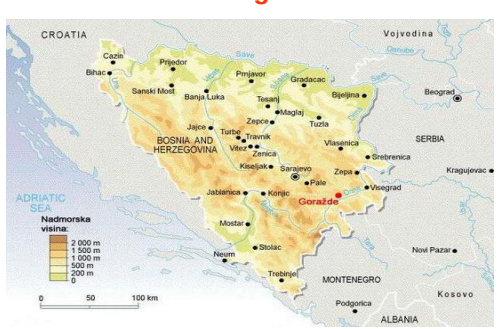
ECRAN-ECENA
Multi country Capacity Building workshop on compliance with environmental legislation

Site visit to the Pilot Plant ArcelorMittal Zenica

19th November 2015

ArcelorMittal in Bosnia & Herzegovina



Arcelormittal Group units in Bosnia & Herzegovina

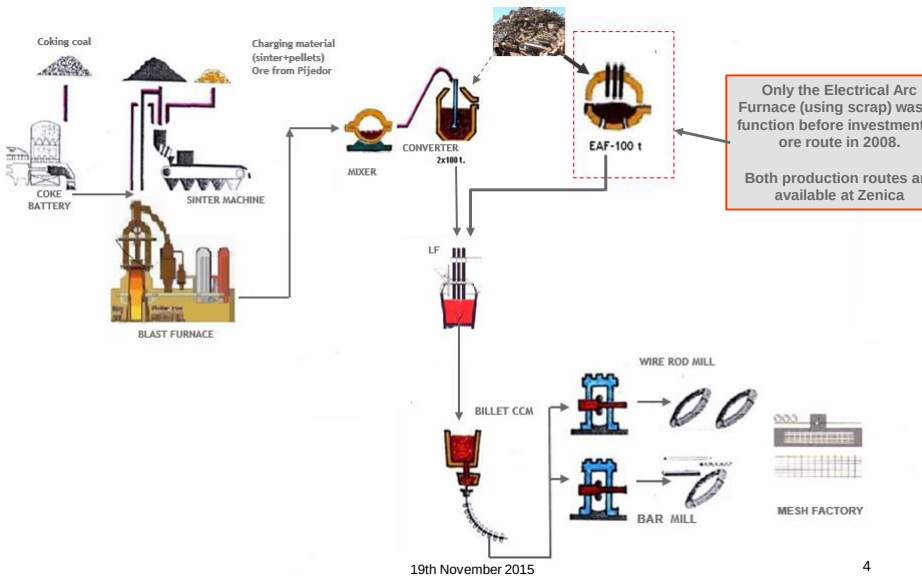
- *ArcelorMittal Zenica, the bigges steel producer in Balkan Region located in Federation of B&H*
- *ArcelorMittal Prijedor, iron ore mine, located in Republic of Srpska*
- *ArcelorMittal Zenica consumes total volume of iron ore from Prijedor mine*
- *Employment: direct 2.425 workers ArcelorMittal Zenica*
- *1.000 workers ArcelorMittal Prijedor;*
- *Indirect more than 10.000 (rail ways, electricity, forwarders, metal processing companies, administration)*
- *Support of development other sectors connected to steel production (working with more than 300 companies – customers and suppliers;*

ArcelorMittal Zenica
Celebrating 123 year of existance

- **1892** establishment by group of Austrian industrialist,
- **1988** the capacity of the plant was around 1,8 million tons,
- **2005** take over by Mittal Steel, later in 2007 ArcelorMittal
- **2008** integrated production restarted, after almost 17 years of stoppage

ArcelorMittal Zenica

Technological production concept



Only the Electrical Arc Furnace (using scrap) was in function before investment in ore route in 2008.

Both production routes are available at Zenica

INTERGRATED PRODUCTION LINE

COKE BATTERY
Capacity
687.000 t/g.
Designer:
Giprokoks(1982)

SINTER PLANT
Design capacity 625.000 t/machine/y
Designer: USSR (1979-1987)

BLAST FURNACE
Capacity: 1.250 t/god.
Designer: USSR (1979)

BOF STEEL PLANT
Capacity : 1.068.000 t/y
Design: USSR (1976)

STEEL PLANT – EAF 100 T – (Dec. 2004).

SCRAP YARD

Capacity : 21000 t

EAF-100 T

CAPACITY:

800.000 t/y

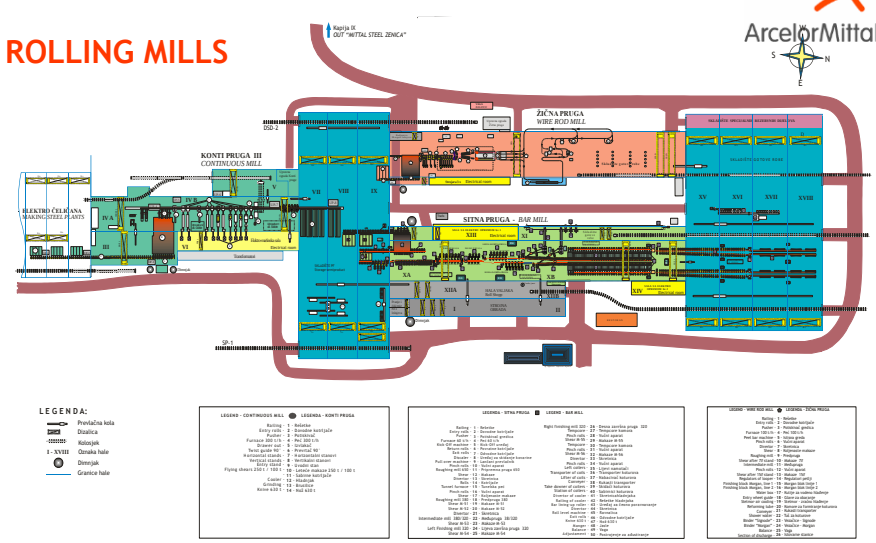
LF-100 T

CCM-billets

CAPACITY:

