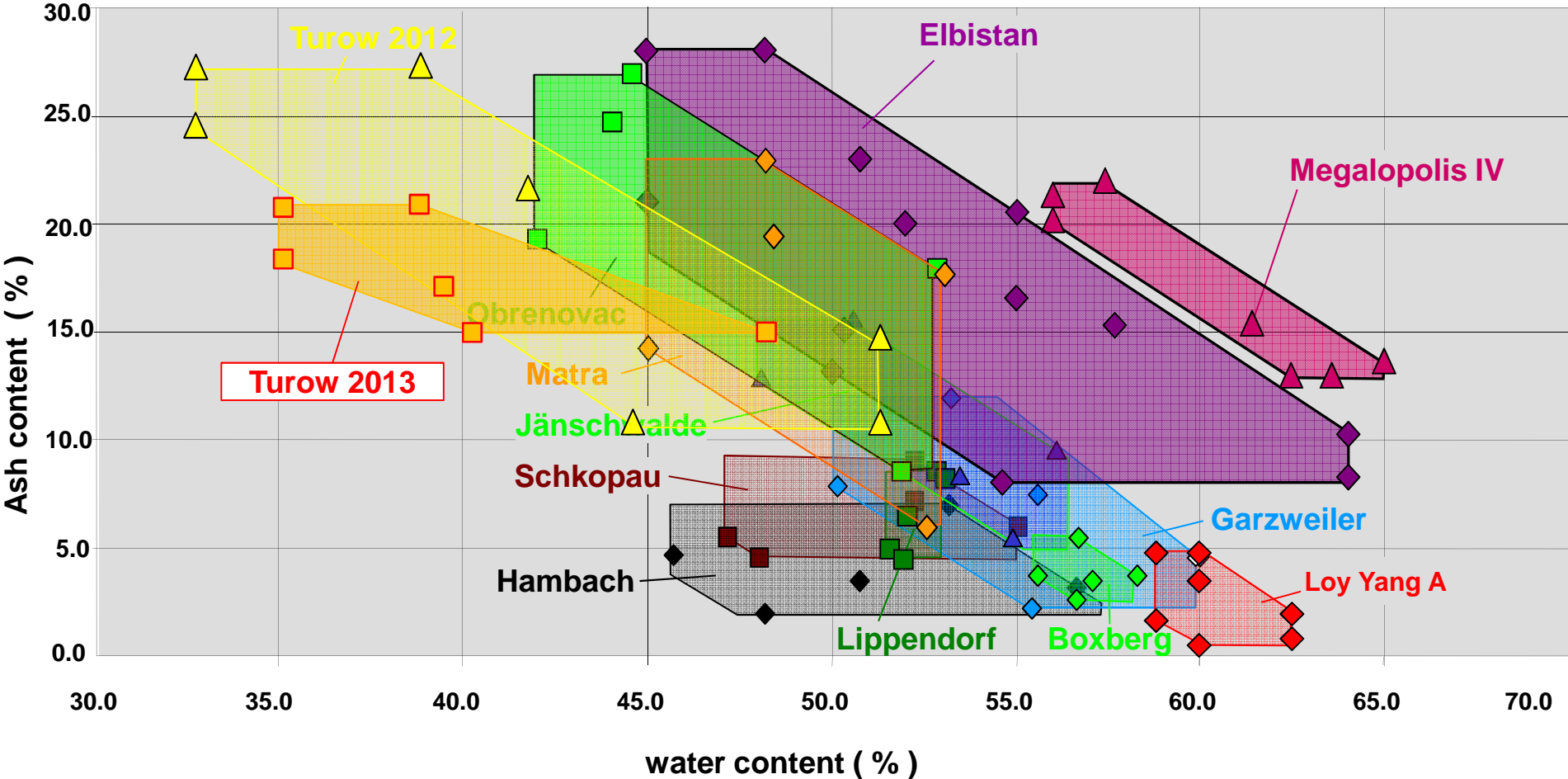
Horst-Dieter Berten

## Lignite coal qualities

# HPE know-how for a wide range of coal qualities



# Lignite Characteristics

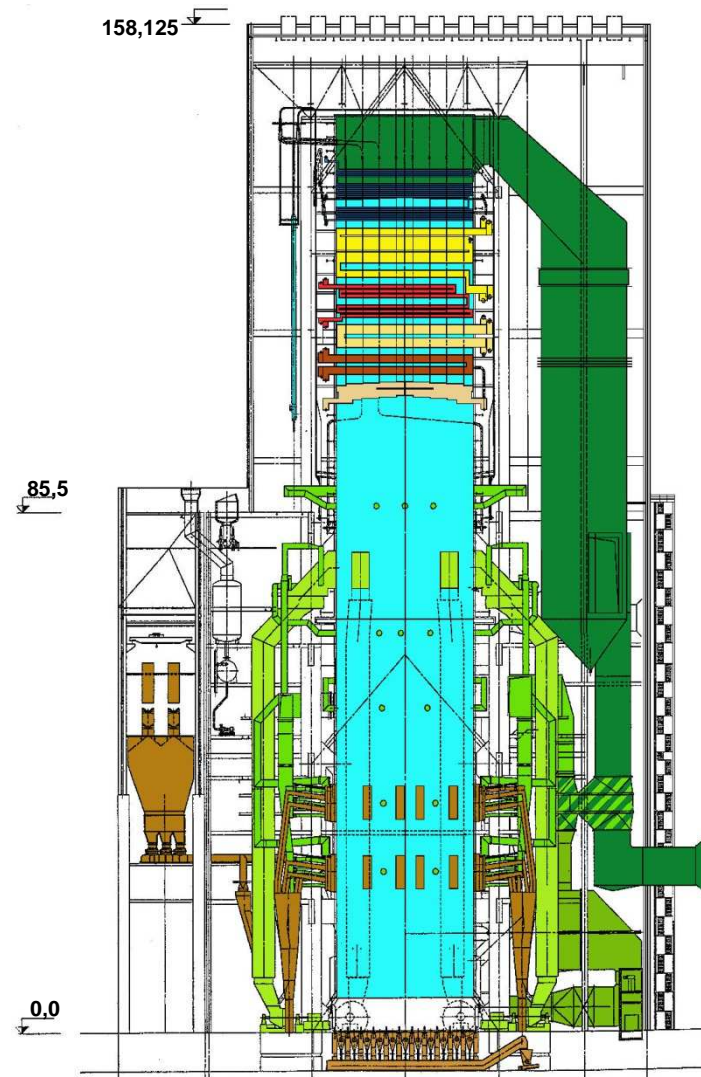


# HPE's selected references: Lignite fired Steam Generator – New Installations

<b>Project</b>	<b>Country</b>	<b>Unit</b>	<b>MWeI</b>	<b>Steam parameters t/h / °C / bar</b>	<b>Contract award</b>
Schkopau A & B	Germany	2	450	1360 / 545 / 262	1992
Lippendorf R & S	Germany	2	933	2420 / 554 / 267	1994
Niederaußem K	Germany	1	1012	2514 / 580 / 262	1995
Boxberg Q	Germany	1	907	2423 / 545 / 265	1995
Elbistan B	Turkey	4	360	1068 / 540 / 195	1998
Neurath F & G	Germany	2	1100	2898 / 600 / 272	2003
Boxberg R	Germany	1	670	1760 / 600 / 285	2005

