**INTRODUCTION**

A new revolutionary automated inlet system that allows injection of nanoliters of liquid directly into the column is here presented. It combines the performances of the well-known traditional On-COLUMN Inlet with the versatility of use of a Split Injector. Particularly, it is the only injector currently able to perform a true on-column injection into the narrow bore columns used in FAST-GC, the technique more and more frequently applied because of its high resolution and short analysis time.

At present time, the existing inlets have great limitations especially if used for FAST-GC technique. In brief:

- **Split Injection limitations**: sample alteration and discrimination, ghost peaks and impurities coming from hot septa, very high split ratio needed for FAST-GC application (typically 1:500 split ratio or higher) which strongly affects the accuracy and repeatability of amount injected.
- **PTV limitations**: impurities coming from hot parts (septa), very high split ratio for FAST-GC applications, unwanted absorptions on glass wool insert.
- **Traditional On-COLUMN limitations**: sample dilution is needed, Retention-Gap is necessary to prevent contamination and degradation of the analytical column, not applicable to FAST-GC.

The new FAST On-column inlet system (*) is able to solve the listed limitations since performs an introduction of very small amount (1nL or lower) in a cool-on-column injection mode. (*) Patented system.

**Automated FAST ON-COLUMN inlet system**

The FAST On-column inlet system, installed on a DANI Master GC, is totally automated through the robotic XYZ DANI Master AS liquid autosampler (Figure 1).

**APPLICATIONS**

1. **HYDROCARBONS C10 – C40**
   - Column: 5 m L x 250 µm i.d., 0.1 µm f.t. DNf1
   - Oven: 40°C – 15°C/min – 350°C
   - Carrier gas: Helium at 30 kPa
   - Analysis time: 10 minutes

   The performances of the FAST On-column Inlet system are shown with an introduction of Alkane Mixture (FLUKA Cat.# 68281, “Alkane Standard Mixture for the assay of the system efficiency of GC’s C10–C40”) from 30nL down to 0.3nL direct liquid injection into the column. The discrimination is minimized like a traditional On-column injection.

2. **SAGE ESSENTIAL OIL**
   - Column: 10 m L x 100 µm i.d., 0.1 µm f.t. DNfWAX
   - Oven: 40°C – 15°C/min – 230°C
   - Carrier gas: Hydrogen at 59 cm/s
   - Analysis time: 10 minutes

3. **BUTTER TRIGLYCERIDES**
   - Column: 1.5 m L x 100 µm i.d., 0.1 µm f.t. DNf1
   - Oven: 100°C – 30°C/min – 250°C
   - Carrier gas: Hydrogen at 150 kPa
   - Analysis time: 8 minutes

   The new FAST On-column inlet system (**) is able to perform a true on-column injection into the narrow bore columns used in FAST-GC, the technique more and more frequently applied because of its high resolution and short analysis time. It is the only injector currently able to perform a true on-column injection into the narrow bore columns used in FAST-GC, the technique more and more frequently applied because of its high resolution and short analysis time.

   Two main variables are available, depth of the needle and time of insertion, whose variation allows to inject quantities from 0.2 nanoliter up to “Large Volume” injections.

   - **A** – the syringe needle slides over the column
   - **B** – the column comes in contact with the sample
   - **C, D** – the liquid is sampled by capillarity
   - **E** – the needle withdraws and the analysis starts

   ![Figure 2. FAST On-COLUMN Injector cross-section.](image)

   ![Figure 3. FAST On-COLUMN operation steps.](image)