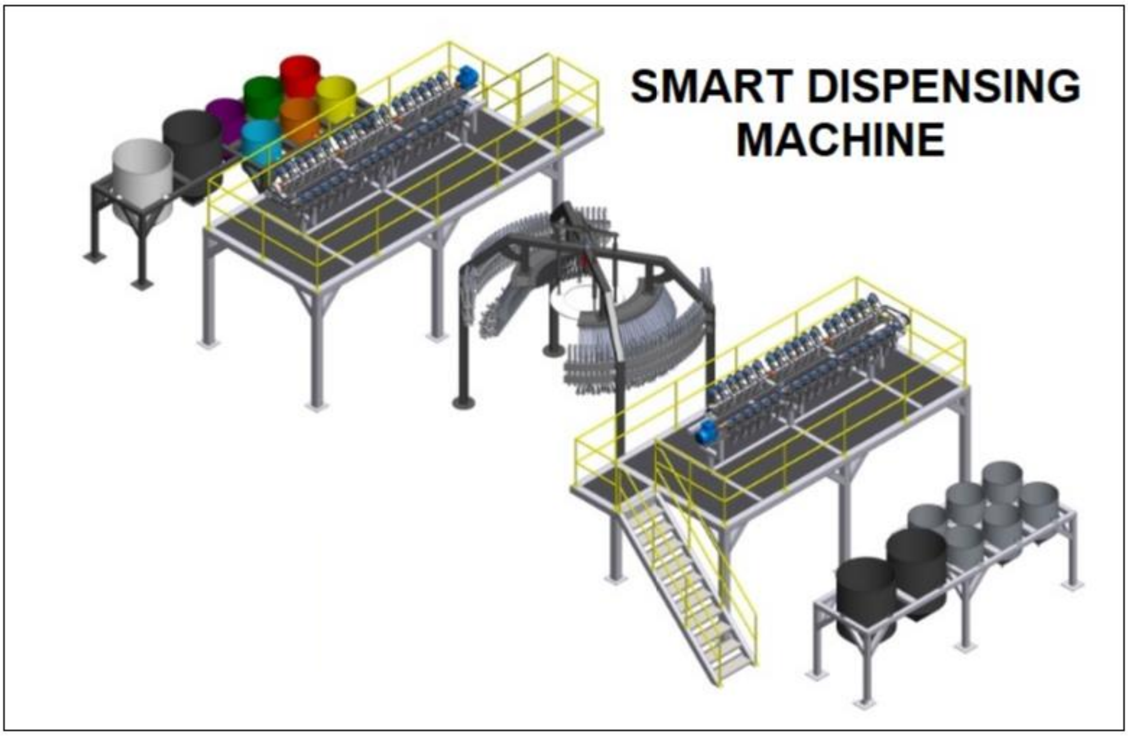
RMA

TECH

RMA SMART DISPENSING MACHINE **- Accelerating production with intelligence and precision. Towards for the 4.0 INDUSTRY in the World of Paints.**



RMA TECH, through its founder, with decades of experience and patents in paint manufacturing processes, aware of the challenges that the paint segment faces, decided to explore new paradigms for this sector, through the creation of cutting edge technology that enable evolutionary leaps in this sector, following the other industrial segments that are in more advanced stages, such as the oil, petrochemical, paper and cellulose, pharmaceutical, automobile sectors, among others, where Industry 4.0 already has the necessary bases for establish yourself.

On the other hand, the Paint Industry, both nationally and internationally, in practically all its manufacturing processes, has demonstrated a large technological GAP.

Commonly "automations", which translate into isolated mechanizations of industrial processes, are carried out in one or another unitary operation, basically motivated by a better balance of the production line.

These evolutionary mechanizations, commonly called "automations", however, bring little in terms of effective gains to the business, since they do not alter the production dynamics in terms of their flow, integrating the various stages of the processes, until we reach a final product with low lead time, minimum variability and minimum cost, which, for example, the automotive industry has been practicing for decades.

It is easy to observe large stocks both in terms of raw materials and finished products in paint factories, which corroborates the thesis of the low manufacturing productivity of this segment.

Over the decades we have listened to several theses and explanations regarding this, however the real explanation is that the paint manufacturing processes, in the vast majority, are not capable, which implies that a “stock based strategy” is the safeguard adequate to manage the lack of capacity, accuracy, stability and productivity of the processes.

Large stocks, in the final analysis, demonstrate only the fragility and low capacity of the manufacturing processes, in view of the market demand, a paradigm already overcome by several industrial segments, through highly robust, flexible and lean processes, where the stock is treated as heresy.

