

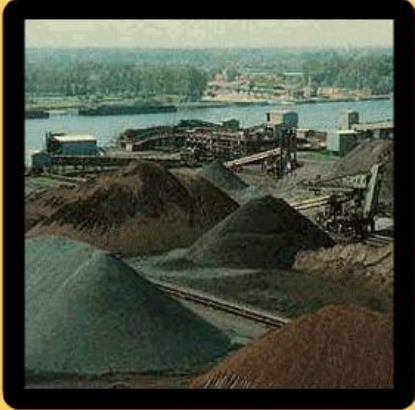
Burdinaren lorpena: enpresa baten funtzionamendua

Lehengaiak

Labe garaiaren funtzionamendurako behar diren lehengaiak, burdinaren mineralak, ikatza eta urtugarriak dira.

Sidmar enpresak duen kaian deskargatzen dira lehengai horiek.

Lehengai horiek deskargatu eta metatu egiten dira.



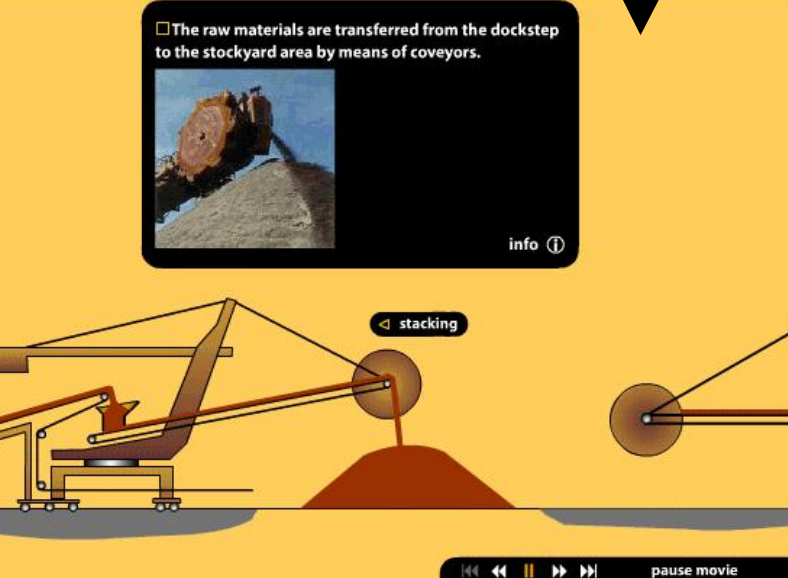
Raw material handling covers the activities of:

- unloading and storing all raw materials for the coke plant, the blast furnaces and the steel plant
- conditioning these materials to a form suitable for the blast furnaces and the steel plant
- charging the coke plant, the sinter plants and blast furnaces, and the steel plant

Raw material handling [1]

play movie

The raw materials are transferred from the dockstep to the stockyard area by means of conveyors.

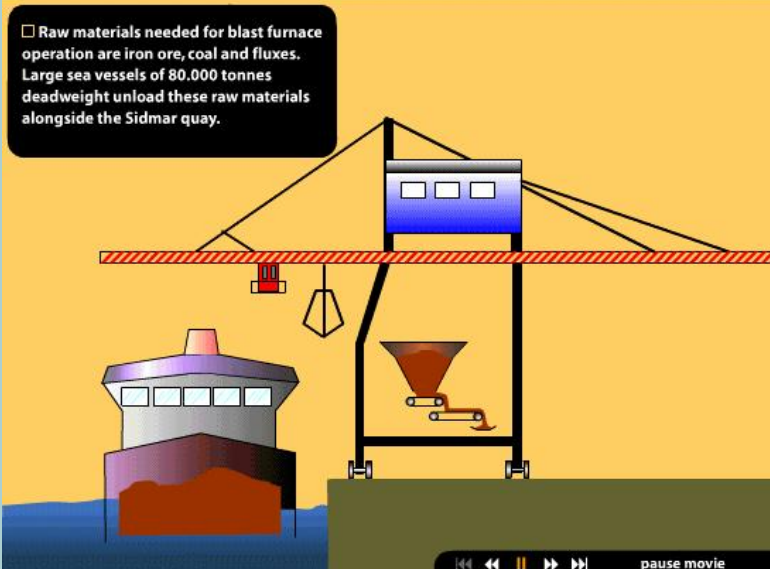


info ⓘ

stacking

pause movie

Raw materials needed for blast furnace operation are iron ore, coal and fluxes. Large sea vessels of 80,000 tonnes deadweight unload these raw materials alongside the Sidmar quay.