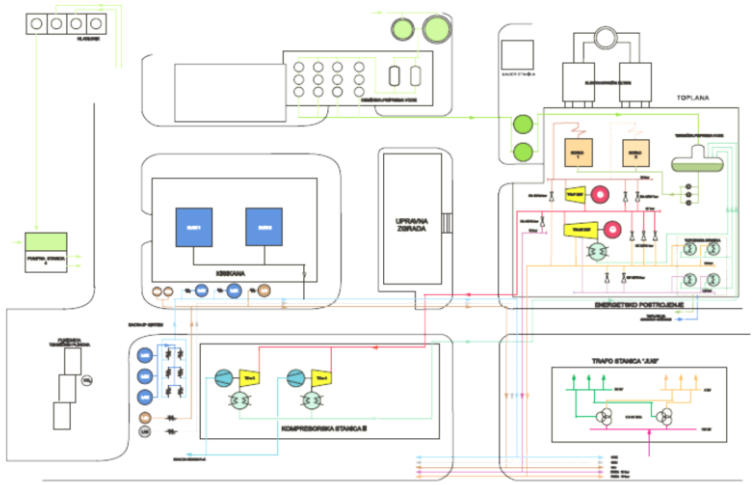
approx. 1 mill t/y

ROLLING MILLS



Slika 4.1. Shema rasporeda tehnoloških cjelina Sitne i Žične pruge

POWER PLANT



ArcelorMittal Zenica product portfolio

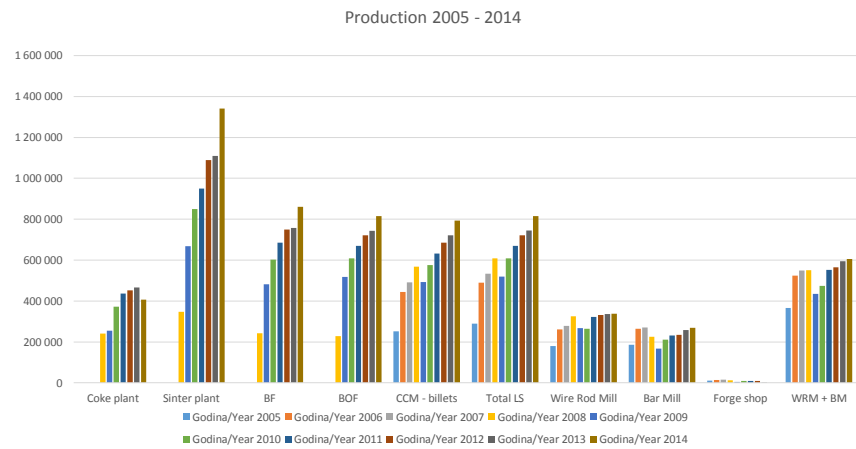
Rebar in bar **B500B, B500C, B450C,B550B, PC52, OB37 lengths 6 and 12 m**
Ø 8,0 mm, Ø 10,0 mm and Ø 12,0 - Ø 32,0 mm
Rebar in coil
Ø 8,0 mm, Ø 10,0 mm and Ø 12,0
Diameters above 12mm coming soon
Wire rod mesh **S235JR,SAE 1010, SAE 1008,**
Wire rod LC **SAE 1006, C4D, C9D**
Wire rod welding (stick electrode) **S1,S2**
Wire rod HC C45-C75 coming next season
Ø 5,5 mm and Ø 6,0 - Ø 12,0 mm

MBQ **S235JR/J2, S275JR/J2**
Ø14,16,18,20,22,25,28,30 mm

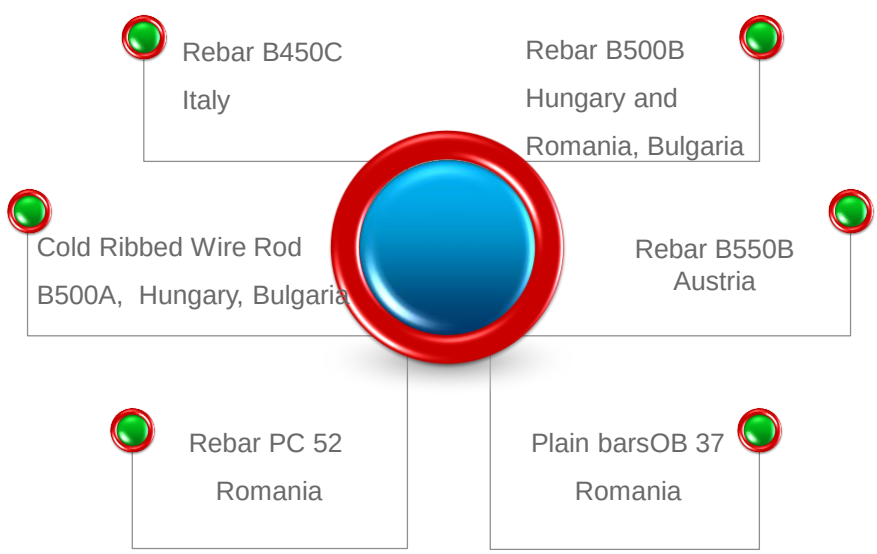
Mesh Plant
Mesh panels **B500A**
Lattice girders **BSt500M**
Bendings