In these segments, "industrial automation", which is the result of the sum of "automation" plus "integration" and "intelligence", made possible real leaps in competitiveness through advanced strategies to control their processes, 100% integrated.

“Intelligent” processes, integrated and capable, lead to optimal solutions where the business gain is then maximized.

The time has come when the paint industries, driven by fierce competition, low profit margins, high production costs, high inventories, resulting from low productivity and etc., change the manufacturing paradigm, using cutting-edge technological resources to win productivity and competitiveness in the international scenario.

In this sense, RMA, focused all its expertise seeking to make the “intelligent automation” of the paint industries possible, where then, among others, the concept of SMART DISPENSING MACHINE INDUSTRIAL RMA and its consequent international patent under the code (PCT / BR2020 / 050084).

SUMMARY OF THE INNOVATIONS OF THIS IDEA:

• Volumetric dosing system with high productivity, with precision and reproducibility of similar Gravimetric;

• 100% automated system for calibration of metering pumps, which can be performed outside production hours, in a pre-programmed manner and without the presence of operators;

• Drive system for the set of metering pumps, through a driving shaft and single motor, controlling all pumps simultaneously and reducing the cost of implantation;

• High precision dosing (cutting) finishing system, emulating proportional cutting systems, using Artificial Intelligence resources (learning machine);

• Use of "Vision System" with Digital Image Processing for interlocking and filming operations;

• Automatic Temperature Compensation, individual for each dosing component, aiming to eliminate errors related to the volumetric expansion of the material;

• Possibility of dosing for up to 100 components (clears, bases, colorants, solvents, additives, etc.), serving several product lines;

• Full integration with corporate systems, ERP and databases, enabling the implementation of the INDUSTRIA 4.0 concept;

• Total synergy with the concept ***[RMA LOW COST PAINT CONTINUOUS],*** enhancing the process gains;

CONCEPT PRESENTATION

SMART DISPENSING MACHINE, conceived and patented by RMA, brings together the dosing speed of VOLUMETRIC DISPENSING MACHINES, but with the precision and reproducibility of GRAVIMETRIC DISPENSING MACHINES, which we often quote as “the best of both worlds” ...

For a better understanding, regarding the dosage philosophy offered by the main manufacturers of DISPENSING MACHINES and the pros and cons of each philosophy, we have the following considerations to make:

Industrial Dispensing Machines with GRAVIMETRIC DOSING, are characterized by the great accuracy in their dosages that are carried out through electronic scales with high precision load cells.

In this type of equipment, each component is dosed individually (one at a time), making the process usually very slow, thus providing low productivity.

Industrial Dispensing Machines with VOLUMETRIC DOSING technology, on the other hand, have higher productivity, considering that the dosage of all components of the formulation is carried out simultaneously.

These equipment’s, however, do not have as high a reliability as the gravimetric systems in relation to the dosing accuracy, due to problems related to the volumetric dosing process itself, which is performed through dosing pumps, where it is assumed that a certain number of revolutions of the rotor corresponds to a determined metered volume.

These pumps, due to internal wear that are generated gradually, over time they wear out and change the amount of material displaced for each rotation, which is the basis for calculating the dosage of these machines.

This means that, over time, a pump that displace for example 3.00 ml for each rotation, after a certain time, starts to displace for example 2.87 ml, due to its natural wear.

In addition to the variations produced by the internal wear, other variables directly affect the dosing accuracy, such as: variations in viscosity, density, component temperature, pressure in the lines, room temperature, among others.

These variables alone significantly change the dosing accuracy, limiting the use of this type of equipment.

In order to minimize these factors, machines with VOLUMETRIC technology, usually incorporate a calibration routine where it is possible to compensate for these dosing errors.

In this calibration routine, the machine's computerized system doses on a scale, a predetermined amount of a component and thus measures the error between, what is supposed to be displaced and what was actually displaced.