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Koke ikatzaren planta

Ikatza landuz, koke ikatza lortzen da.

Horretarako, ikatza 1250 °C-ra berotzen da, oxigenorik gabe.

Lortutako koke ikatzak, %90eko ikatzaren aberastasuna dauka.

Material hori, labe garaietan erabiltzen da, erreakzio kimikoaren erreaktibo gisa.


Coke Plant

The coke plant produces metallurgical coke from a blend of different coking coals. This is achieved by heating the coal to 1,250 °C in an oxygen free atmosphere, a process also called dry distillation.

[2]

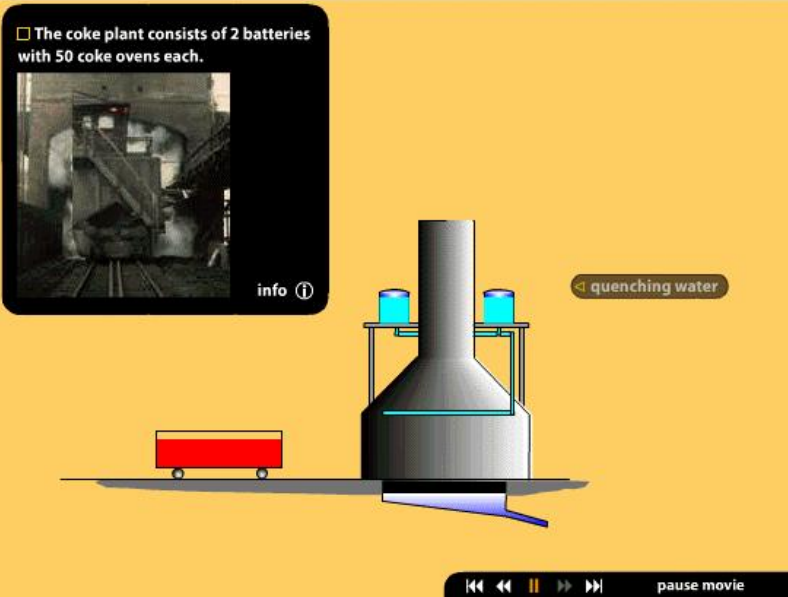
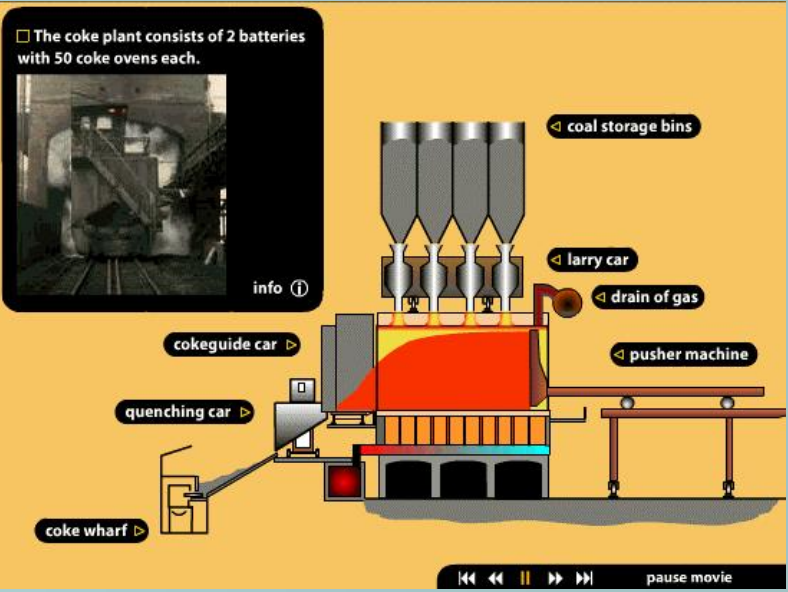
The coke produced consists of more than 90% carbon, which serves as energy supplier and as chemical reagent in the blast furnaces. The volatiles, produced during the distillation process and consisting largely of gas, are then purified of tar, sulphur, ammonia, naphthalene and benzene.

The cleaned coke oven gas, which is a rich gas, is used to heat the coke ovens themselves, while the remainder is used as fuel in the furnaces of the hot rolling mill, the coppers, the sinter plant and the steel plant.



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Burdinaren lorpena: enpresa baten funtzionamendua



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Sinterizazio plantak

Sinterizazio planta horietan burdinaren mineralak, urtugarriak eta koke ikatza, aglomeratuan bihurtzen dira.