By Products
Blast Furnance Slag
Ammonium Sulphate
Tar

Production 2005 - 2014

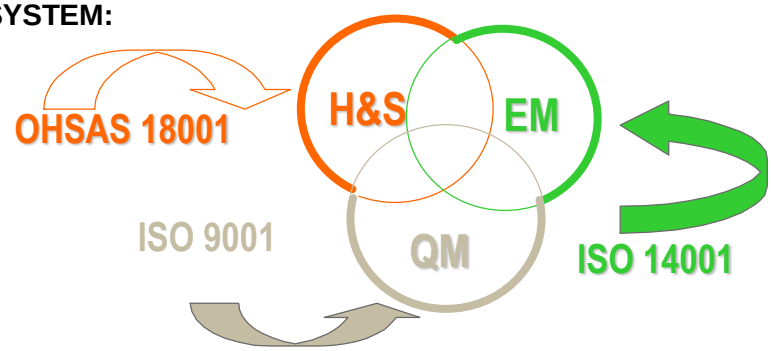


Certification



Shipping by Trains, Trucks, Sea Ships

ArcelorMittal Zenica today is in possession of INTEGREATED SYSTEM:



Implemented and certified systems
Target: keep, improve and prove application of the systems

ArcelorMittal Zenica
Environment protection

ArcelorMittal Zenica
General strategy

- ArcelorMittal Zenica consider Safety, Health and Environment as top priority
- The major environmental concerns in an integrated steel plant are
  - Dust Emissions
  - SOx Emissions
  - NOx Emissions
  - Water pollutions

AM Zenica – Environmental Permits Status

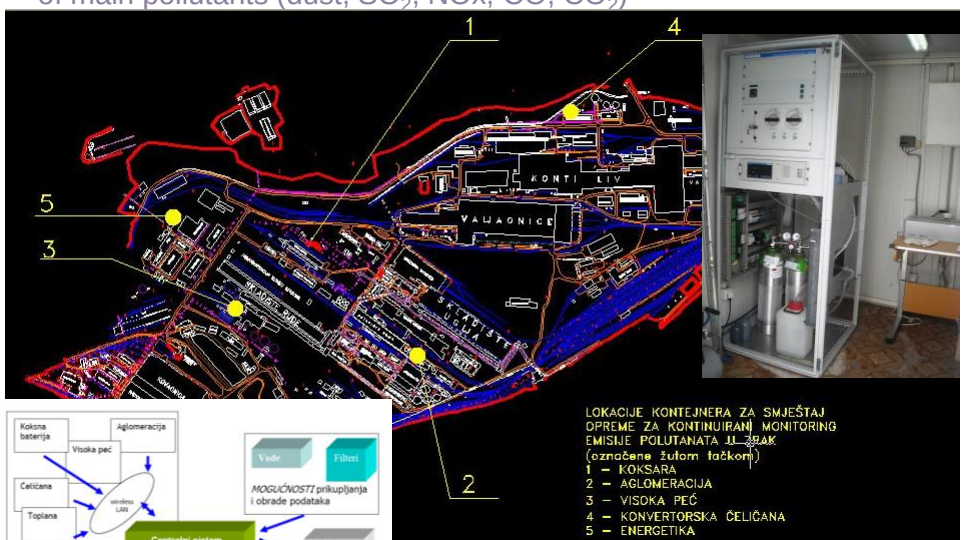
Plant	Date of issuing of permit	Permit validity period
Coke plant	26/11/10	5 years
Sinter Plant	26/11/10	5 years
Blast Furnace	02/12/09	5 years
Steel Plant (BOF & EAF)	02/12/09	5 years
Rolling Mills	02/15/09	5 years
Power Plant	26/11/10	5 years

ArcelorMittal Zenica
Environmental Permits conditions

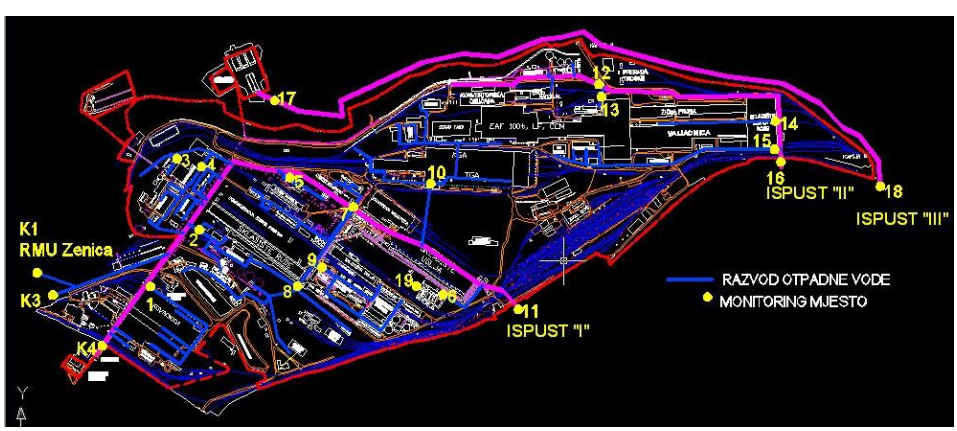
Conditions and measures under which a renewed permit is issued

