

PNEUMATIC DIVISION

Possible applications for MATRIX's valves

In order to evaluate possible applications of MATRIX's valves it's necessary to start from what the technology applied, in terms of characteristics and performance, is capable to obtain. This is very important because, a part some extremely specific sector, the use of MATRIX's valves is possible anywhere there is a need of:

- Low / reduced response time
- High frequency of operation (> 100 Hz)
- Frequency piloting (PWM – PFM) with relative proportional flow rate control
- Extra flexibility, thanks to the possibility of controlling individually more shutters in the same valve-body (shell)
- Reliability and long lifetime requirements guaranteed (> 500 Million Cycles)

Consequently, analyzing all the areas where pneumatic automation is best-known, it's possible to identify the specific applications where MATRIX can make the difference in terms of performance. The main application sectors are:

- **SORTING:** all the fast actuator applications for deviation, turnover and/or air blowing, for the selection and subsequent displacement, reject and arrange of various products. These are applications where the two key elements are the reading (vision) system of transiting pieces with its software and the valve module that blows exactly where the software indicates. In these extremely fast applications frequency can reach up to 2000 Hz (in the case of air blowing). The main final users of selection systems are the food packaging industry (rice, fruit, vegetables, frozen and non frozen goods), the pharmaceutical and chemical industry, the paper industry, the automated assembly industry and the environmental field (litter selection, etc.). In this last area, Matrix has developed several technical solutions in order to be considered a worldwide leader in supplying the main builders; other than the single 2/2 valves, specific manifolds and complete valve groups as well as engineered solutions are available for selection applications (electronic control management included).
- **HANDLING & ROBOTICS:** in this area the applications are the most various, in the power and speed as well as position control. For example, we can mention:
 - **Speed/position regulation of linear pneumatic actuators:** the availability of parallel multi-shutter valves and the relative possibility to manage and modulate the passage section makes Matrix's valves extremely interesting for this kind of application
 - **Speed and torque control of pneumatic tools (air drilling and screwing):** regulation can be obtained through the partitioning of the passage, impulse modulating or combining the two techniques (see proportional valve 860).

- **Welding control:** pneumatic actuators that control welders have to be run by extremely accurate, reliable and repetitive power/pressure controls. Matrix's valves and pressure regulators ERP100/SPR1000 are the answer for these applications, where feedback loop is the key to assure precise and well-controlled strength, jeopardizing the welding spot otherwise.
 - **Vacuum managing and control:** the use of 2/2 variable-section valves allows the suction cap to have variable values of vacuum, in order to obtain the desired grip
 - **Pneumatic vibrators:** high frequency (>50 Hz) three way valves satisfy typical requirements these applications demand, where pushing is generated from compressed air that is introduced and released at high frequencies
 - **Component assembly:** in this area (where electronics and semiconductors are chiefs), supply and movement of components to assembly are sometimes greater than 4000 – 6000 elem. / h, and Matrix's valves satisfy this need of frequency and repeatability
 - **Pasting:** another application progressively used as alternative to most traditional fastening systems. In this case, the greatest concern is the pressure tail generated by an approximately controlled leak of adhesive. Matrix's valves, with their technological and fabrication characteristics, assure opening and closing time up to values of 1-2 ms (according to characteristics and control systems). This feature reduces drastically or even eliminates pressure tail concern.
- **PACKAGING:** the applications in this area are the most various and contemplate all the typical phases, from filling to weighing, other than packing and displacement at line finish. The possible applications can relate to:
 - **Filling:** the use of 2 or 3 way valves, for either air or liquids, mono and multi shutter, for an accurate and précised control of the assigned filling rule
 - **Selection:** same as described above for sorting applications
 - **Handling:** all the high speed actuations in the packing area: cutting, labeling, movement managing and control, article routing, etc...
- **TEXTILE:** the most well-known applications in this field are:
 - **System controlling** of wool input in air blowing chassis machinery
 - **System controlling** of power in yarn guide
 - **High speed actuator system controlling** for auxiliary handling
- **MARKING AND PUNCHING:** the use of pneumatics in this field is vast; the air pilots the punchers that engrave the surface to mark according to the managing software rule, or controls machine tools that directly engrave the surface. These applications require very high speed (frequency) and precision in repeatability. In the case of marking on different surfaces (material and / or thickness) modularity and flexibility of the multi-shutter can make the difference concerning control of power / pressure.

- **MEDICAL AND BIOTECH. INDUSTRY:** the applications in medical and pharmaceutical area are various and, at times, very sophisticated. The fields most interested in pneumatics are:
 - **Ventilation / breathing**
 - **Dialysis**
 - **Anesthesia**
 - **Presso-therapy**
 - **Optics**
 - **Dental**
 - **Biotech. applications for recovery of physical functions**
 - **Hospital material and products (beds, mattresses, etc...)**

In these fields the use of fast and precise valves, with dedicated electronic control capable of managing with extreme repeatability pressure / range, represents the possible answer to expectations. In this area, Matrix's capability of customizing products respecting the often strict and detailed specifics typical of this field.

- **AUTOMOTIVE AND COMMERCIAL VEHICLE:** interesting applications concerning "power train" (clutch system – brake – suspensions) as well as chassis-cub (seat – automatism managing and controlling – air drying control) can be found thanks to speed, repeatability and low-consumption of our valves.
- **PROCESSING INDUSTRY:** the possible applications in this field involve two and three way valves for flow regulation. The first kind of use is given directly by the control of air and neutral or liquid gas flow (where possible). The multi-shutter valves, easily linked to a PLC, allow a direct, precise and easy control of range, if these are of medium-low value. A second type of application concerns the piloting of servo-valves for controlling great flows. In this case, the possibility to modulate the range can allow to obtain rules of opening / closing corresponding to demand.
- **AMUSEMENT PARK AND ATTRACTIONS:** the show industry often uses mobile figures to obtain simulations and special effects. The possibility of having a fairly good proportionality piloting medium-small actuators with 3 way multi-shutter valves, other than single valves with frequency piloting, offers a variable moving management improving the "reality" effect of the attraction. The reduced dimensions of the valves and the range required (not high) make Matrix's solutions an interesting component and the answer to this field's issues.
- **MEASUREMENT AND TESTING MACHINERY:** Matrix's valves characteristics (repeatability, frequency, no leakage, managing of electric control on-off as well as modulation, etc...) allow this kind of application.

Obviously the quoted exemplifications are only some of the possible applications; the truth is that Matrix's products have an extended range of applications; any area where a précised control of pressure / power and range is required, Matrix's technology can make a difference or represent a valid functional alternative, with value added features given by manufacturing flexibility and the wide set of control possibilities.