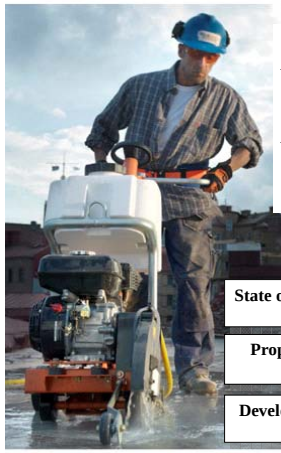
# Cutting methods using a minimum of water with efficient recovery of dust and slurry





**A method providing adapted cutting and drilling solutions for specific jobs**

**A method reducing the quantity of slurry or dust for better environment,**
**…ecological and economical !**

**State of the art in diamond tool usage for Construction markets**
Wet or Dry - Problems and limits

**Proposal for an innovative solution with reduced volume of slurry and dust**

**Development of an *experimental* method in waste management**
Case study in practical field conditions



## State of the art in diamond tool usage

| | WET | DRY |
|---|---|---|
| **Drilling** | Standard | Very difficult |
| **Power cutting** | Additional | Standard |
| **Wall sawing** | Standard | Impossible |
| **Wire sawing** | Standard | Possible IF… |
| **Floor sawing** | Standard | Additional |
| **Road sawing** | Standard | Very difficult |



## Diamond tools definetely prefer water

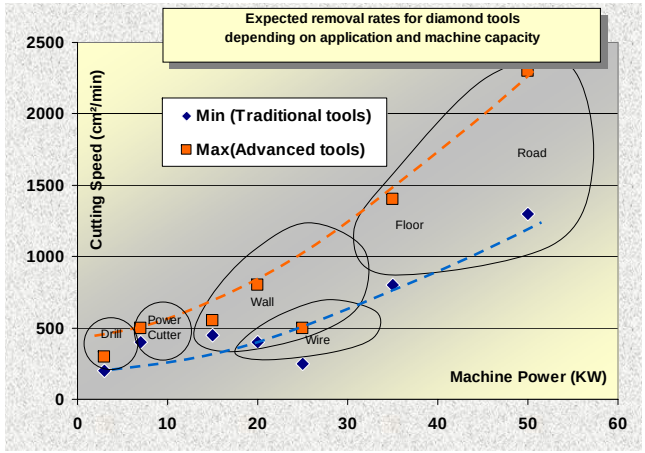
Usual water flow to cool down is far above the 3-5 liters per minute in disc sawing or core drilling or wire sawing…

Common water feeding is around 10 to 20 liters/minute.
One hour job quickly makes more than 500 liters of slurry…

This amount has to be evacuated, taking time, resourses, equipment, care…

Slurry could be a problem when contaminated.

**WET**





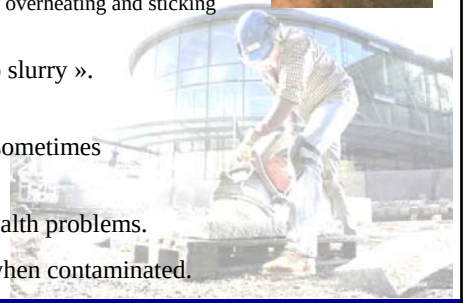




## Dry cutting exists since a long time

But the method is limited to small tools.

- Steel bodies suffer from generated heat.
- Diamonds are stressed to breakage
- Metal bond damage by overheating and sticking



The advantage is the «zero slurry ».
Only dust to evacuate !

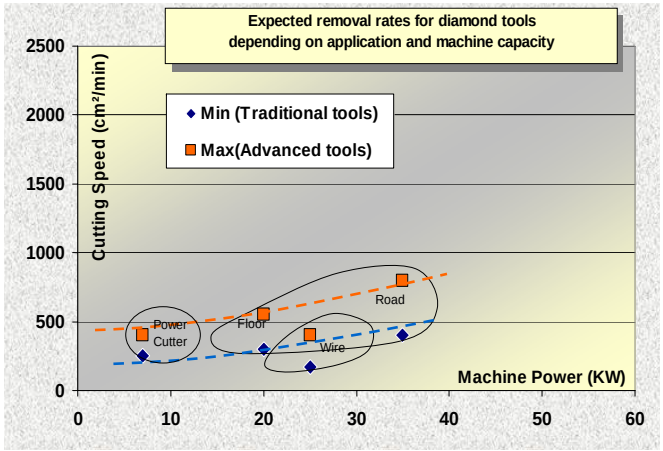
Dust is light, volatile and sometimes difficult to collect.