- **Environment protection measures**
  - Preventive activities and actions
  - Technical- technological measures for to regulation in FB&H & BAT
  - Capex measures
- **Monitoring of emissions into environment**
  - Monitoring of production and utilities
  - Monitoring of emissions into air and limit values
  - Monitoring of emissions into water and limit values
  - Monitoring of noise and limit value
  - Monitoring of waste material
- **Reporting**

ArcelorMittal Zenica
System for continuous air emission monitoring of main pollutants (dust, SO_2, NOx, CO, CO_2)

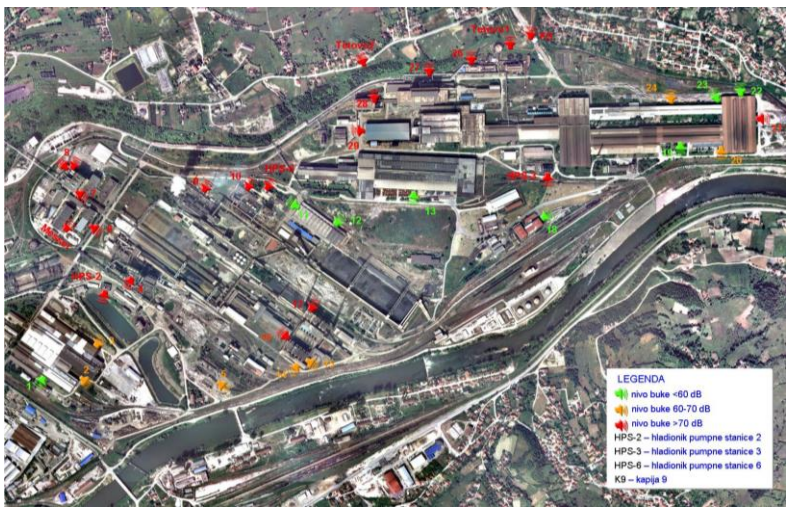


ArcelorMittal Zenica
Wastewater monitoring system



- Main inlet and discharging points in/from ArcelorMittal Zenica (monthly),
- All industrial wastewater discharging points from the plants (monthly),
- Biochemical plant in Coke plant (daily)

ArcelorMittal Zenica
Noise pollution monitoring

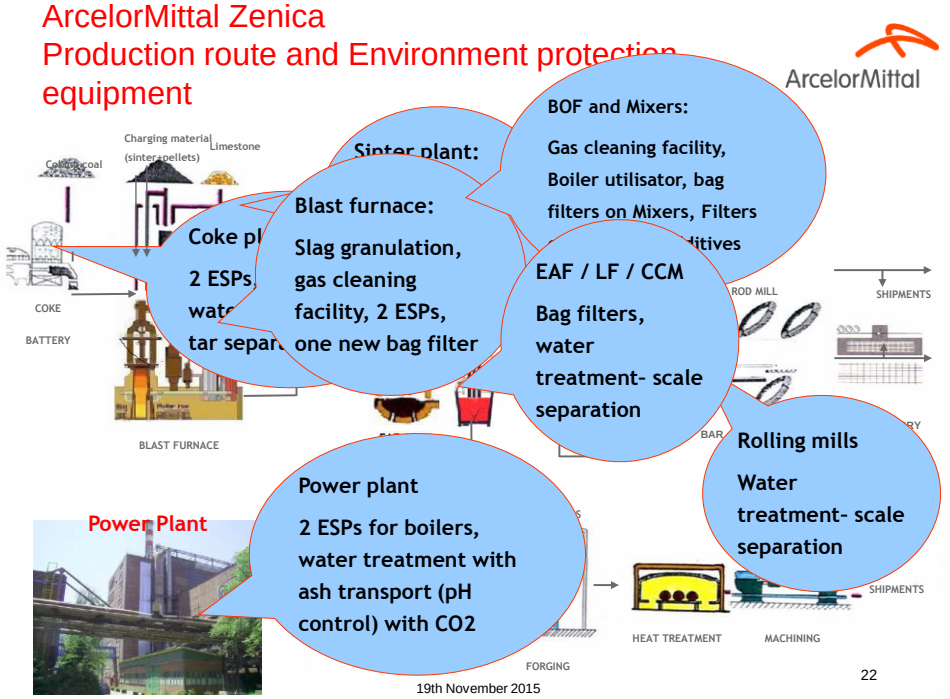


Monthly inside and outside the Company

ArcelorMittal Zenica
Reporting plan

The report	deadline for reporting	to whom the report submitted
Report on measurements of pollutants in the air (in accordance with Article 33 of the Rulebook on monitoring emissions of pollutants into the air („Of Gazette F B&H, No.9 / 14)	March 31 of the current year for the previous year of reporting	**Federal Ministry of Environment and Tourism and Environmental Protection Fund**
Report on implementation of the annual maintenance plan	March 31 of the current year for the previous year of reporting	**Federal Ministry of Environment**
Report on the implementation of the plan for continuous improvement	March 31 of the current year for the previous year of reporting	**Federal Ministry of Environment**
Report on conducted measurements of quality of industrial waste water	After performed measurements	**Authorized laboratory to submit the Report to the Sava River Watershed Agencyy, Sarajevo**
A report on the quantities of waste materials	No later than 30.06. for the previous year	**Federal Ministry of Environment**
A report on noise measurements	After performed measurements	**Federal Ministry of Environment**
Summary report under the Rulebook on registries of plants and pollution ("Official Gazette of BiH" No. 82/07	**No later than 30.06. for the previous year**	**Federal Ministry of Environment**

