The M17 CMP process monitoring and control system is unique in its speed and precision. It makes continuous polishing possible, without any measurement interruptions. It measures in-situ, in real-time and stops precisely at the right stack while being completely independent of any kind of removal rate variations.

The sensation: the analyzer’s response and signal sensitivity.
Our approach simply detects the nitride-containing polishing product with sub-ppb detection sensitivity and one-second response time, in-situ, in real-time – currently the fastest CMP end-point detection at all times.

Robustness.
Many features have been designed-in to assure robust, safe operation in the production environment. The design of the system allows for continuous operation with minimum maintenance (few hours a year), user friendliness and guaranteed end-point capturing.

The multi-functional software.
The method measures the entire wafer, since the signal is averaged over the whole wafer surface. The slope of the signal is a function of the uniformity. The maximum signal depends on the N-containing area of the current layer. The M17 system has highly intelligent, flexible and user friendly process control software which provides reliable endpoint detection for each and every kind of product wafers.

What history tells us.
Existing methods to control CMP-processes are either based on simple timing, on frictional changes, on optical measurement of thickness or on measurement control in-line or off-line. All these methods need a relatively large process window. CMP processes depend on quite a large number of parameters such as downward pressure, rotational speed of the platen and the carrier, relative rotational directions, kind and condition of the pad, slurry, temperature and much more.

E.g. for STI CMP, all above parameters are changing. Such a process also has a very small window. Therefore, the methods mentioned above are poorly suited or very time consuming.

M17 – How simple a good solution can be.
The M17 system has been developed jointly by ECO PHYSICS and a leading edge semiconductor company in 1996. The systems were initially applied to monitor and control shallow trench isolation (STI) CMP which must be stopped at the interface containing silicon nitride film. The control requirement is to clear out the oxide on top of all nitride film.
### Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection method</td>
<td>Chemiluminescence</td>
</tr>
<tr>
<td>Detection limit</td>
<td>10 ppt</td>
</tr>
<tr>
<td>Rise time (0–90%)</td>
<td>0.5 sec</td>
</tr>
<tr>
<td>Probe modules</td>
<td>several types, optimized to polisher-specific space situation</td>
</tr>
<tr>
<td>Park position of probe arm</td>
<td>vertical or sideways</td>
</tr>
<tr>
<td>Alarms</td>
<td>optical and acoustic, with specific indicator LED’s at the relevant modules</td>
</tr>
<tr>
<td>Dimensions</td>
<td>height: 185 cm, width: 60 cm, depth: 80 cm</td>
</tr>
</tbody>
</table>

**Weight**: 200 kg  
**Supply voltage**: 115 V/50–60 Hz, 230 V/50 Hz  
**Power required**: 1.5 kVA maximum  
**Interface**: Direct interfacing to polisher RS 232  
**Temperature range**: 5–35 °C  
**Supply gases**: no external supply gas required  
**Maintenance required**: few hours per year

ECO PHYSICS reserves the right to change these specifications without notice.

### Flow diagram

The flow diagram illustrates the process of zero air supply unit, ozone restrictor, ozone generator, sample gas restrictor, CMP pad, Wafer, ozone scrubber, and vacuum pump. The diagram shows the interaction and flow of gases through the system.