# PS Boxberg Q, Germany

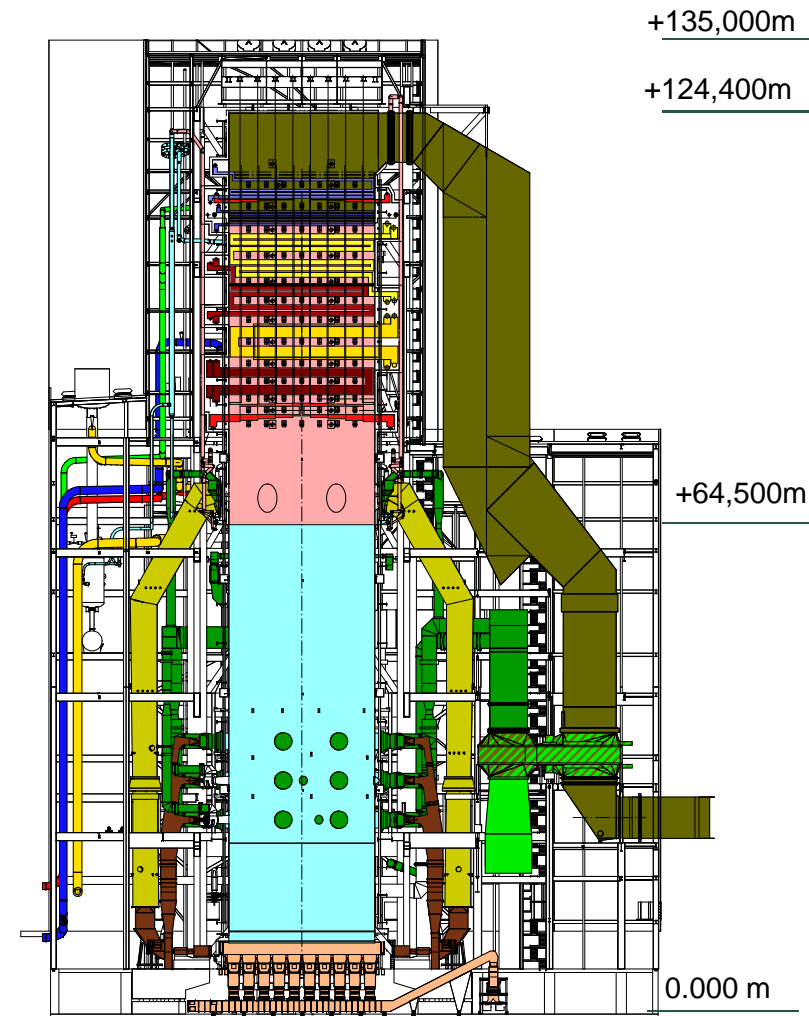
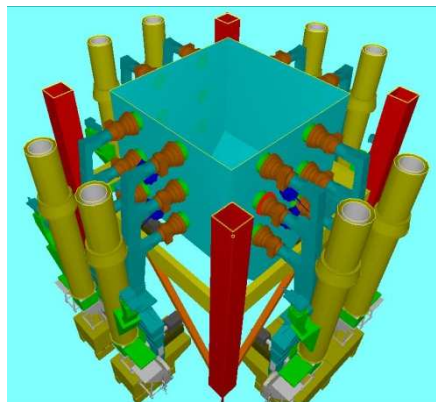
- 1 x 907 MWel / 1 x 2420 t/h
- Once-through steam generator, Benson®
- Lignite
  - Hu = 8.6 MJ/kg**
  - A = 5.2 %**
  - W = 56.1 %**
- Design parameters:
  - SH: 545 °C / 285 bar
  - RH: 580 °C / 66 bar
- Commissioning: 2000



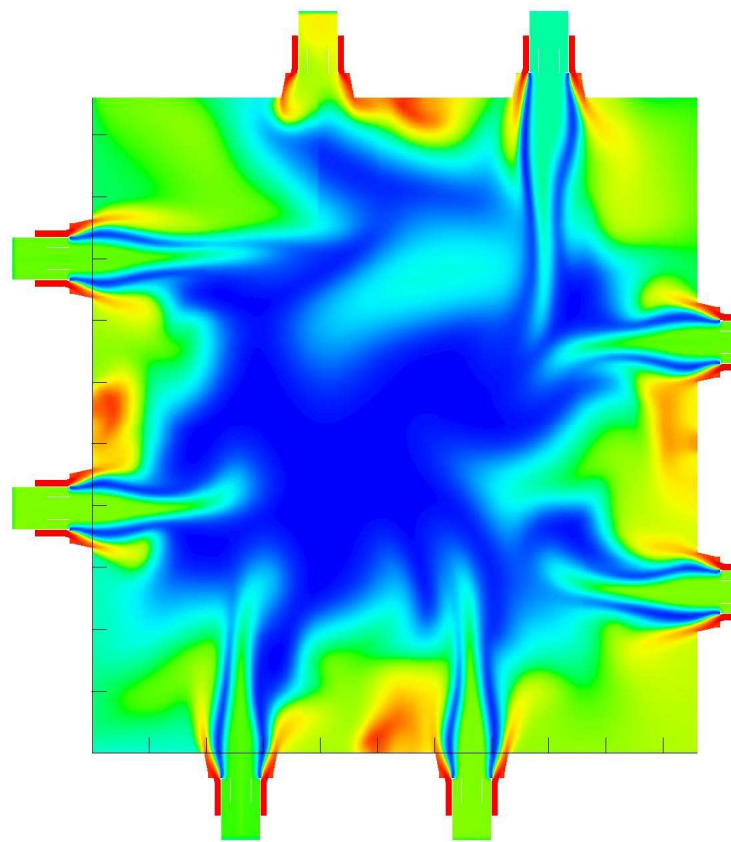
# P.S. Boxberg R (670 MW) Supercritical steam parameters

- 1 x 670 MWe / 1 x 1760 t/h
- Once-through steam generator, Benson®
- Lignite
  - Hu = 8.6 MJ/kg**
  - A = 5.2 %**
  - W = 56.1 %**
- Design parameters:
  - SH: 600 °C / 315 bar a
  - RH: 610 °C / 72 bar a
- Commissioning 2012