ArcelorMittal Zenica
Production route and Environment protection equipment



ArcelorMittal Zenica
Schematic overview- Implemented projects in period 2007- 2015

Coke plant:

1. New facility for biochemical water cleaning
2. Naphthalene and ammonia separation
3. Repair of coke quenching tower
4. Mechanism for waste tar from decanters, ammonia sulphate and biochemistry
5. Two ESPs for Coke oven gas cleaning
6. Water sealing system of ascension pipes covers and hydro injection during charging
7. Video surveillance of the battery operation
8. Repair of coke ovens by ceramic welding
9. And other small projects

ArcelorMittal Zenica
Investment in environmental protection for 2005 – 2015

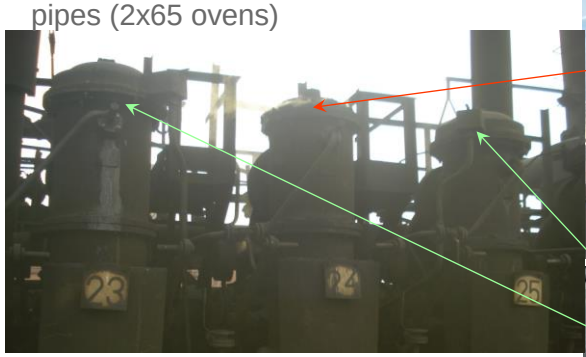
Year	Description	EURO
2005	Various projects	48.631
2006	Various projects	40.222
2007	Repair of filters during restart of integrated route	2.222.783
2008	Repair of filters during restart of integrated route and projects on waters	4.301.867
2009	Repair and reconstruction of filters in Sinter plant	362.775
2010	Reconstruction of filters on Mixers of Steel plant, Sinter plant and other projects on BOF	2.472.402
2011	Installation of new and reconstruction of the existing de-dusting systems	3.326.684
2012	Projects on BOF boilers (primary de-dusting systems), on Sinter plant and BF	5.420.373
2013	Project on de-dusting cast house on BF, new charging machine on Coke plant, reconstruction of ATU system on sinter plant	4.066.150
2014	Repairs on Coke battery, Project on ESP 3, de-dusting coke line and line 1 in Sinter plant, other projects in Power plant	1.405.039
Dec 2014	BOF Secondary de-dusting in Steel plant (start of implementation)	5.500.000
Aug 2015	**Revamping ESP'4 into the New filter in Sinter plant (start of implementation)**	**3.000.000**
	Total investments and commitments 2005-2014	**32.166.926**
	Technological projects with environmental impact (2007-2014)	16.685.000
	Total 2005-2014 (realized and contracted investments)	**48.851.926**

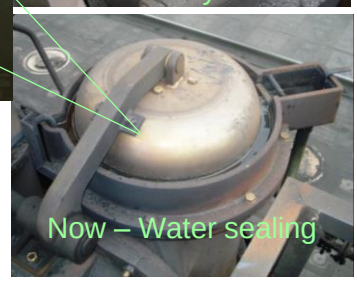
ArcelorMittal Zenica
Waste and Hazardous Material Management

- **Waste management:**
  - Waste management plan implemented for all plants
  - Register of all waste materials for all plants made
  - Recycling and wastes reduction
    - internal: BF slag granulation, using of own scrap, scales, dried sludge's, waste tar, est.
    - external: old oils and greases, old paper, PET packaging, toners and others recycling
- **Hazardous Materials Management**
  - ArcelorMittal first in B&H installed in 2005 system for radiation detection on road and railways
  - Register of hazard materials is made: asbestos, PCB, radiation elements
  - Equipment with PCB – shifted and destroyed in 2006/07
  - Hazardous waste material disposal – in cooperation with external authorized company

Coke plant
Ascension pipes water sealing system and hydro injection – 2009/10

Sealing of 130 covers on ascension pipes (2x65 ovens)





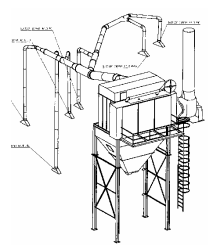
Two ESP for Coke gas – May 2010 - Mart 2011 - Reduction of tar contain in coke oven gas from 5 g/Nm3 to <0,15 g/Nm3

Repair of the Ovens using ceramic welding to reduce the emissions from Chimney

Sinter plant
New de-dusting system for Diffused emissions from sinter transport with Bag filter -2009/10