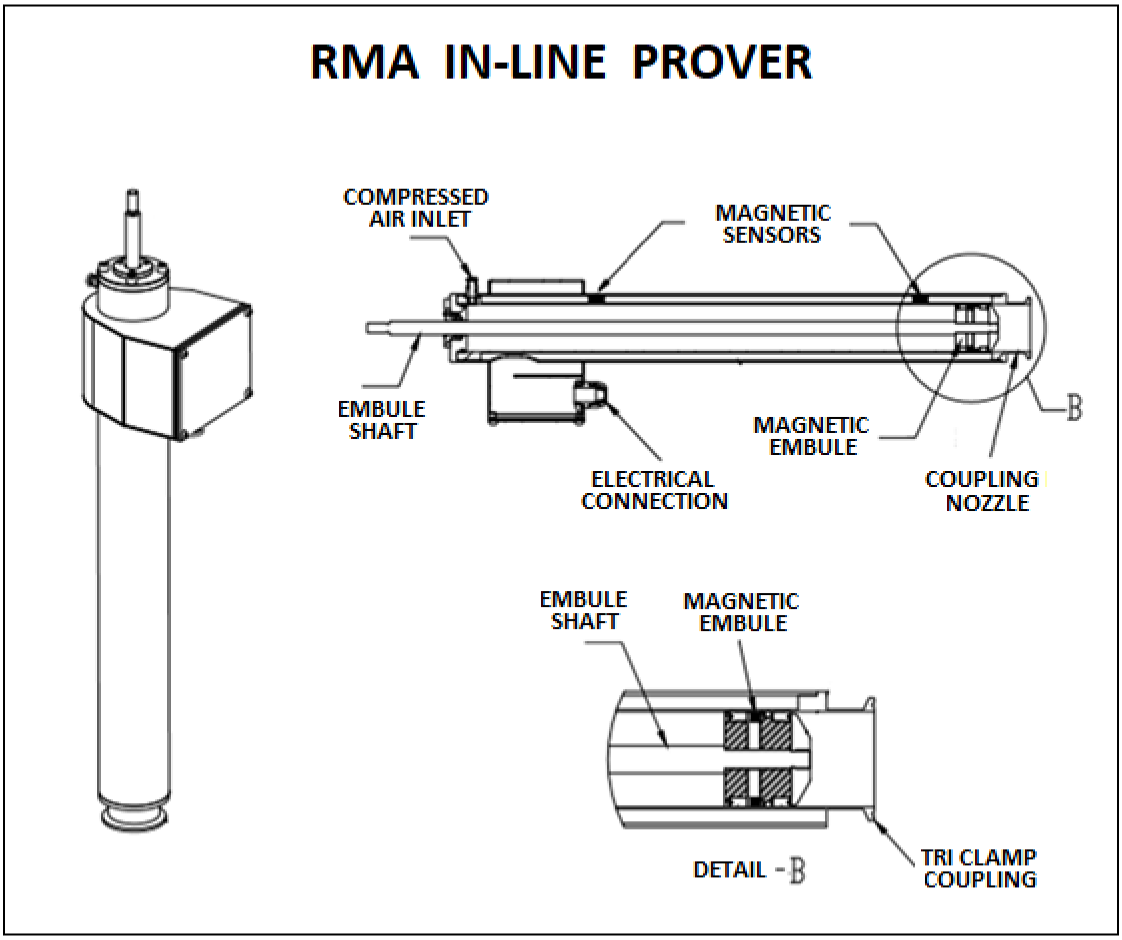
In this way, the system then calculates a “correction factor” that will change the parameter that lists 1 ROTATION = X Displaced Grams (or Milliliters).

However, this process is relatively slow and laborious, having to be carried out relatively frequently and individually for each component, becoming a major problem, especially when these machines are designed to dose dozens of components, due to the enormous time spent in this type of operation and the difficulties linked to this process.

In this way, due to **“pressure for production”,** it is very usual for the operators responsible for this procedure to end up relaxing in these routines and, therefore, the products produced through these machines, even if their components have been pre-adjusted, end up having their “deteriorated” characteristics over time due to the lack of calibration, causing major quality problems for paint manufacturers that use Industrial Dispensing Machines with this philosophy.

Seeking to overcome the individual deficiencies of each philosophy of Industrial Dispensing Machines available on the market, RMA idealized and patented a new equipment concept that, through innovative solutions, incorporates a new and sophisticated “on-line” (closed) and 100 calibration system % automated for each metering pump in the system, which performs this operation extremely quickly and accurately, through "in-line providers".

This system even allows the complete calibration of the machine (all metering pumps), to occur in periods when the machine is idle (period between shifts, etc.), extremely quickly and without the presence of operators, incorporating concepts of intelligence artificial for this procedure, providing that the calibration frequency can be performed daily.



