

# SONIC CLEANING

for  
Marine Applications



**Kockum Sonics**



## Kockum Sonics

The embryo of Kockum Sonics was formed in the 1870's when Kockums Shipyard launched its first newbuilding.

In 1918 Kockum Sonics was awarded the patent for the Kockum ship whistle – now a world wide standard!

Ever since we at Kockum Sonics have explored different industrial- and commercial areas where our expertise in acoustics and sound generation can be applied.

In the late 1960's the first trial with sonic cleaning for industrial use were conducted in Europe, today we have thousands of installations in a wide variety of applications all over the world.

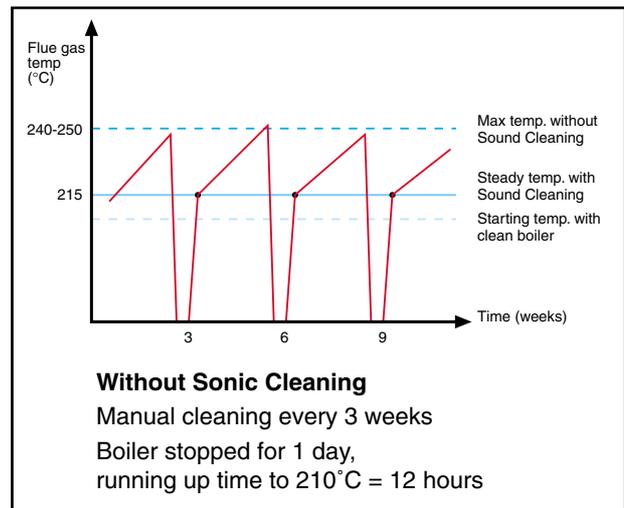
## Basic theory of cleaning by sound

The basic principle of sonic cleaning is to create a sound wave carrying an energy level exceeding the forces that tend to make particles suspended in a gas flow to adhere to each other and the surrounding surfaces, i.e. preventing a build up by breaking up the particles before they can form a hard layer.

In practice this is achieved by activating one or more sound emitters for a short insonation period and repeat this insonation cycle continuously with certain intervals, more frequently for harsher conditions and with longer intervals between insonation for lighter conditions.

To obtain optimal cleaning results it is important to comply with the following conditions:

- the build up has to be dry and powdery, the lower the moisture content the better the cleaning result
- the sound pressure level has to be high enough throughout the whole volume that is supposed to be cleaned, i.e. make certain a correct number of sound emitters are engaged



This continuous on line cleaning method can decrease costly shut downs and increase product recovery with virtually no wear on the process.

- the time interval between insonations must be short enough to ensure that particles do not become firmly adhered to each other (a normal cycle is 10–15 seconds of insonation every 5–10 minutes)
- in installations with vertical gas flow, such as boilers and cyclones, gravity alone will transport the loosened parts, in other cases a minimum gas velocity of 5 m/s is required
- start with clean surface, sonic cleaning is a method of preventing build ups to form

