

## THEME № 4

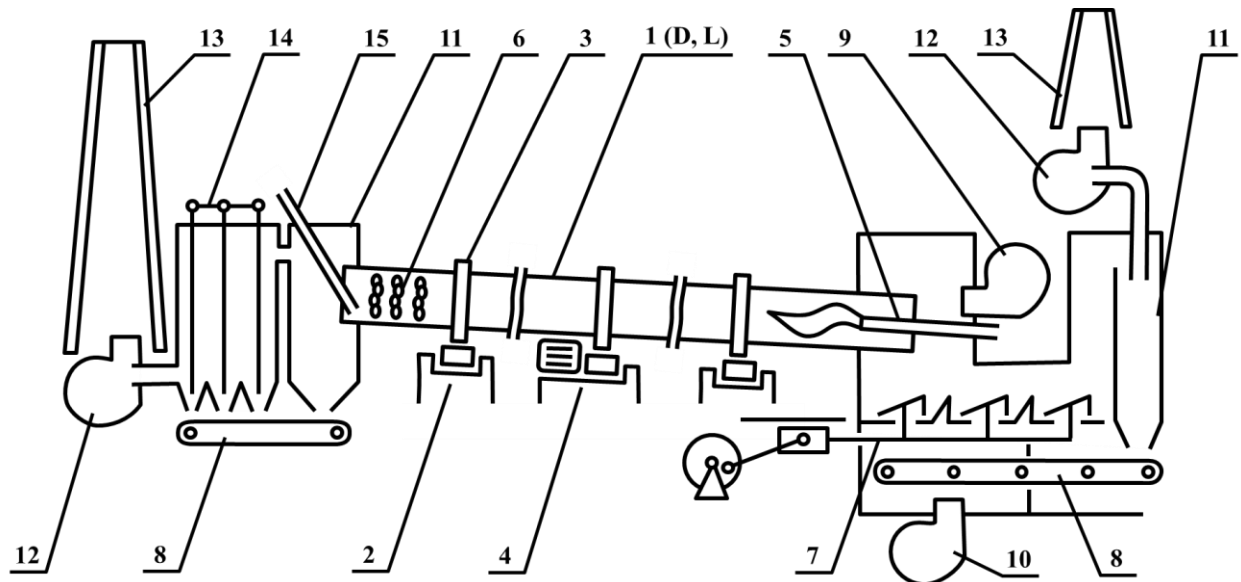
### ROASTING EQUIPMENT

#### Summary

The purpose of roasting equipment. Construction of rotary furnace. Basic parameters of rotary furnace.

#### Theory

Rotary furnace is a most important type of equipment for cement clinker manufacturing.



The main part of the furnace is a long CASE (pos. 1) covered by the heat-insulating tiles. The case mounted on the SUPPORT COLUMNS (pos. 2) system. Columns include a rollers which are in contact with SUPPORT RINGS (pos. 3) mounted on the furnace case. The case rotates with help of the ROLL DRIVE (pos. 4) with a system of a huge gears.

The raw slime delivered (provided, given) into the cold part of the furnace by the SCREW FEEDER (pos. 15). There is a GAS BURNER (pos. 5) in the hot part of the furnace. The case rotates and has a small angle so the slime moves from cold part of furnace to hot one. During the motion the slime becomes a clinker. In the cold part of furnace the system of CHAIN (pos. 6) covers the volume of furnace to

make the heat-balance. The chain also prevents the pasting of material to inside surface of furnace.

After roasting (heating) the clinker goes into REFRIGERATOR (pos. 7). The moving grid of refrigerator pushes and mixes the clinker. The air flows through the clinker, reduces its temperature and goes into the furnace. This air delivered by the SHARP AIR PUMP (pos. 10). Additional GENERAL AIR PUMP (pos. 9) delivers the air directly into the furnace. The ready clinker transported to silo by the special CONVEYOR (pos. 8). The air used in all these processes is cleared in a system of CYCLONES (pos. 11) and ELECTRIC PRECIPITATOR (pos. 14). In cyclones dirt falls down by the gravity force. In electric precipitator dirt particles settle on special electrodes. Cleaned air is moving out by the EXHAUST PIPES (pos. 13) with help of AIR PUMPS (pos. 12).

A few words about parameters. Usually the furnace has a diameter (D) up to 5 m and length (L) up to 200 m. The distance between columns is about 25 m. The rotation speed (frequency of rotation) is up to 2 times per minute. Productivity is about 12 ton per hour.