Aglomeratu horiek, konposizio eta tamaina egokia dute, labe garaiak ondo funtzionatzeko.



[3]

Sinter plants

In both sinter plants a mixture of iron ore fines, recycled ferriferous products and various fluxes, together with coke breeze as fuel, are converted into an agglomerate with a chemical composition and a size distribution which are optimal for blast furnace operation.

play movie

Burdinaren lorpena: enpresa baten funtzionamendua


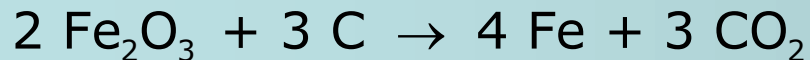
Labe garaiak

Labe garaiek, arrabioa (pig iron) lortzen dute; burdina karbono asko duena.

Hori lortzeko, burdinaren minerala urtzen da. Burdinaren mineralak erredukzio-prozesua jasaten du eta burdina elementua sortzen da (karbonoarekin nahasturik).

Konbustioak, temperatura altua mantentzen du.

Hona hemen ekuazio kimikoa:



Blast furnaces produce pig iron by melting iron ores in a reducing atmosphere. Iron ores are compounds of iron and oxygen. Reduction is the extraction of the oxygen from the ores.

Schematically, sinter, pellets, coke and fluxes are loaded into the blast furnace through the blast furnace throat. The reduction gas is created by the reaction of the coke with the injected hot air, which has a temperature of 1,000 °C to 1,200 °C.

This combustion does not only generate the gases for reducing the iron ore, but also the heat necessary for melting the reduced ores.

Blast furnaces

[4]

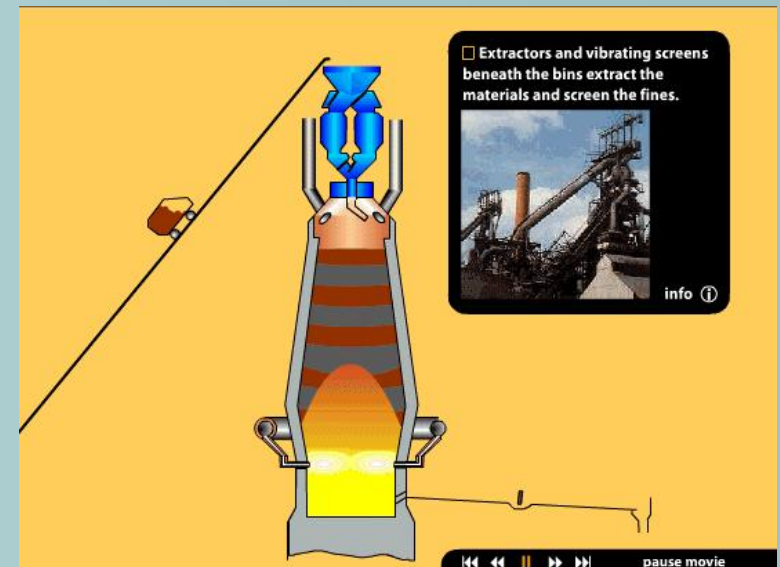
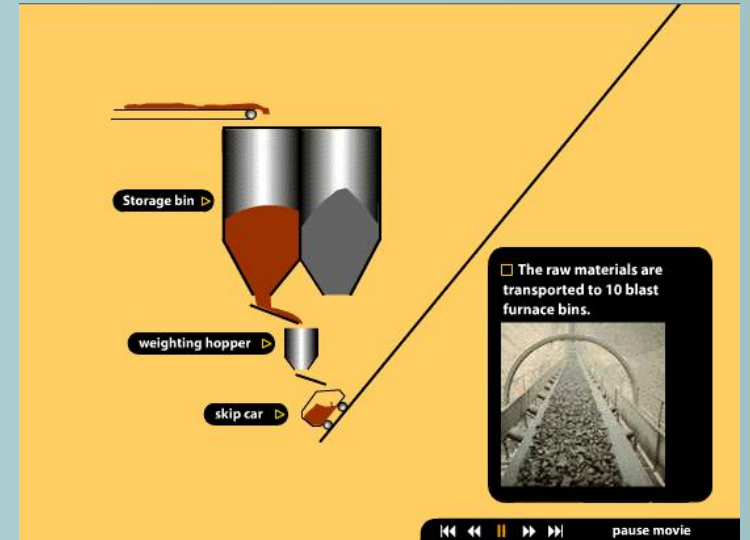
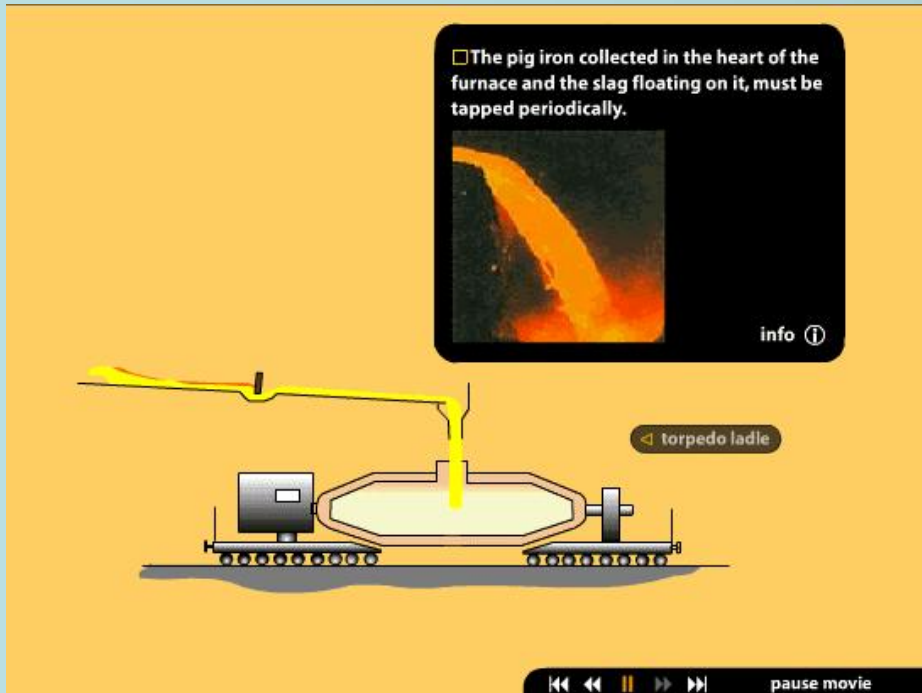
play movie