## *Sonic Cleaning for Marine Applications*

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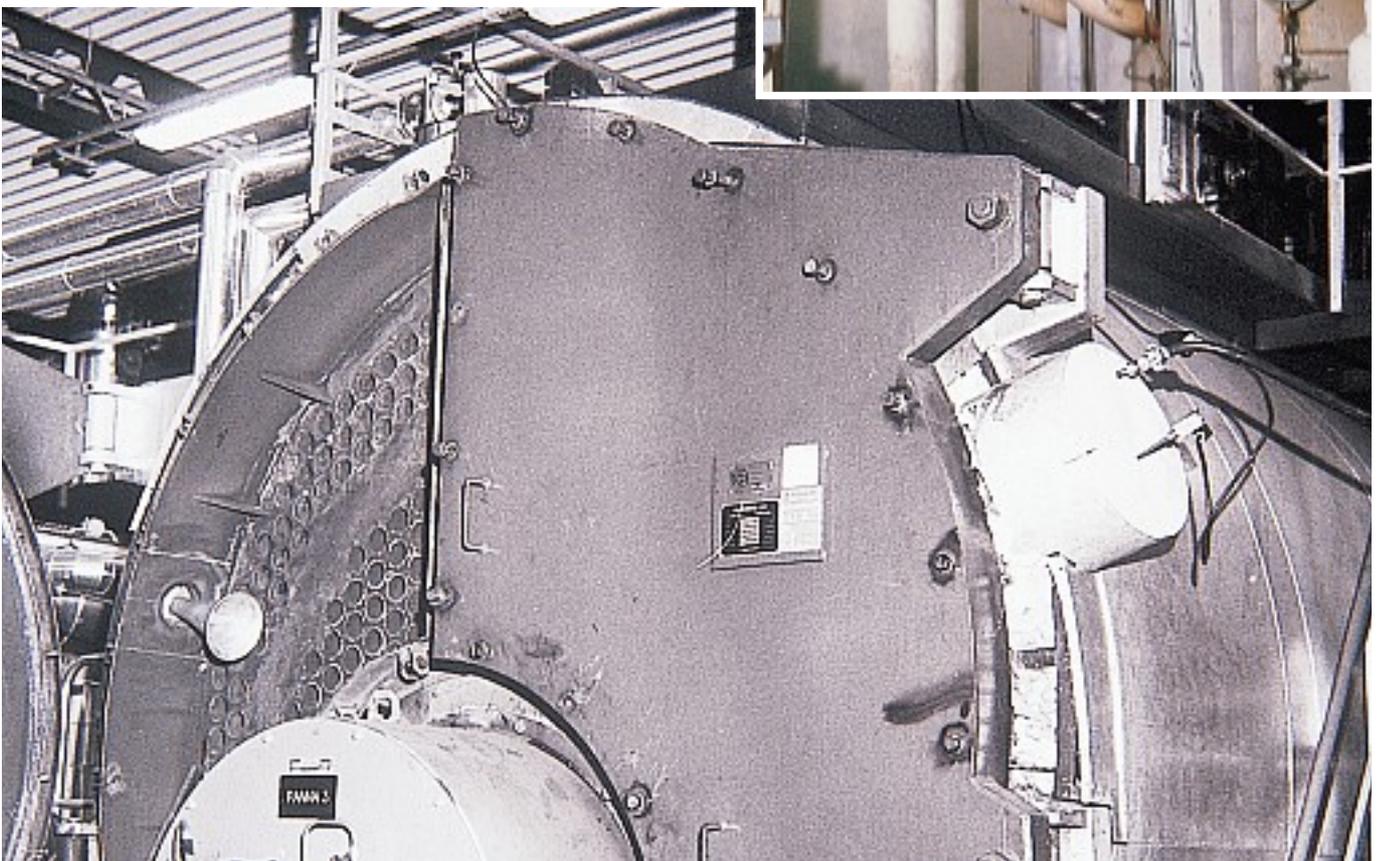
The sonic cleaning system on board vessels will apart from the general improvement in boiler and economizer efficiency also significantly reduce the risks of stack fires.

Cruise ships and passenger vessels often experience severe problems caused by soot-flakes on decks and passengers, this nuisance can effectively be avoided by the use of sonic cleaning.

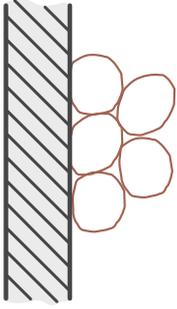
The sound emitters used for marine applications are designed to resist and absorb the heavy vibrations caused by the propulsion system on large vessels.



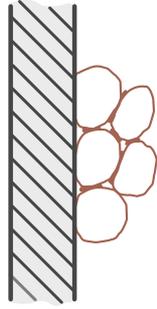
Many of the installations have been in boilers of smoke pipe type as well as in exhaustgas boilers of water pipe type.



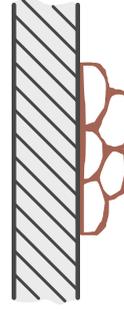
## ***The formation of a powder deposit without sonic cleaning***



powder particles settle loosely on the surfaces of the equipment,

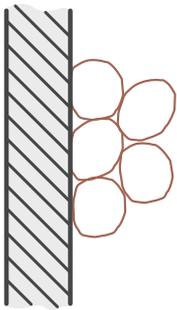


further layers of powder settle and the particles start to adhere to each other,

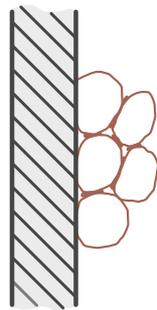


the procedure continues and the particles form a hard layer which can only be removed by mechanical force.

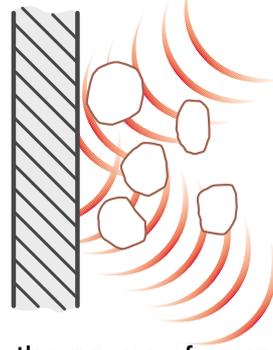
## ***The same procedure when controlled by sonic cleaning***



powder particles settle loosely on the surfaces of the equipment,



further layers of powder settle and the particles start to adhere to each other,



the power of sound breaks up the particles from each other, thus making them transportable either by a gas flow or by gravity.

## ***Fundamentals to create a Sound Cleaning System***

- Sound emitter one or more sound emitters are needed depending on the size of the volume to be kept clean
- Control unit one control unit to handle the activation- and pause times for the sound emitters
- Compressed air and/or electric power our sound emitters are either electrically powered or air driven

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