Dust can cause injuries, health problems.

Dust could be a problem when contaminated.



**DRY**




Dry cutting, when this is applicable, easily makes 5 to 50 m³ of dust per hour to exhaust.



**Proposal for an innovative solution with reduced volume of slurry and dust**



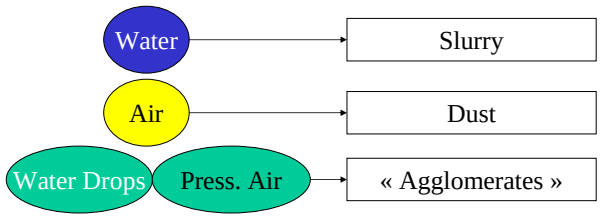
## A method could be:

**The capture of the cuttings and the concrete particules in a <u>mist under pressure</u>…**

***Under controlled and accurate conditions***

**With the effect of creating <u>a dense slurry or a paste, or humid agglomerates</u>**

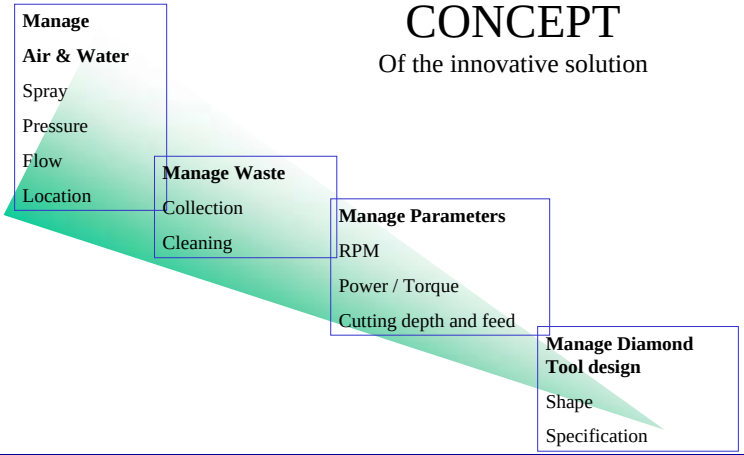
- With the ability to dry-up as quick as possible in a few minutes by evaporation
- Applicable to many different tools: blades, drills, chains, rings …