24 RS® burners  
„All-wall“ firing

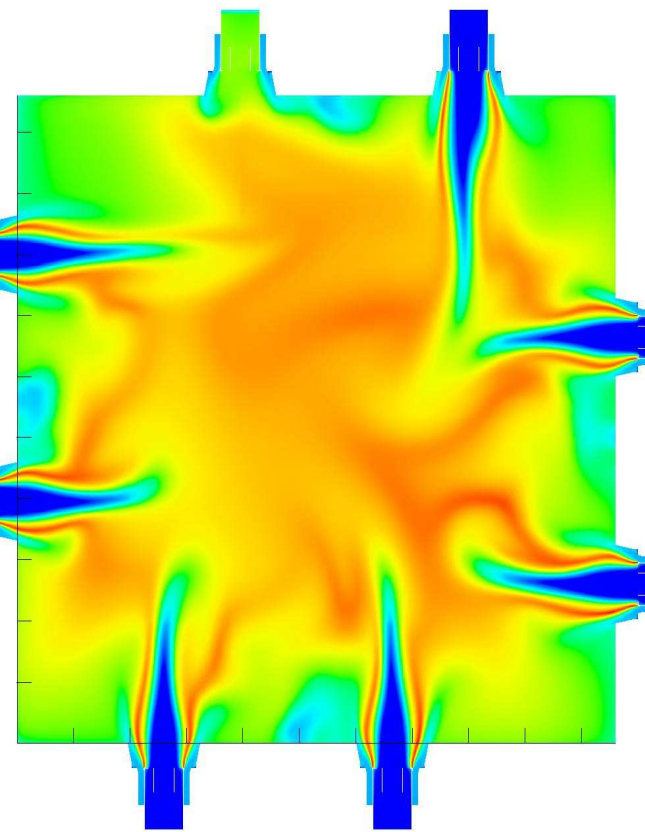
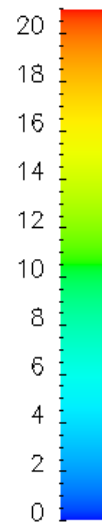


**Burner Level 2 (27.4 m)**

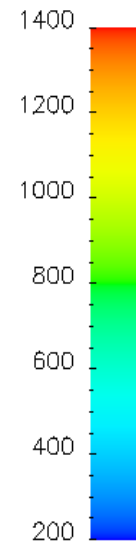


**Oxygen**

O<sub>2</sub>  
[vol.-%, tr.]



Temp.  
[°C]



**Temperature**



# P.S. Boxberg R (and Boxberg Q)



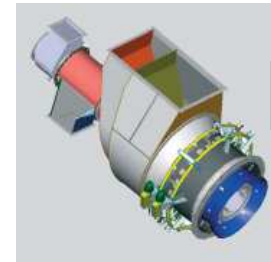
# EXAMPLE MAIN PRODUCTS – Firing Components