Before installation

After installation



Novi vrećasti filter (izlaz)				
Datum	23.03.2010	23.03.2010	23.03.2010	29.03.2010
Mjerenje	1	2	3	4
Instrument	Tecora	Tecora	Tecora	Tecora
Vrijeme uzorkovanja	3x10 minuta	3x10 minuta	3x10 minuta	3x30 minuta
Prečnik dimnjaka(mm)	800	800	800	800
Temperatura dimnih gasova(°C)	19	20	23	24
Pritisak u kanalu(mbar)	988	988	988	973
Protok dimnih gasova (Nm3/h)	28396	30566	30385	31470.3
Koncentracija prašine (mg/Nm3)	3,5	3,8	2,1	2,2

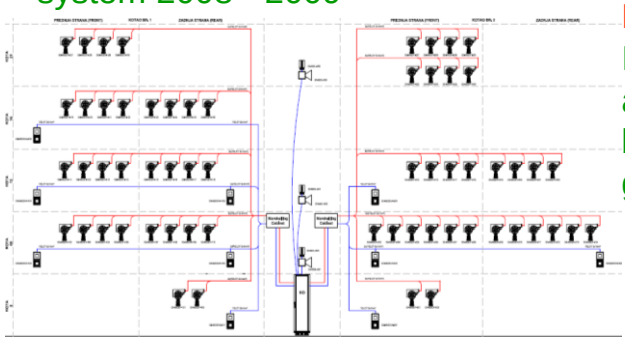
Sinter Plant
Improvemnt in operation of 6 ESP's – First phase - Oct 2009 – June 2010

Before

After

- Improved all ESPs of Sinter plant in 2009/10 and sustained good operation for 4 years.
- Now the equipment is not performing as required
- In 2015 we will go for the best solutions in this field

Power Plant and Blast furnace
Centralized CO and flammable gas detection system 2008 - 2009



Blast furnace
Installation of additional settling basins on BF slag granulation 2010-2011

Power Plant
Centralized industrial water monitoring system 2009-2010

Steel Plant – Mixers and BOF
Reconstruction of Mixer's de-dusting system – April 2010-July 2011

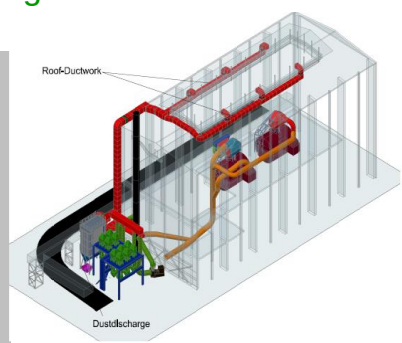
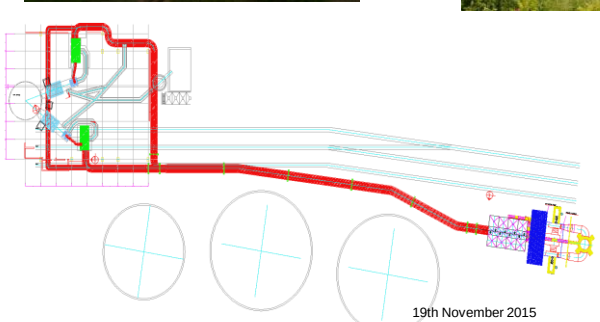


Tabela 5.2. Rezultati mjerenja emisije na dimovodnim kanalima vrećastog filtera

Parametari mjerenja	Mjerenje 1	Mjerenje 2
Površina poprečnog presjeka mjernog profila [m²]	1,766	1,766
Odsisana količina dimnih gasova (Nm³)	1,61	1,55
Prašina [mg/Nm³]	**7,78**	**8,20**
Brzina dimnih gasova [m/s]	14,54	14,17
Temp. dimnih gasova [°C]	35	37
Apsolutni pritisak u kanalu [mbar]	936	937

- Dust emissions from the stack below 10 mg/Nm3
- Dust emissions in the building below norms
- Installation of additional compressors and improvement of air knife on BOF - May 2010-Sep 2011

Blast furnace
Cast house de-dusting project – Dec 2011–July 2013



- Reduction of emissions by installation of suction hoods
- Emission capturing efficiency >95%
- Contract signed in Dec. 2011
- Cold trials from July 2013
- System in regular operation from Sep 2013
- Guaranteed emission's levels in environment and for working place

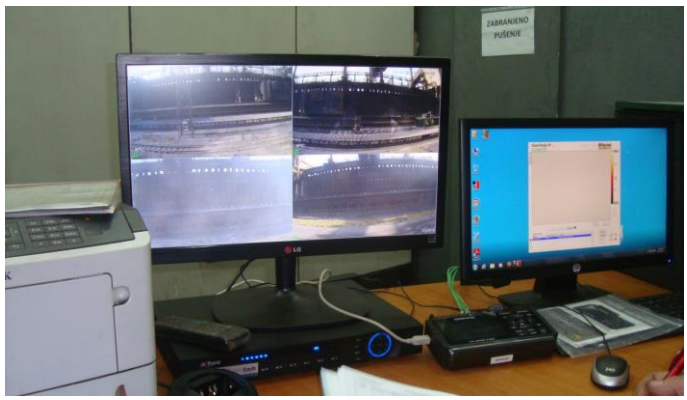
Blast furnace
Cast house de-dusting project – Dec 2011–July 2013