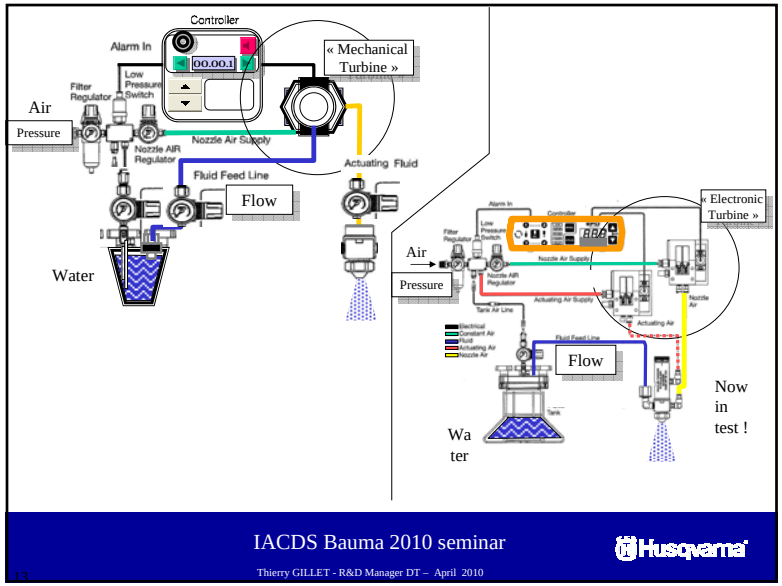





## CONCEPT

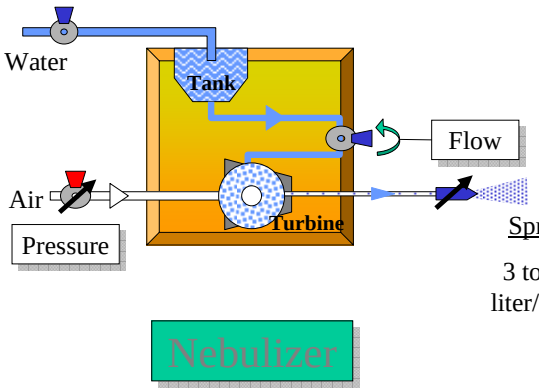
Of the innovative solution








Manage Air & Water*




3 to 20 liter/hour

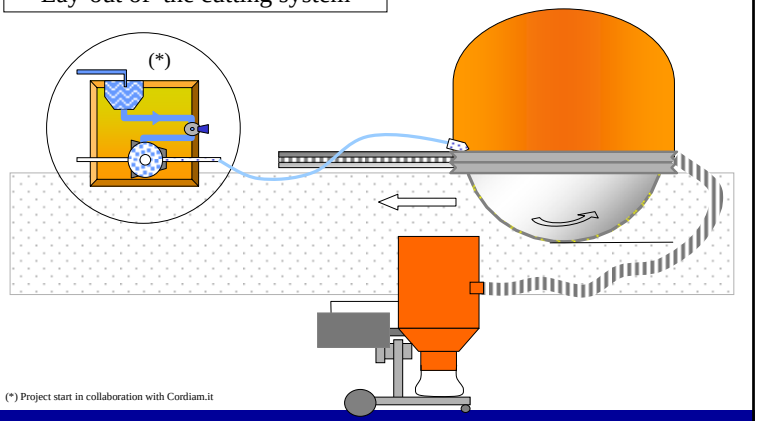
Nebulizer

(*) Project start in collaboration with Cordiam.it



**Proposal for an innovative solution with reduced volume of slurry and dust**

Lay-out of the cutting system

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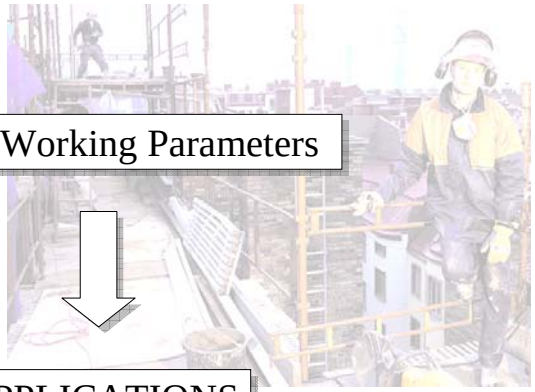
Manage Working Parameters



APPLICATIONS

## Circular Blade Sawing

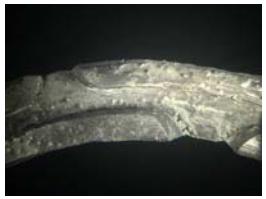
1. **Reduce RPM**
   - **To easily collect waste.**
   - **To allow cutting with low thermal exchange.**
2. **Make sure the saw is stable and powerful at this rotation speed.**
3. **Optimize cutting depth and feed.**

20 liters/h

5 liters/h



## Core Drilling



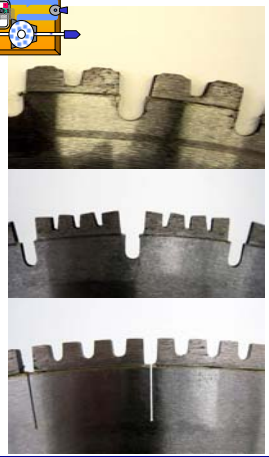
Design the system to keep effective cooling of diamond part by droplets in the hole.

Reduce RPM to low level.

Control water flow and air pressure accordingly.



## Circular Blade Sawing



Standard plain diamond segment shapes are not adequate. Rapid glazing becomes desastrous for the operation of the tool.

Segment design has to be reconsidered.

*For example*:

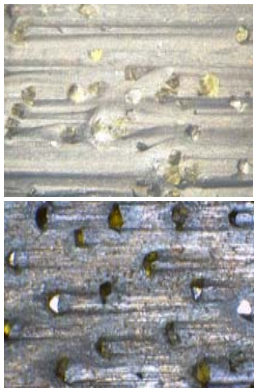
Segment slotting is required.