**Coal feeding**



**Belt conveyor**



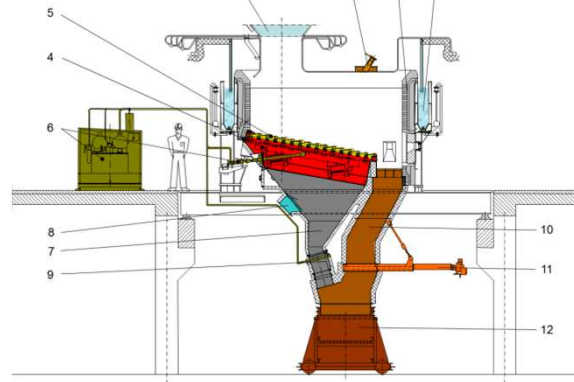
**Burners**



**Pulverizers**



**Burn-out grate**

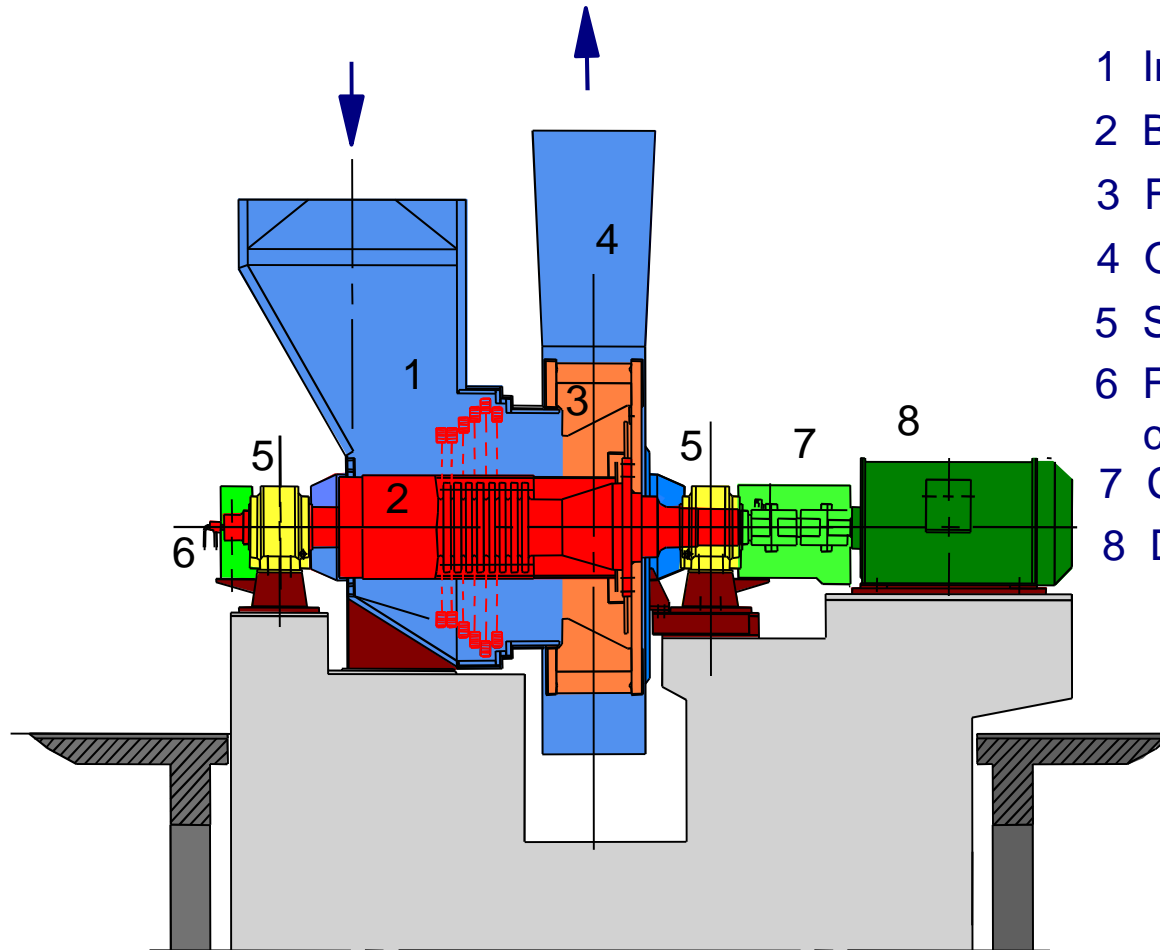


**Ash removal**



DGS®- and NV-Mills for lignite

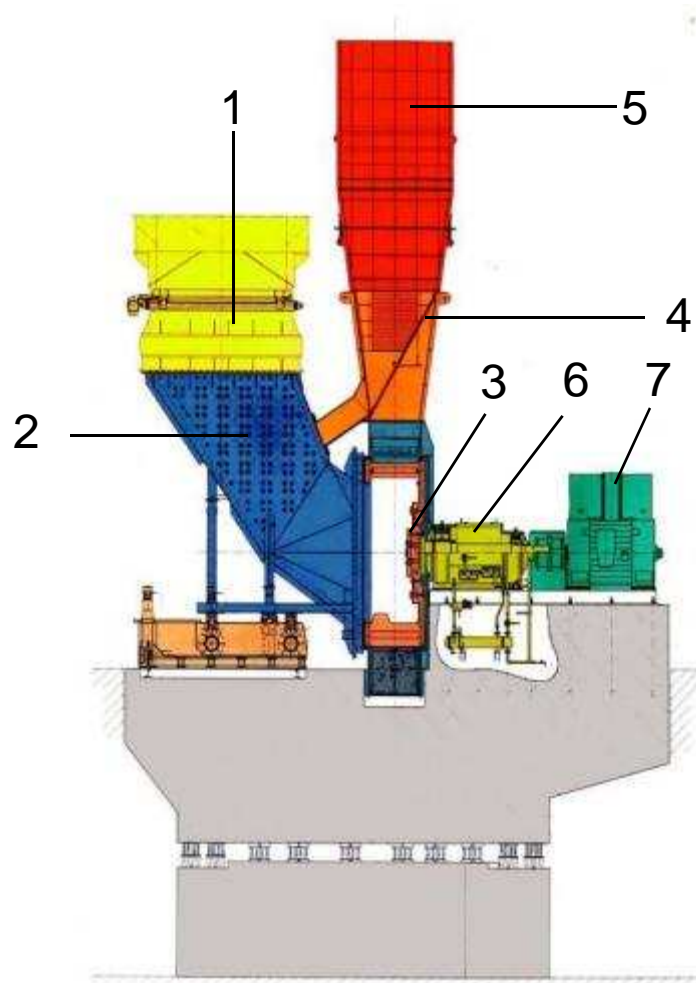
## DGS<sup>®</sup> Mill – HPE's technology without classifier



- 1 Inlet Housing
- 2 Beater Section on common Shaft
- 3 Fan wheel on common Shaft
- 4 Outlet Housing
- 5 Shaft Bearing
- 6 Free end connected to cooling system
- 7 Coupling
- 8 Drive



## Lignite Mill with Classifier, N- / NV-type



- 1 Admission box
- 2 Pulverizing chamber door
- 3 Beater wheel
- 4 Adapter Piece
- 5 Classifier
- 6 Bearing
- 7 Motor



# Technology lead supported by numerous references

## Reference list NV mills

Hitachi Power Europe GmbH

Hitachi Pow

LTZ. Nr.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.
No.	Suppl./Operator	Quantity	Capacity t/h	Size t/h	Boiler Capacity MW	Start-up Date
36	Kraftwerk Borsberg II Deutschland, Germany	8	113	110	660	2000
37	Kraftwerk Lippendorf III Deutschland, Germany	8	116	110	633	1998
36	Kraftwerk Borsberg VI Deutschland, Germany	8	140	130	900	1999
36	Kraftwerk Lippendorf III Deutschland, Germany	8	118	110	633	1998
34	Kraftwerk Hagenwerder II Deutschland, Germany	1	111	110		1993
32	Industriekraftwerk Sonne Deutschland, Germany	4	10	10	IKW	1991
32	Kraftwerk Borsberg Deutschland, Germany	16	90	90		1991
31	Kraftwerk Hagenwerder II Deutschland, Germany	8	90	90		1991
30	Kraftwerk Hagenwerder II Deutschland, Germany	4	82	63		1991
29	Kraftwerk Espenhahn Deutschland, Germany	4	30	30		1990
28	Kraftwerk Schwarze Pumpe Deutschland, Germany	8	82	32		1990
27	Industriekraftwerk Sonne Deutschland, Germany	4	10	12,5	IKW	1989
26	Kraftwerk Lippendorf Deutschland, Germany	8	90	90		1989
25	Kraftwerk Borsberg Deutschland, Germany	16	90	90		1988
24	Industriekraftwerk Sonne Deutschland, Germany	4	10	12,5	IKW	1987
23	Industriekraftwerk Chemnitz Nord II Deutschland, Germany	12	40	40	HKW	1987
22	Industriekraftwerk Klingenberg Deutschland, Germany	8	40	40	HKW	1987
21	Kraftwerk Jämschowitz F Deutschland, Germany	12	78	80	260	1996
20	Industriekraftwerk Regis Marmoritz Deutschland, Germany	8	20	20	IKW	1996
19	Kraftwerk Osenda III Deutschland, Germany	20	92	90		1993
18	Kraftwerk Jämschowitz D Deutschland, Germany	12	78	80	260	1992
17	Kraftwerk Jämschowitz E Deutschland, Germany	12	78	80	260	1992
16	Kraftwerk Jämschowitz B Deutschland, Germany	12	78	80	260	1990
15	Kraftwerk Jämschowitz C Deutschland, Germany	12	78	80	260	1990
14	Kraftwerk Borsberg III Deutschland, Germany	12	78	80	260	1978
13	Kraftwerk Jämschowitz A Deutschland, Germany	12	78	80	260	1978
12	Kraftwerk Borsberg II Deutschland, Germany	12	78	80	260	1976