### **Practice**

1. Select a variant of equipment from the list:

- shaft furnace;
- refrigerator for rotary furnace;
- electrostatic precipitator;
- bag filter;
- the roar (sieve-machine);
- cyclone;
- steaming chamber;
- bridge crane;
- crane beam;
- belt conveyor;

- screw conveyor;
- bucket conveyor;
- excavator;
- dump truck;
- gear box (reducer).

2. Give characteristic of selected equipment:

- make constructive scheme;
- describe the principle of action;
- specify base technical parameters;
- highlight the advantages and disadvantages.

3. Make report according to previous actions.

### **Control questions**

1. Describe the general scheme of cement clinker roasting.
2. Try to define the principle of action of cyclone.
3. Try to define the principle of action of clinker refrigerator.
4. Try to define the principle of action of electric precipitator.
5. Try to define the purpose of chain system in rotary furnace.
6. Try to define the purpose of each air pump in rotary furnace scheme.
7. Define the list of basic parameters of rotary furnace.

## **USEFUL LINKS**

### **Roasting equipment**

1. <http://www.giessereilexikon.com/en/foundry-lexicon/Encyclopedia/show/shaft-melting-furnace-4493/?cHash=a7efc42d501fca487263c1dbc25292ce>
2. <http://www.ievb.tu-clausthal.de/en/research/reduction-of-energy-consumption-in-high-temperature-processes-introduction/>
3. <http://www.flsmidth.com/en-US/Industries/Categories/Products/Pyroprocessing/SF+Cross+Bar+Cooler/SF+Cro>

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4. <http://steamofboiler.blogspot.ru/2011/07/electrostatic-precipitator-parts.html>
5. <http://www.fireproofingcorp.com/electrostatic-precipitator-cleaning-and-maintenance.html>
6. [https://www.alibaba.com/product-detail/ptfe-membrane-filter-dust-bag-air\\_60599469554.html](https://www.alibaba.com/product-detail/ptfe-membrane-filter-dust-bag-air_60599469554.html)
7. [https://www.alibaba.com/product-detail/stainless-steel-316l-linear-vibrating-screen\\_60584260150.html](https://www.alibaba.com/product-detail/stainless-steel-316l-linear-vibrating-screen_60584260150.html)
8. <http://forum.driveonwood.com/t/cyclone-filter/349>
9. <https://www.behance.net/gallery/4424943/External-Cyclonic-Filter-for-Vacuum-Cleaner>
10. <http://www.spiraxsarco.com/Resources/Pages/Steam-Engineering-Tutorials/steam-traps-and-steam-trapping/selecting-steam-traps-process-equipment.aspx>
11. <http://heavyliftnews.com/news/video--crane-parts--overhead-crane-parts-assembly-3d-presentation>
12. <http://weihuacranegroup.com/html/201510/a32.htm>
13. <http://ob8skto7.adtdns.asia/overhead-crane-parts-diagram.html>
14. <http://feeco.com/belt-conveyors/>
15. <http://pkmachinery.com/faq/screw-conveyor-occur-material-backflow.html>
16. [http://world-prime.com/catalogues/elevator\\_bucket\\_conveyor\\_belt](http://world-prime.com/catalogues/elevator_bucket_conveyor_belt)
17. [https://www.volvoce.com/-/media/volvoce/global/products/excavators/crawler-excavators/brochures/brochure\\_ec480e\\_t4f\\_en\\_22\\_20040768\\_b.pdf?v=2hkuPw](https://www.volvoce.com/-/media/volvoce/global/products/excavators/crawler-excavators/brochures/brochure_ec480e_t4f_en_22_20040768_b.pdf?v=2hkuPw)
18. [https://www.volvoce.com/-/media/volvoce/global/products/articulated-haulers/brochures/brochure\\_a60h\\_t4f\\_en\\_22\\_20050842\\_c.pdf?v=2Zs2Pw](https://www.volvoce.com/-/media/volvoce/global/products/articulated-haulers/brochures/brochure_a60h_t4f_en_22_20050842_c.pdf?v=2Zs2Pw)
19. <http://www.salecnc.com/catalog/RNMRV063-Gearbox-175-10-15-20-25-30-40-50-6080-100>
20. <http://www.verdes.com/en/docs/Verdes-reclaimers.pdf>