BUT !

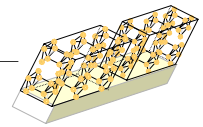
Optimized dimensioning of the segment and of the slots, combined with acurate active surface distribution, clearly improves cutting behavior.



## Adapted diamond tool



**Traditional tool**

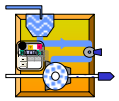


DIAGRIP

Reducing RPM provokes higher stress on diamond.

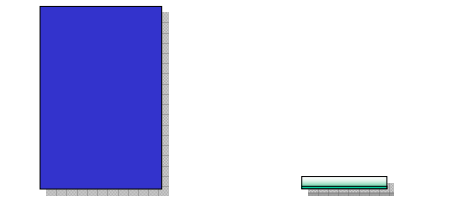
An optimized grit distribution is required to minimize breakage and generation of thermal damage.

Large grain size of the best diamond grade provides the optimum waste evacuation and reduces risk of glazing.



# Performance tables

Waste volume

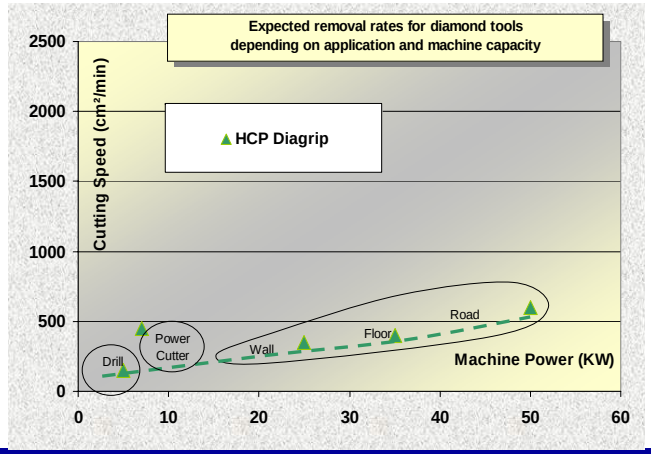


**500** l/h
**Wet**

**3 to 20** l/h
**Nebulizer**



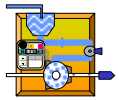
NEBULIZER






**Development of an *experimental* method in waste management**





## Deep Grooving

Circular blade/wheel
**Nebulizer**

**3 to 5 l/h**

High frequency electric

**13 KW**
Blade diameter 750 mm
Max cut depth of 35 cm

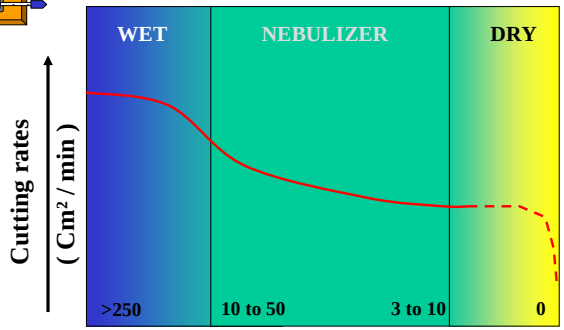
RPM down to 400
Air pressure: 3 bars -

Expected life
20 m² per blade
Cutting speed
100 to 350 cm²/min

## Plunge Chain Sawing








## NEBULIZER

| | | | |
|---|---|---|---|
| Slight decrease in cutting rates Compared to wet cutting | Wide application windows Compared to dry cutting | Low volume of waste | Quick cleaning of job side |

**ADAPT** →

| | | |
|---|---|---|
| Operating Parameters and Exhaust conditions | Diamond tools: grit position and segment shape | High Torque properties at low RPM |

High cycle saw is prefered



## Improvement by the new technique

| | WET | DRY | NEBULIZER |
|---|---|---|---|
| **Drilling** | Standard | Very difficult | Applicable* |
| **Power cutting** | Additional | Standard | Applicable*** |
| **Wall sawing** | Standard | Impossible | Applicable** |
| **Wire sawing** | Standard | Possible IF… | Applicable ? |
| **Floor sawing** | Standard | Additional | Applicable** |
| **Road sawing** | Standard | Very difficult | Applicable** |
| **Ring** | Standard | No | Applicable** |
| **Chain** | Standard | No | Applicable** |