## Reference list DGS mills

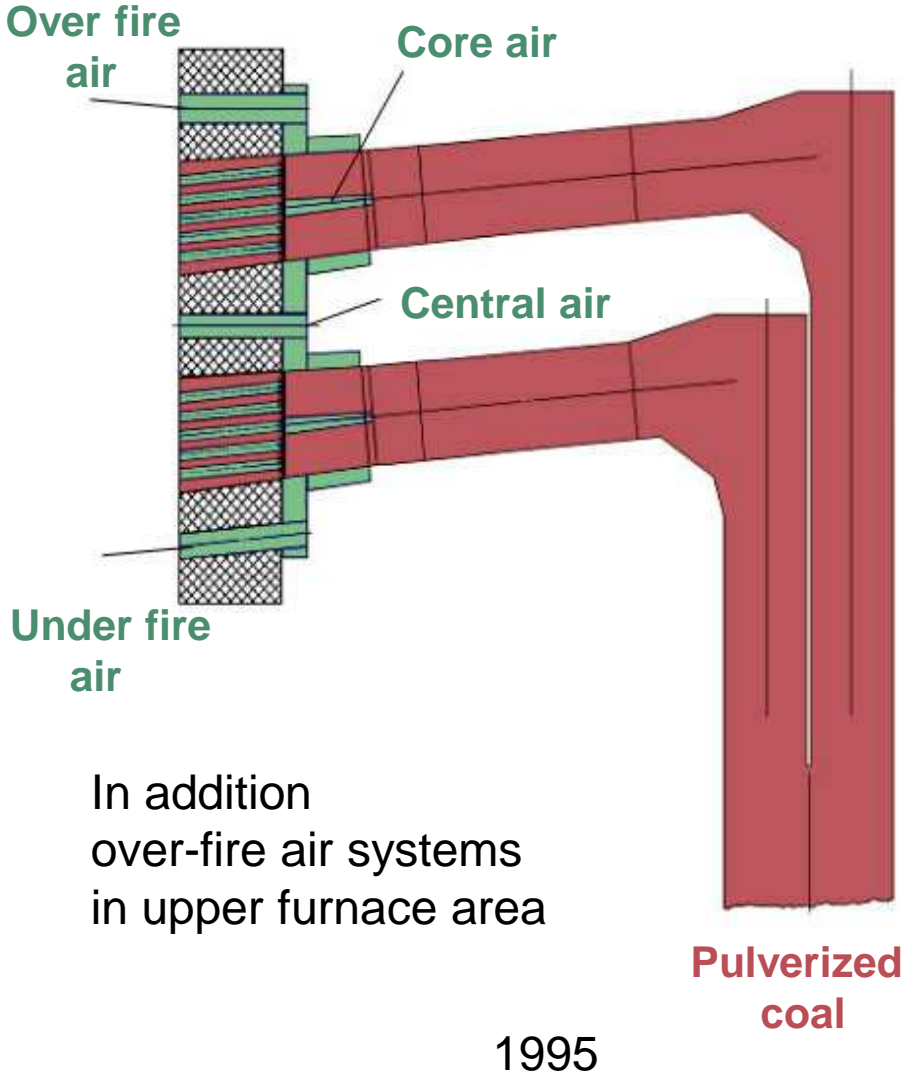
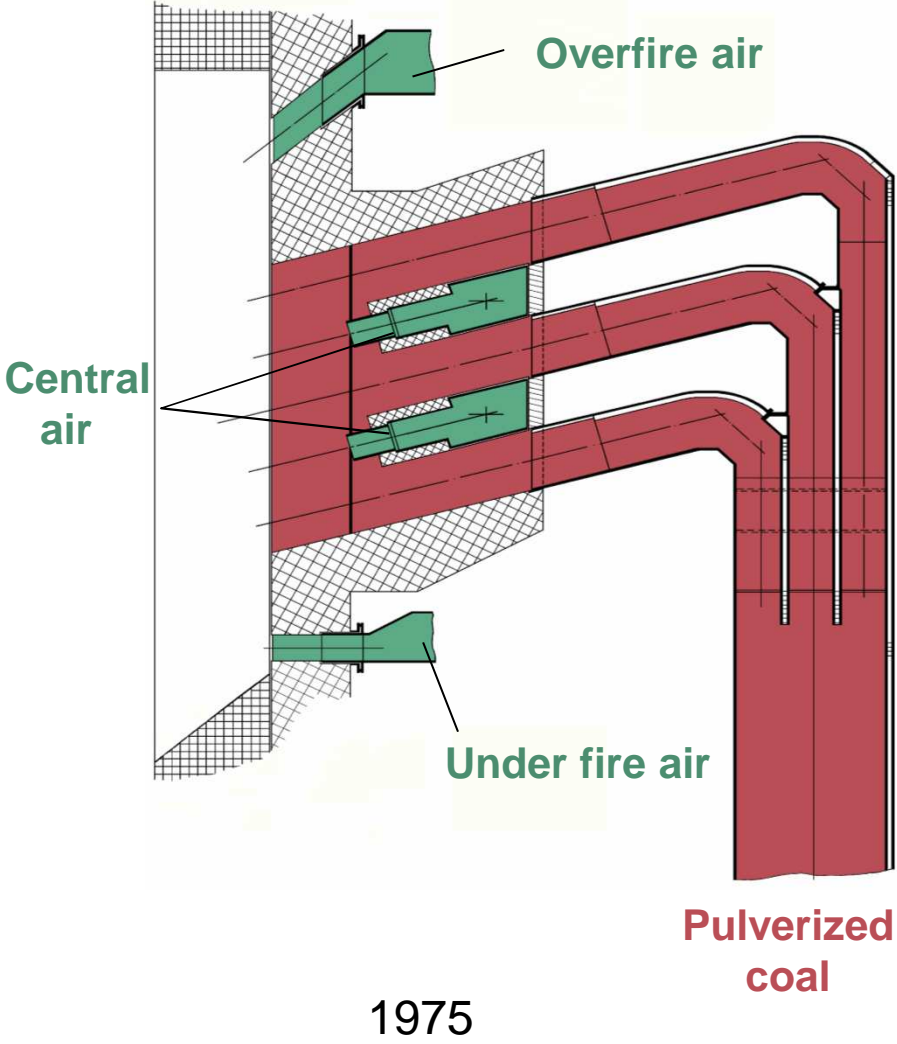
Hitachi Power Europe GmbH

Hitachi Power E Hitachi Power B Hitachi Power

LTZ. Nr.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.	LTZ. No.	
No.	Supplier/Operator	Quantity	Capacity t/h	Quantity	Capacity t/h	DGS-Size	Product to be ground
46	Koncernum Mitsubishi und BEP Energy für TEAS für Alstn-Ebstein II Thermal Power Plant Türkei	4	1037	24	100	100	Ebstein Light Ebstein lignite
47	VESA Kraftwerke Ruhr AG Gabelkirchen für Schkoppe für KW Schkoppe	2	1305	16	96,5	95	Robbrouckste Mittel-Deutschland Raw brown coal Centr. Germany
46	Verenigte Kesselwerke AG Düsseldorf für KW Megalopolis IV Griechenland	1	956,4	8	177	100	Griech. Braunkohle Greek lignite
45	Koncernum Verenigte Kesselwerke AG Düsseldorf für Türkiye Elektrik Kurumu für Sayilower IV Thermal Power Plant	1	400	8	62,2	70	Türkische Braunkohle Turkish lignite
44	Tampella Tampere / Finnland für KW Some Schwelierung / Türkei	2	480	12	37	50	Türkische Braunkohle Turkish lignite
43	Verenigte Kesselwerke AG Düsseldorf für Braunschweigische Kohlenbergwerke AG für KW Buchholz	1	1000	8	81,5	90	Robbrouckste Helmstedt Braunkohle m. brown coal
42	State Electricity Commission of Victoria, Melbourne für KW Yallourn Australien			1	108	130	Austral. Braunkohle Australian brown coal
41	Duro Dedicov Topane Ljubljana II Jugoslawien	1	270	4	20,4	40	Jugosl. Light Jugoslawien lignite
40	Nelson-Finnica teollisuus Nelson Meglay Jugoslawien	1	100	3	17,5 max. 20,9	25	Jugosl. Light Jugoslawien lignite
39	Tampella Tampere/Finnland für KW Some II / Türkei	2	480	12	37	50	Türkische Braunkohle Turkish lignite
38	Tampella Tampere Obrenovac Jugoslawien für KW Nicole Teale (Obrenovac V)	1	920	8	86,2	100 S	Kolubara Light Kolubara lignite
37	Beeche-Duff AG für Fincaza Electrica del Noroeste (FINOSA) I KW Meliana/Spainien	1	1750	8	127	130	Span. Braunkohle Span. Lignite
36	Verenigte Kesselwerke AG Düsseldorf für Türkei/Türkei	7	100	14	ca. 20	20	Türkische Braunkohle (braunkohle Guben) Turkish lignite (From various mines)
35	Koncernum Verenigte Kesselwerke AG Babcock, Steierm. für Türkiye Elektrik Kurumu für Alstn-Ebstein Projekt/Türkei	4	1020	24	175	100	Ebstein Light Ebstein lignite