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Labe garaiak

Materialak labe garaietara garraiatzen dira (10 labe garai daude enpresa honetan).

Arrabioa behean geratzen da (eta hau da nahi dugun materiala) eta goian geratzen den zepa kendu egin behar da.



Burdinaren lorpena: enpresa baten funtzionamendua

Altzairuaren lorpena

Labe garaitik datorren arrabioa (burdina karbono-kantitate handiarekin) altzairua bilakatzen da horretarako dauden elementuekin: oxigeno basikoaren labea (BOF; Basic Oxygen Furnace).

Elementu hauetan, oxigeno purua sartzen da arrabioa dagoen tokian, karbonoa eliminatuz (neurri handi batean).

Ondoren, altzairu likidoa galdaketa jarraitura pasatzen da, piezak lortzeko.



At the steel plant, pig iron coming from the blast furnaces, is converted into steel in one of the two Basic Oxygen Furnaces (BOF's), by blowing pure oxygen above the hot metal bath.

The liquid steel is then deoxidised and alloyed to meet the specified analysis criteria. Subsequently the steel is cast on the continuous casting machine to form slabs. Pig iron and scrap are the main constituents of the BOF charge.

Steel plant

[5]

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Altzairuaren lorpena

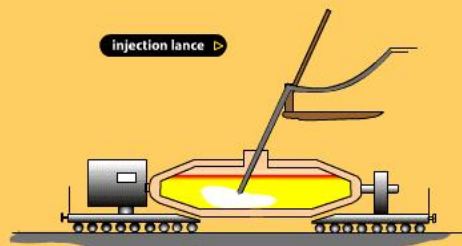
Arrabioa, labe garaietatik ontzi erregogorretan garraiatzen dira.

Arrabioari sufrea kentzen zaio lehenengoz.

Ondoren oxigeno basiko labeetan sartzen da (BOF, basic oxygen furnace). Bertan, oxigeno purua sartzen da, ezpurutasunak oxidatzeko.

