

BLACKFAST BLACKING / HOT BLACK SYSTEMS

A CASE STUDY OF 2 CLIENTS WHO HAVE USED HOT BLACK SYSTEMS AND WHO NOW USE BLACKFAST

Case 1. Sandvik Coromont - Sweden / UK / India

Case 2. Ingersoll Rand – USA

THE MAIN CONSIDERATIONS WHEN COMPARING THE 2 PROCESSES

1. Health & Safety
2. Environment
3. Cost
4. Appearance
5. Protection against oxidation

UNDERSTANDING BOTH METHODS

A summary of the hot and cold blacking methods.

1. Hot blacking converts the metal surface into iron oxide, which has no oil absorption properties. It is a glossy finish and has a black appearance when dried without oil.
2. Blackfast converts the metal surface to a copper complex, which has excellent oil absorption properties. It is a matt finish and has a dark grey appearance when dried without oil. Oil is an important component of the Blackfast process because it helps to retain the black colour and provide protection against oxidation.

The Blackfast process, unlike hot blacking, will eliminate the need for post heat treatment (de-embrittlement).

A COMPARISON OF THE OPERATING PROPERTIES OF THE HOT AND COLD BLACKING SYSTEMS

BLACKFAST

Blackening at 22 degrees C

Low energy.

Low operating costs

Safe & easy chemical

No heat distortion

Low capital setup cost

Convenient to set up an in-house system

Blackens cast iron

Easy to control

HOT BLACKING

Blackening at 140 degrees C.

High heat up and maintenance costs.

Difficult to maintain, as replenishment.

During use can erupt & splatter.

Distortion can occur.

Requires expensive and complicated extraction systems

Requires high energy supply/services/extraction.

Turns cast iron red / brown.

Difficult. Relies on operating temperature.

SANDVIK COROMONT SWEDEN

Investigated the Blackfast process and the use of the product for the following reasons:

1.Environment: The Blackfast process was adopted to meet the environmental specifications demanded by the quality system ISO 14001 and to improve conditions of the workplace. The water treatment system installed involves steam evaporation and enables Sandvik to recycle 90 % of their water with 10% being lost via evaporation. This system was developed in-house by Sandvik.

2.Health & Safety: Blackfast offered a cleaner working environment for the employees. The simple and safe nature of the Blackfast process enabled Sandvik to install several smaller automatic blackening process lines throughout their Swedish facility.

3.Appearance: The unique pre-treatment sequence developed by Sandvik, which is compatible with the Blackfast process, enabled them to obtain a consistent surface finish over a wider variety of materials. This was not possible with the previous hot process.

4. Cost: Production cost measured in throughput time was reduced. The Blackfast blacking time takes 1 minute as compared to 5 10 minutes with hot blacking. Considerable savings were also achieved because of the elimination of a time, consuming manual process involving the removal of the residual caustic salts that developed in the blind holes of the carbide tool holders. This is a common problem associated with hot blacking.

5. Protection: Tests concluded over a long period have shown that components treated with the Blackfast process, and the correct oil gave better protection than those treated with the hot process.

Even though it is not mandatory, Sandvik now adopts a policy to ask their sub-contractors and other Sandvik facilities to independently test and install the Blackfast process. This is taking place globally with several Sandvik facilities already using Blackfast.

PROCESS USED BY SANDVIK

A fully automatic process line

1. Load
2. Soak clean Blackfast 626 @ 70 C for 10 minutes.
3. Rinse
4. 20% phosphoric acid @ 50 C for 10 minutes
5. Rinse with Ultra sonics @ 20 watts per liter (tank installed with a filter unit)
6. Rinse
7. Conditioner (5% phosphoric acid) @ 18 C for 1 minute
8. Rinse
9. Blackfast 181 @ 22 C (with filter unit) for 1 minute
10. Rinse
11. Blackfast 800 rust inhibitor @ 60 C for 5 minutes (allows interstage operations)
12. Blackfast 933 emulsion oil @ 60 C for 10 minutes
13. Unload

Extraction on process tanks # 2 4 7 11 12

Maximum load per flight bar 80 kgs

Process rate 5 flight bars every hour.

Today the Sandvik facility in Sweden process approx. 20,000 kgs of tools every week, consuming 100 ltrs of Blackfast 181 at a cost of £7.66 / ltr = £766 for 20,000 kgs = 0.383 pence per kg.

The total cost of operating the plant and other chemicals is calculated by multiplying the Blackfast 181 cost x 2.5 = 0.957 pence per kg.

Disposal of the Blackfast 181 is not required as filtration and replenishment are carried out daily. All other products and the filters used in the Blacking process are disposed of within the existing waste disposal system adopted by Sandvik.

Blackfast 181 contains small amounts of copper / nickel / selenium – levels which are not toxic. The water recycle system removes all traces of these metals from the rinse waters.

INGERSOLL RAND - USA

Ingersoll Rand Athens USA investigated the use of Blackfast on the advice of their sister company in South Africa. They installed the Blackfast process for the following reasons:

- 1.Environment: The Blackfast process met the requirements of the environmental quality management system ISO 14001. The equipment installed included the newly designed Blackfast water recycle system using activated carbon and de-ionization resin products, (Video of this process is available)
- 2.Health & Safety: Blackfast offered a cleaner working environment for the employees. Adoption of the Blackfast process has also enabled Ingersoll Rand to consider cellular production units for future expansion plans.
- 3.Appearance: The thorough pre-treatment sequence enabled Ingersoll Rand to treat a wider variety of material substrates.
- 4.Cost: Ingersoll Rand achieved 50% savings in production costs. The elimination of residual salts from blind holes played a major part in achieving these cost savings.
- 5.Protection: Tests have confirmed that the Blackfast gave better corrosion protection than had been obtained with the previous system.

The tool division of Ingersoll Rand has used Blackfast for many years. The process treats approximately 10,000 kgs per week when in full production.

PROCESS USED BY INGERSOLL RAND

Semi automatic

1. Prewash parts in agitated hot washing machine
2. Soak clean Blackfast 626 @ 70 C for 10 minutes.
3. Drag out water rinse.
4. Rinse
5. Rinse
6. Blackfast 551 @ 18 C for 1 minute
7. Rinse
8. Rinse
9. Blackfast 181 @ 22 C for 1 minute
10. Rinse
11. Blackfast 925 @ 60 C for 10 minutes
12. Unload / drain & dry.

Water filtration on water tanks 4/5/7/8 filtered with activated carbon.

Water filtration on tank 10 filtered with activated carbon and deionization resin.

Ingersoll Rand process 10,000 kgs of parts weekly, consuming 50ltrs of Blackfast 181 at a cost of £7.66 / ltr = £383 for 10000Kgs = 0.383 pence per kg

Cost of operating the plant and other chemical cost are accounted for by multiplying the Blackfast 181 cost x 2.5 = 0.957 pence per kg

Disposal of the Blackfast solutions falls in line with their existing disposal methods. The Blackfast water recycle system eliminates concerns with the water authorities.