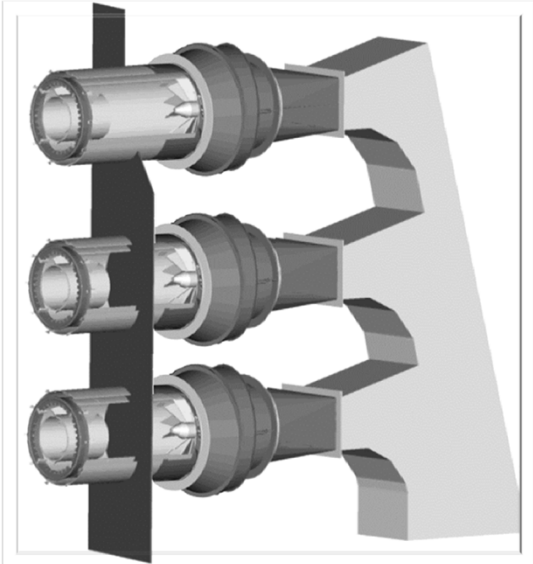
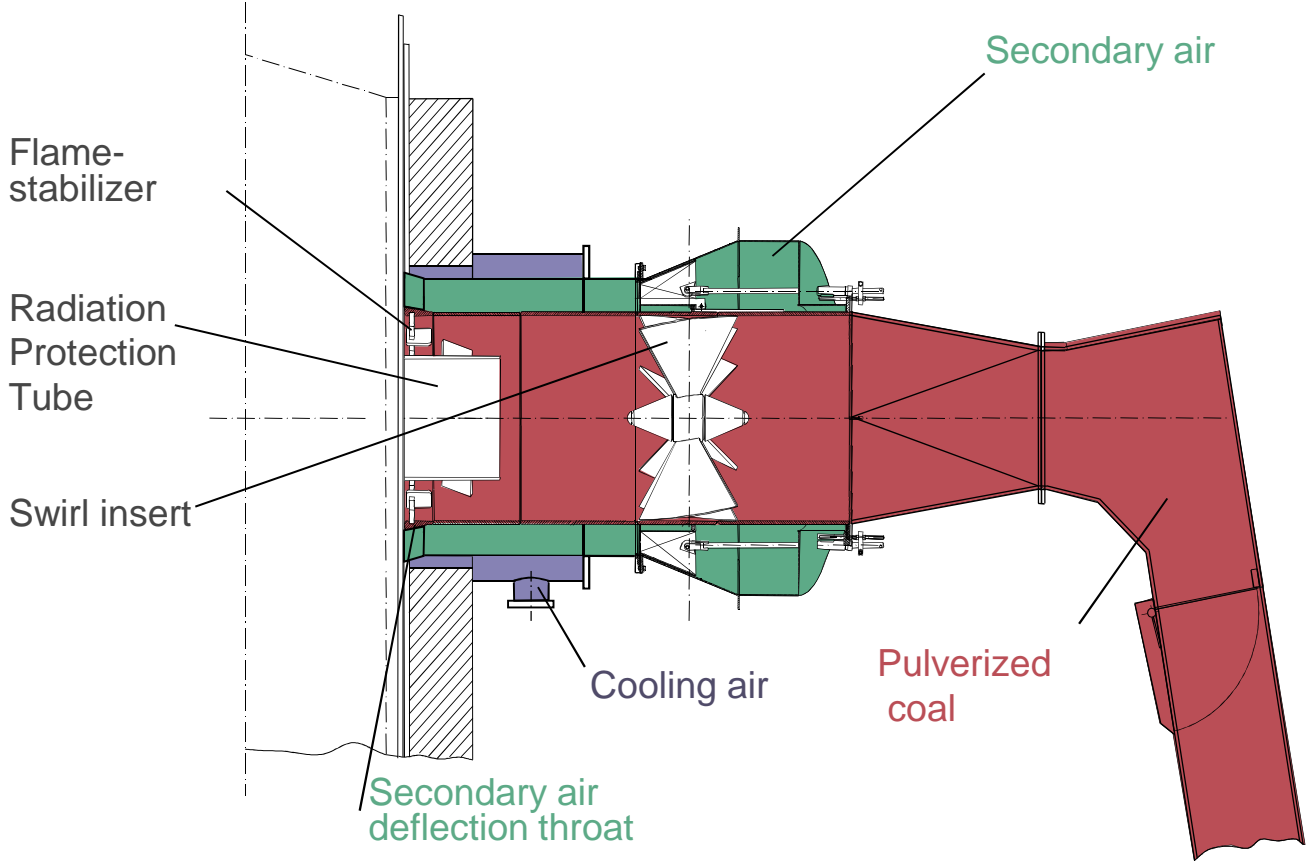
Development RS<sup>®</sup> burner