Sinter Plant
ATU System reconstruction – Aug 2012 – July 2015

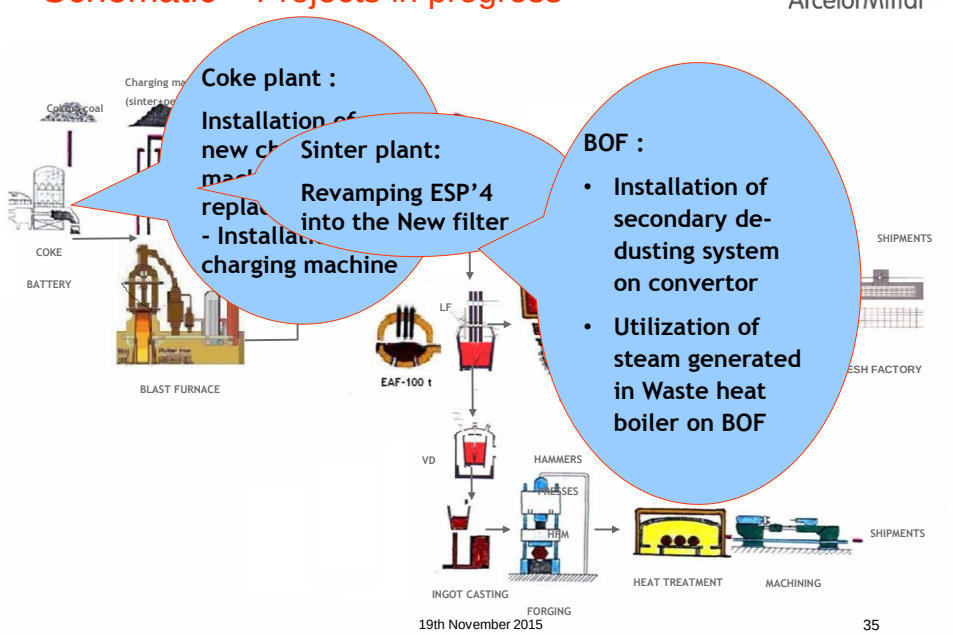
- Replacement of 14 existing ATU systems with 5 new bag filters and installation of 1 new bag filter for lime transport.

Coke Plant
Video surveillance of the battery 2014-2015

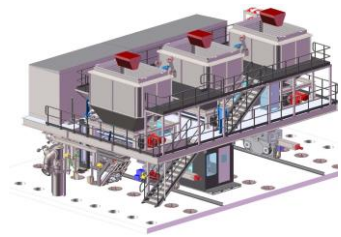
- Installed six video camera for visual monitoring of battery operation



ArcelorMittal Zenica
Schematic – Projects in progress



Coke Plant
New charging car



- Reduction of emissions by installing new charging car
- Contract signed in Dec 2011
- Commissioning Q2 2016

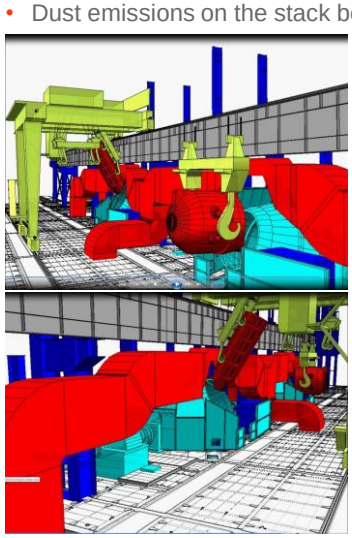
New charging machine

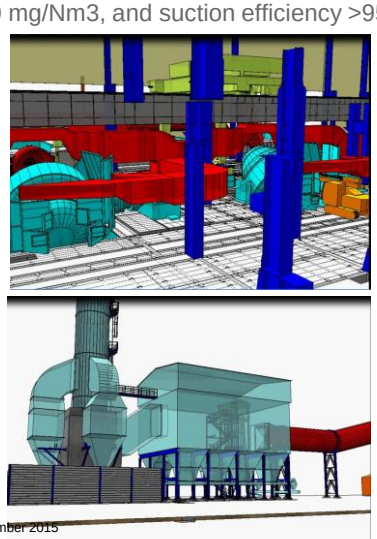
- Guaranteed performance of new charging machine:
  - below 12 sec of visible emission during coal charging (BAT recommendation below 30 sec)

BOF Steel Plant
BOF secondary de-dusting system

ArcelorMittal

- Installation of inductive suction hoods on charging and taping side of BOF
- Treatment of off gases in bag filter capacity approx. 1 mill m3/h
- Dust emissions on the stack below 20 mg/Nm3, and suction efficiency >95%



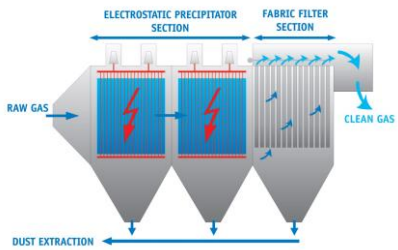


Sinter Plant

Sinter machine 5 Primary de-dusting

Revamping of ESP'4 into the New filter

Main objective: work **below 50 mg/Nm³** in sinter plants **after 2016.**



ESP section:

-Removes around 85 to 90% of dust

-Ionizes the rest of dust before the bags

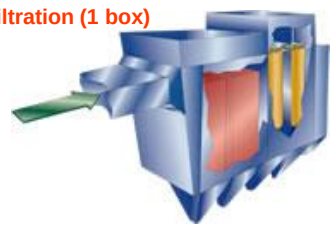
FF section:

-Brings the mechanical filtration to ensure the emission value at the outlet

-Ionized dust remains on the bags increasing the permeability of the dust cake

ESP + Fabric Filter (2 boxes)