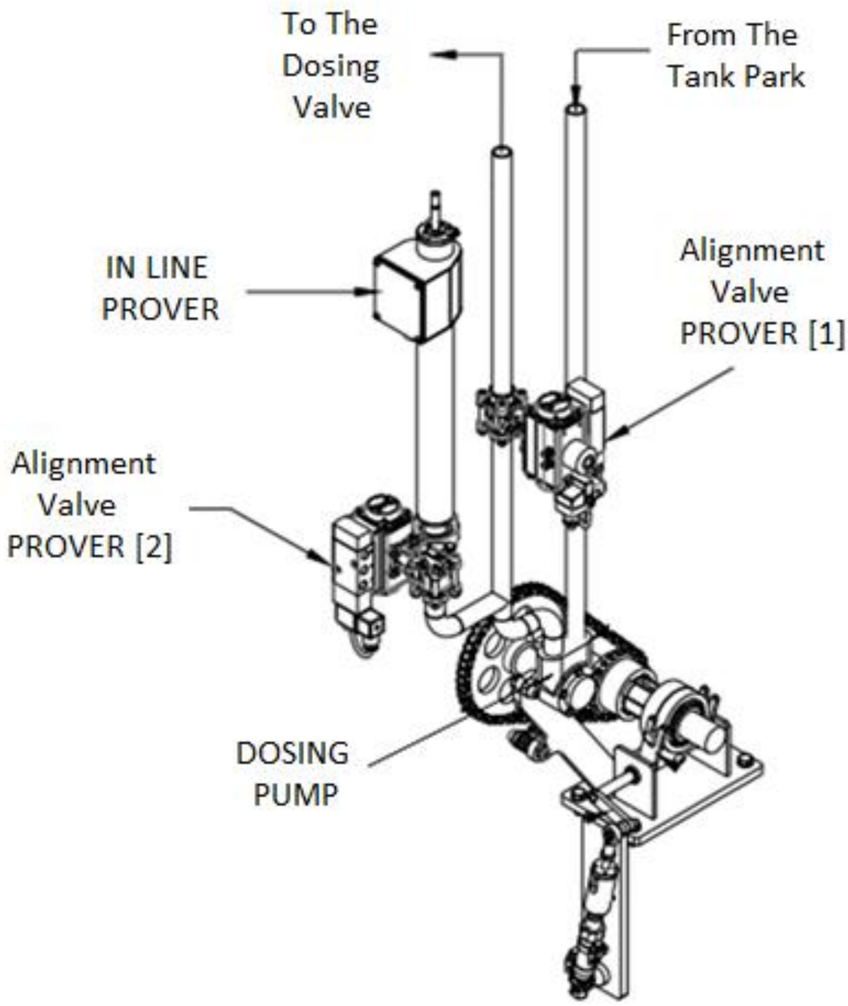
AUTOMATIC CALIBRATORS CONCEPT (In Line Provers)

The “in line provide” are installed individually for each metering pump, which allows the individual or joint calibration of several metering pumps to be carried out simultaneously, shortening the period necessary to carry out a calibration of the entire DISPENSING MACHINE dosing system.

The calibration process stores the individual historical data of each metering pump, allowing the maintenance area to obtain a predictive analysis of the life of each pump, facilitating the routine maintenance planning of the equipment.

The “in line provide” are 100% manufactured in stainless steel, and with seals resistant to any type of organic solvent or aqueous mixtures, being easily installed to the dosing pump modules through Tri Clamp connections, which facilitates their assembly and disassembly when necessary.

IN-LINE CALIBRATION SYSTEM



All management of the automatic calibration process is done by the DISPENSING MACHINE control PLC, ensuring total security in operations.

During the calibration process of a metering pump, first the “Alignment Valve [1]” is blocked and the “Alignment Valve [2]” is opened simultaneously and automatically, directing the flow of the dosing pump into the interior of the “In line provide”.

As soon as the PLC receives the confirmation of positioning of the valves, the dosing pump to be calibrated is then geared to the driving shaft through the Pneumatic Coupler and the calibration process is ready to be executed.

In this process, the control PLC will be simultaneously monitoring the driving shaft encoder, the discharge pressure of the dosing pump and the magnetic sensors of the "in line provide".

The calibration process starts with the activation of the metering pump at a pre-defined speed (RPM).

When the pump is activated, the magnetic plunger of the “In Line Prover” begins to move vertically when its movement is then detected by the first magnetic sensor (bottom).

At that exact moment, the PLC starts counting, through the encoder, the number of turns made by the driving axis and, consequently, the metering pump, until the magnetic piston activates the second (upper) magnetic sensor.

An auxiliary timer on the PLC also monitors the time elapsed during the path of the magnetic piston between the two sensors.

As soon as the second magnetic sensor is activated, the whole process is then interrupted.