# Jet Burner Development for Lignite





# RS<sup>®</sup> Burner

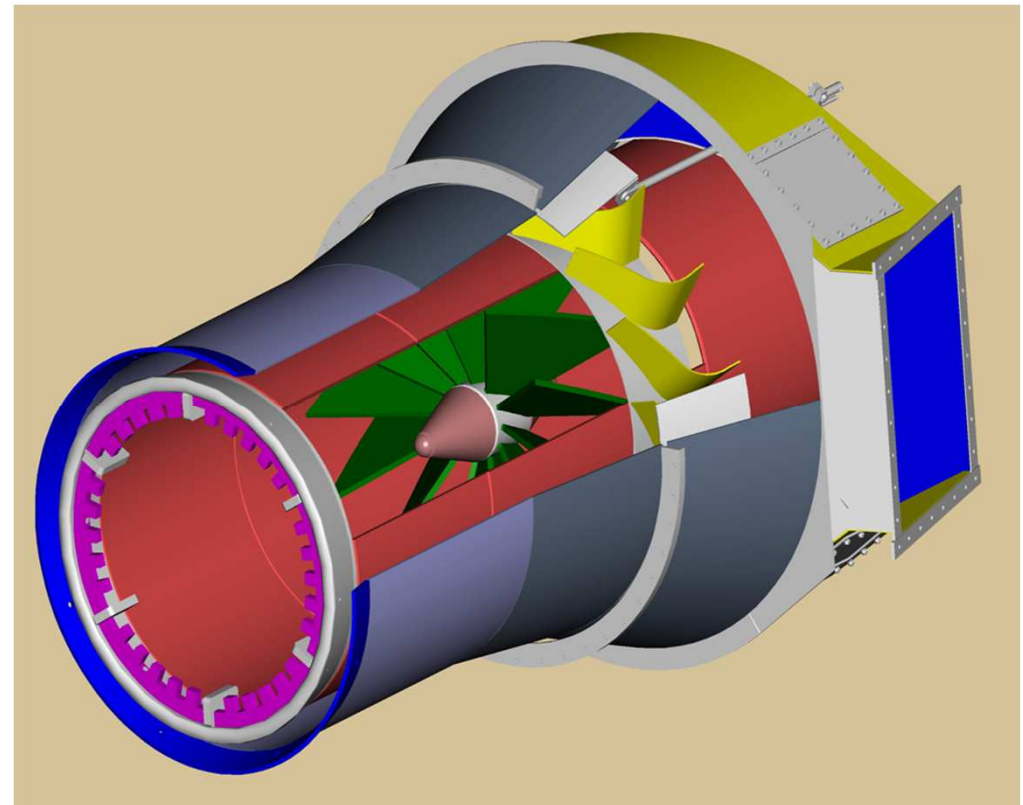


# RS<sup>®</sup> Burner - Best solution for all lignites

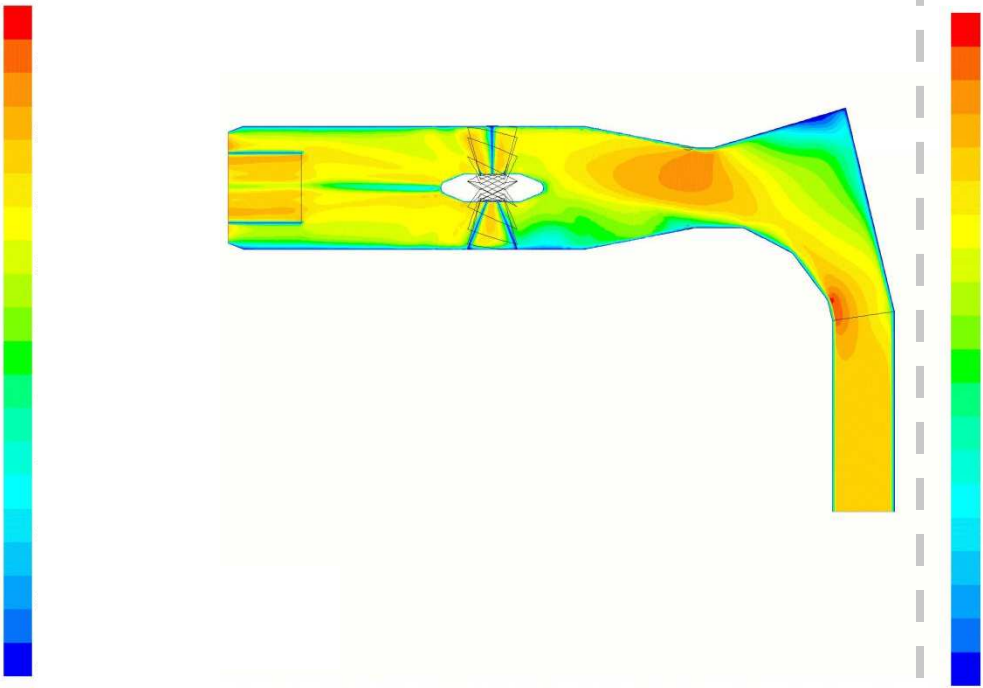
HPE's key component (patented) for advanced lignite combustion.

Development started together  
with TES at Sostanj Power Plant  
in the beginning of the Nineties.

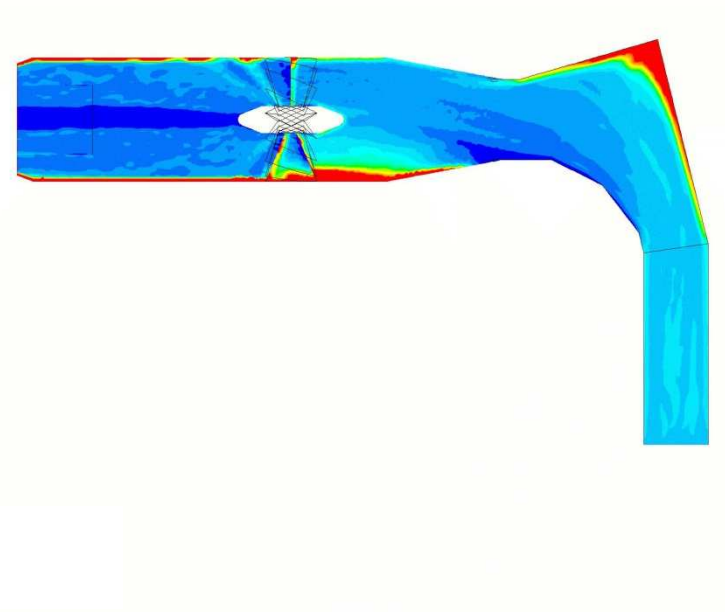
Continuous improvements  
for best and reliable technology.