New Filtration (1 box)



Sinter Plant

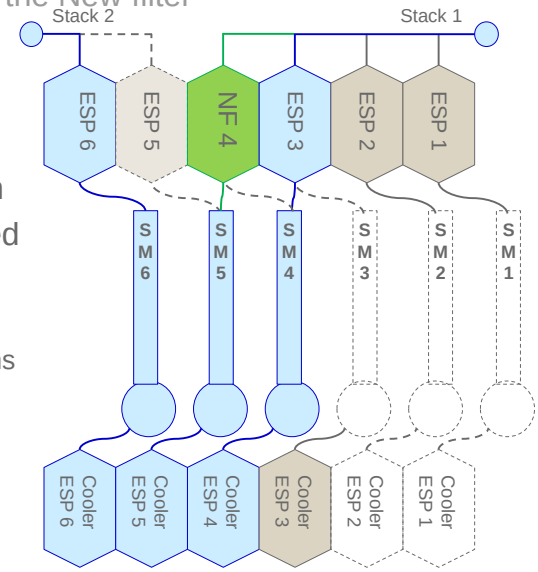
Sinter machine 5 Primary de-dusting

Revamping of ESP'4 into the New filter

Situation after Project:

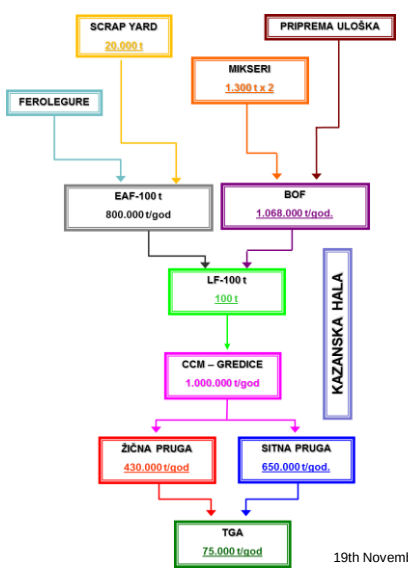
- Green: NEW Filter
- Blue: in operation
- Grey: out of operation
- Dotted line: dismantled or offline
- Stacks No.:
  1. No visible emissions
  2. Low/No visible emissions

Schematic layout AFTER project



ArcelorMittal Zenica
Steel Plant

ArcelorMittal Zenica
Steel plant – BOF and EAF



ArcelorMittal Zenica
Environmental Permits conditions for Steel Plant

Conditions and measures under which a renewed permit is issued

- **Environment protection measures**
  - Preventive activities and actions
  - Technical- technological measures for to regulation in FB&H & BAT
  - Capex measures

- **Monitoring of emissions into environment**
  - Monitoring of production and utilities - daily
  - Monitoring of emissions into air and limit values continuous/periodical
  - Monitoring of emissions into water and limit values - monthly
  - Monitoring of noise and limit value –internal monthly; external annual
  - Monitoring of waste material – monthly, report from the plant quarterly

- **Reporting**

AM Zenica is the main supplier in the region

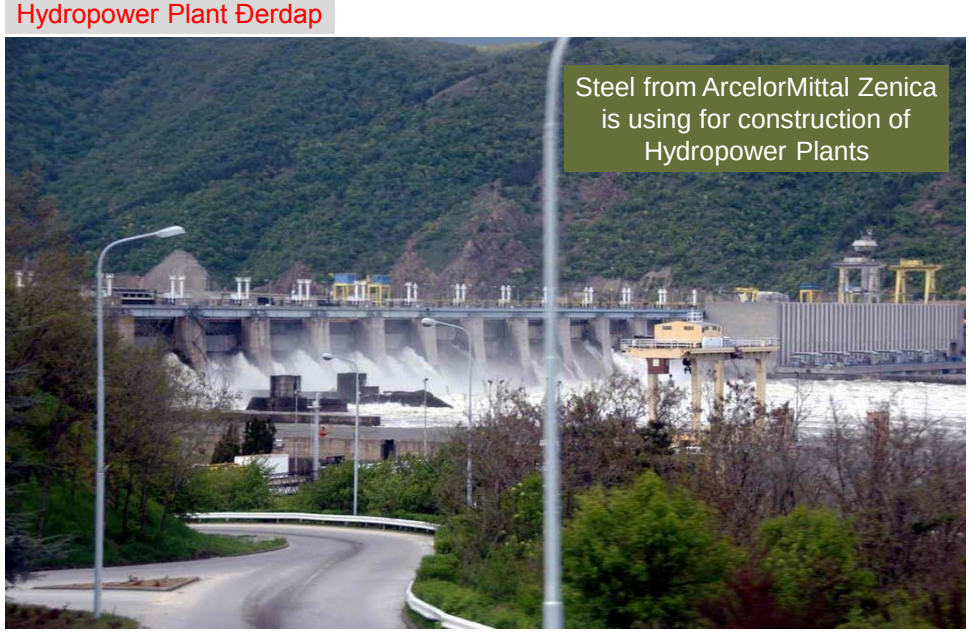
Tunnel Vijenac

Highway in B&H

Tunnel Sveti Rok

Route Vrgorac - Ploče

Hydropower Plant Đerdap



Maslenički

. . . for building bridges

Dubrovnik

.....for sports halls

47