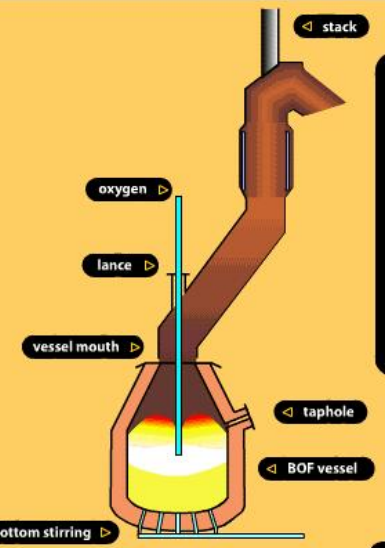
□ Pig iron is transported from the blast furnaces to the steel plant by means of torpedo ladles with a capacity of up to 200 tonnes.

The pig iron is first desulphurised in one of the two desulphurisation installations, and subsequently transported to the slag removal station.



injection lance ▶

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stack

oxygen ▶

lance ▶

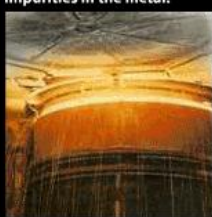
vessel mouth ▶

taphole

BOF vessel

bottom stirring ▶


□ After being brought in a horizontal position, pure oxygen is blown on the liquid bath in order to oxidise all impurities in the metal.



info ⓘ

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□ As soon as the pig iron is poured into the BOF vessel, accurately weighed quantities of scrap are added by means of scrap bins.



pig iron

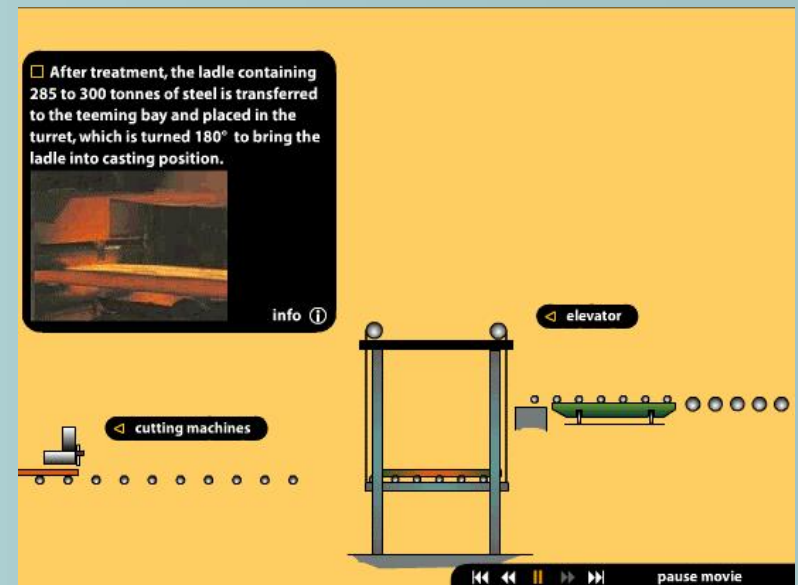
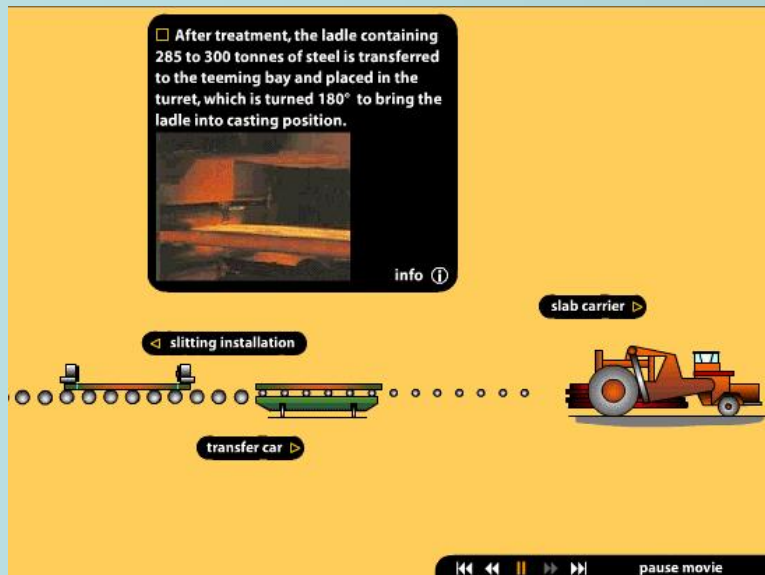
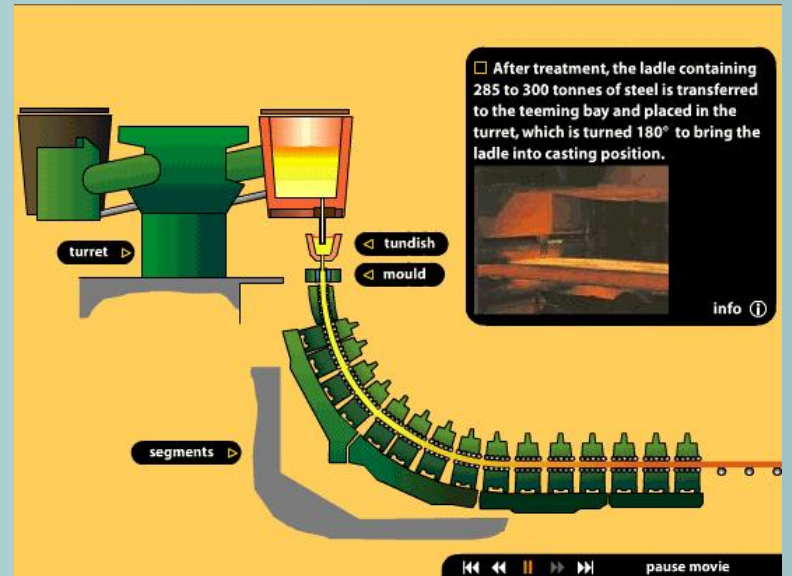
BOF-vessel