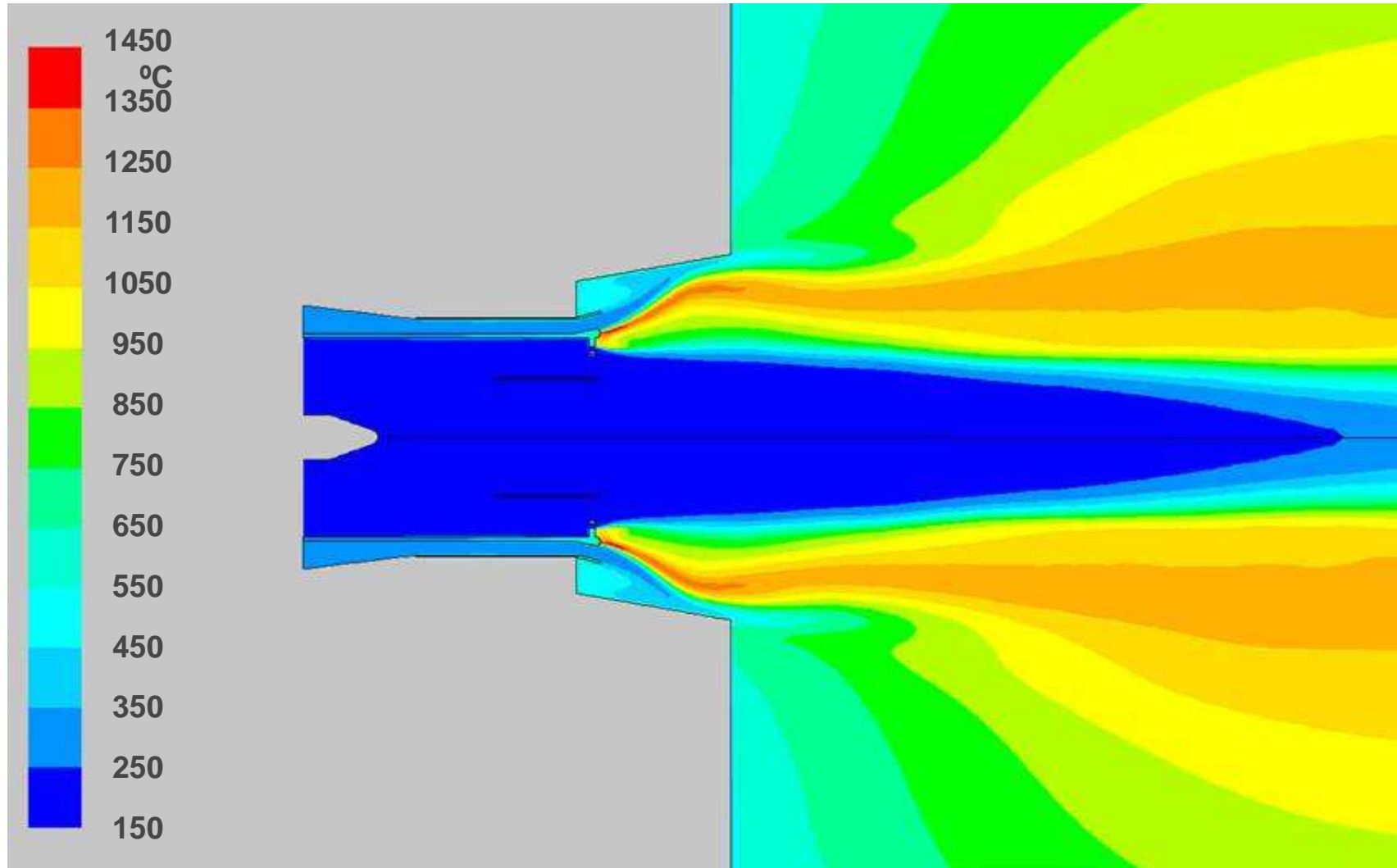
### Velocity Distribution



### Particle Concentration

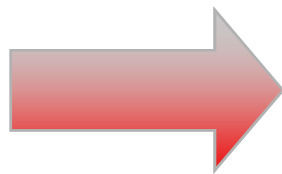


# Temperature distribution in the flame



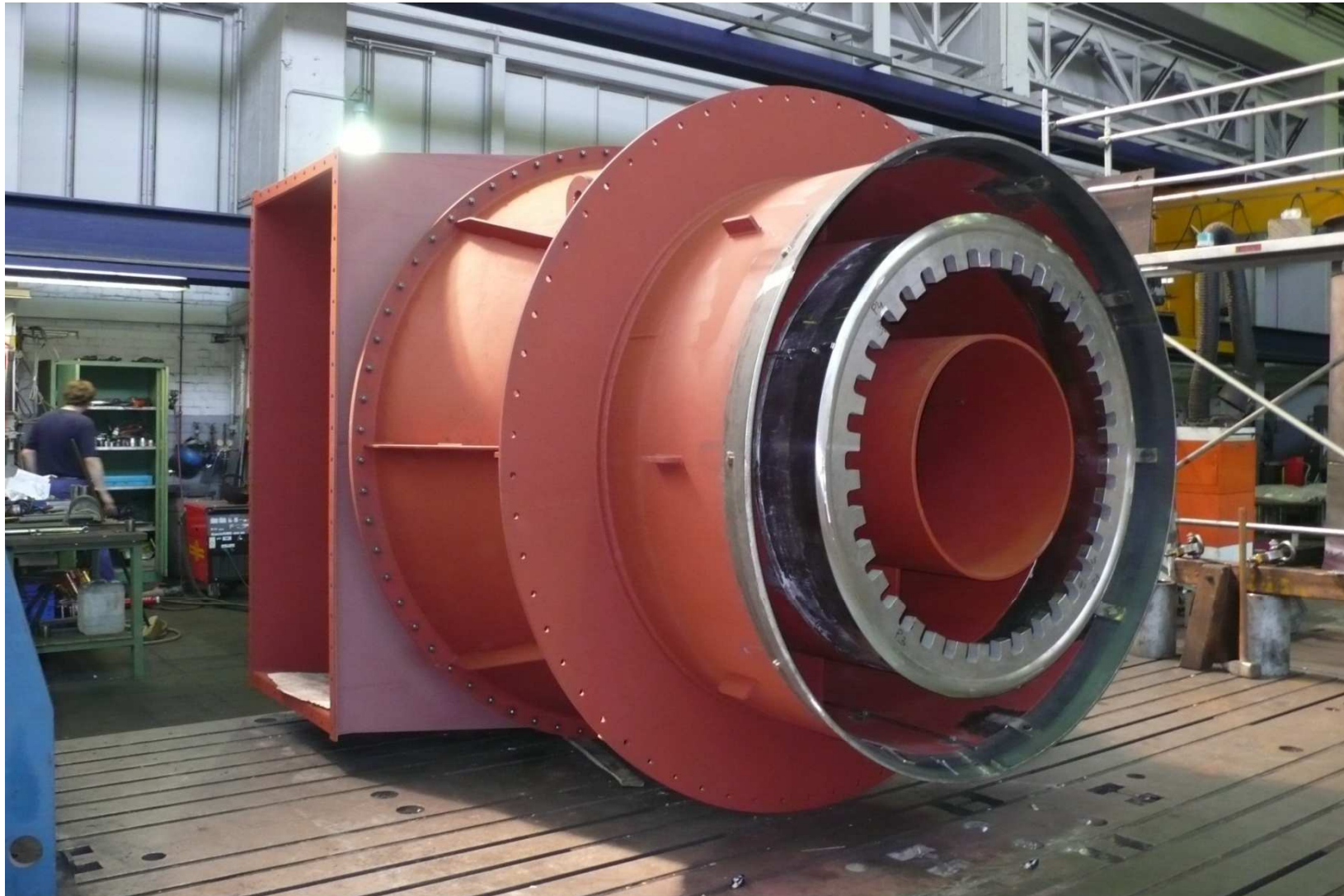
General advantages of RS<sup>®</sup> Burner compared to former burner technology:

- ✓ **Excellent combustion results (wide fuel range, low load operation)**  
Good availability for ignition combined with excellent flame stability for all lignites
- ✓ **Lowest NOx and CO emissions**
- ✓ **Effective measure against furnace wall corrosion**  
Protection against sulphur driven corrosion process by secured minimum air supply



**better operation reliability**  
**longer operation time without boiler cleaning**  
**Perfect protection against furnace wall corrosion**  
**Low investment cost to meet NOx regulations**

# RS<sup>®</sup> Burner of Today



# RS<sup>®</sup> Burner References

No.	Customer / Unit	Country	Fuel			Number	Burner Load MW	Year of Commissioning
			LCV KJ/kg	Volatile matter %	Ash %			
1	Sostanj III, Block 4	Slovenien	9.000	35 - 40	19 - 22	4	31	1994
2	Niederaußem Block A	Germany	8.415	51	12	6	76	1998
3	Niederaußem Block B	Germany	8.415	51	12	6	76	1996
4	Ljubljana, Kessel 3	Slovenien	9.630 – 20.000	22 - 27	2 - 35	12	23	2000
5	Neurath Block A	Germany	8.000 – 10.500	51 – 55	2 – 12	18	58	2000
6	Neurath Block B	Germany	8.000 – 10.500	51 - 55	2 - 12	18	58	2000
7	Niederaußem Block C1/C2	Germany	8.415	51	12	2x6	76	2001
8	Sostanj IV, Block 5	Slovenien	8.400 - 11.300	58 - 68	10 – 24	24	46	2003
9	Ljubljana, Kessel 1/2	Slovenien	-	-	-	-	-	-
10	Boxberg R *	Germany	8.000 – 9.200	54 - 57	3-7	24	79	2011
11	TENT A5	Serbia	6.280 – 6.900	56 - 58	12 - 25	18	58	2013

\* Boxberg R is new installation, all other references are for rehabilitation



Thank you for your attention

**HITACHI**  
Inspire the Next