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Burdinaren lorpena: enpresa baten funtzionamendua

Galdaketa jarraituan, altzairu urtua posizioz aldatzen du (bertikaletik horizontalera).

Ondoren, materiala ebaki egiten da, behar den taminara.



Burdinaren lorpena: enpresa baten funtzionamendua

Konformazioa temperatura altuan

1000 °C ingurura berotzen dira elementuak,
forma eman aurretik.

The hot rolling mill consists of a slab stockyard, where the slabs arriving from the continuous caster, cool down, are checked for faults, and if necessary are then scarfed with oxygen-natural gas torches, and a hot strip mill, where the slabs are reheated in one of the two walking beam furnaces.



Hot rolling mill

They are then rolled to form a strip with a thickness range from 1.25 to 12.7 mm. After leaving the finishing mill, the steel strip is cooled, coiled and transported by an underground conveyor to a warehouse.

[6]

Subsequently, the strip passes through the finishing scalebreaker, before entering the roughers.



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finishing mill



cooling

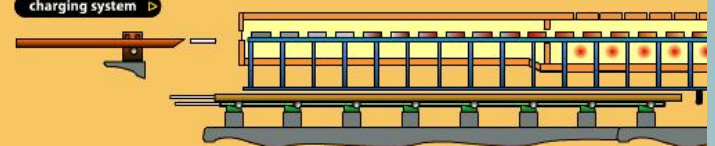
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The hot strip mill is normally fed by two walking beam furnaces and two pusher type furnaces (on stand-by). These furnaces reheat the slabs to discharging temperatures between 1,100 and 1,265 °C, according to the metallurgical requirements.



burners

charging system




pause movie

Burdinaren lorpena: enpresa baten funtzionamendua

Konformazioa hotzean

Hotzean, azken forma ematen zaio produktuari.



Cold rolling mills

In the cold rolling mills, the hot rolled strip is transformed into a finished product: cold rolled sheet with a thickness range from 0.3 to 3 mm. This process is performed in about 6 different stages.

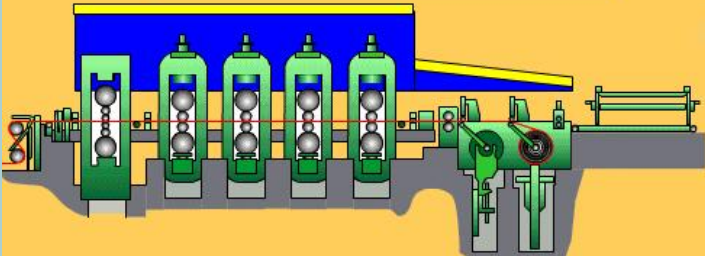
First the steel strip is pickled with acid in 1 of the 3 pickling lines and subsequently cold rolled in 1 of the 2 tandem mills to the thickness required by the customer. The cold rolled coil is then annealed either by batch annealing or by continuous annealing.

Afterwards the annealed coil is skinpassed. If required, the cold rolled coils are cut into sheets in the finishing section. The finished material, either coils or cut sheets, is packed and shipped to the customer.

[7]

play movie

❑ Cold rolling reduces the thickness of the strip to the thickness required by the customer.



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pause movie