It is important to note that for greater accuracy in the calibration conditions of the pumps, consistent with the process conditions, compressed air at a certain pressure is supplied on the opposite side of the "in line supply" magnetic piston, simulating the process condition.

As soon as the process is interrupted, immediately the Prover Alignment Valve [1] is opened and the pressure of compressed air on the opposite side of the magnetic piston moves it in order to expel the contents of the "in line provide", when the Valve Alignment Prover [2] is then blocked.

After this extremely fast process (in the order of 1 to 2 minutes), the PLC has two basic information that were captured during the calibration process, the first and most important being the number of turns performed by the metering pump in the calibration process. and the time spent on that event.

As the “in line provide” is basically a cylindrical tube whose internal diameter is precisely known and the two sensors are still at a distance “L”, the volume of material that the piston displaced during the procedure is obtained by the following formula:

$$Vp = \pi \times R^2 \times L$$

Where:

Vp = Internal volume of “in-line to prover” (cm^3)

R = Internal radius of the “in-line prover” tube (cm)

L = Distance between the two magnetic sensors (cm)

With the internal volume of the “in line prover” and the number of revolutions performed by the metering pump so that the piston travels its course, it is then possible to easily calculate the displaced volume per revolution of the metering pump **(Vd),** using the following formula:

$$Vd = Vp / Nr$$

Where:

Vd = Volume of product displaced per revolution (cm^3 / rotation)

Vp = Internal volume of “in line to provide” (cm^3)

Nr = Number of revolutions performed by the pump during calibration

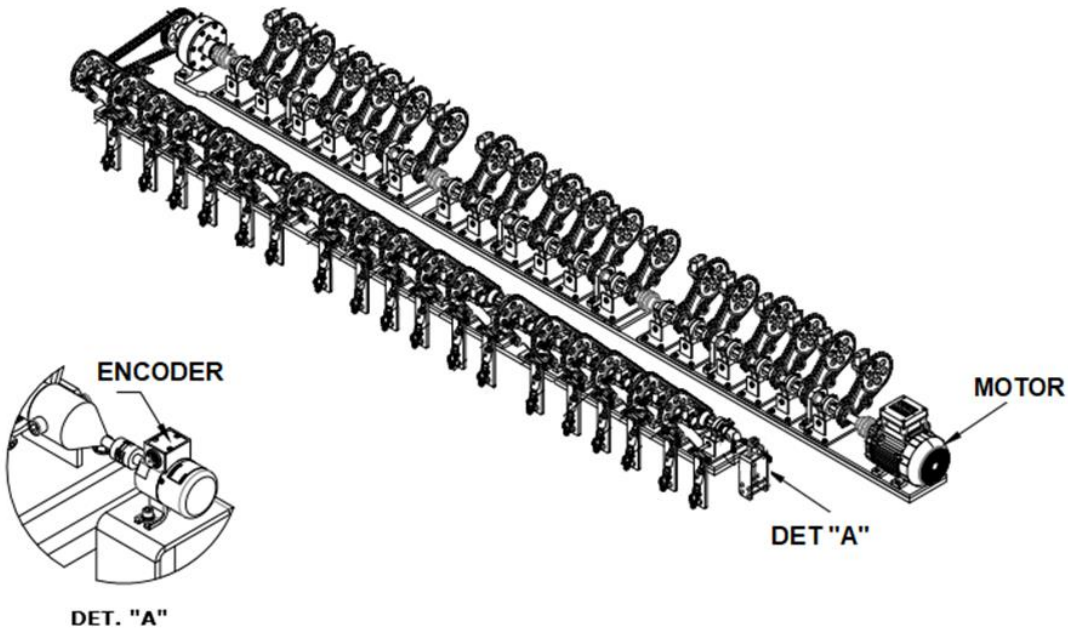
The value found for **Vd** is then updated in a correlation table (Dosing Pump x Pumping Capacity) on the PLC, then serving as a reference for future dosages and also for wear diagnosis for the maintenance area.

It is important to note that the calibration process can be performed in a single way for a pump or simultaneously for a specific set of pumps.

DOSING PUMP STATION

Unlike the other Industrial Dispensing Machines offered on the market, RMA's SMART DISPENSING MACHINE has an extremely revolutionary and innovative design, sharing a single drive motor for all metering pumps used in the equipment, which makes its implantation cost extremely competitive.

In this case, a single motor can simultaneously drive up to about 40 metering pumps, for the most diverse components to be metered, since all metering pumps are arranged along a single driving shaft, connected to an electric motor driven through a frequency inverter.

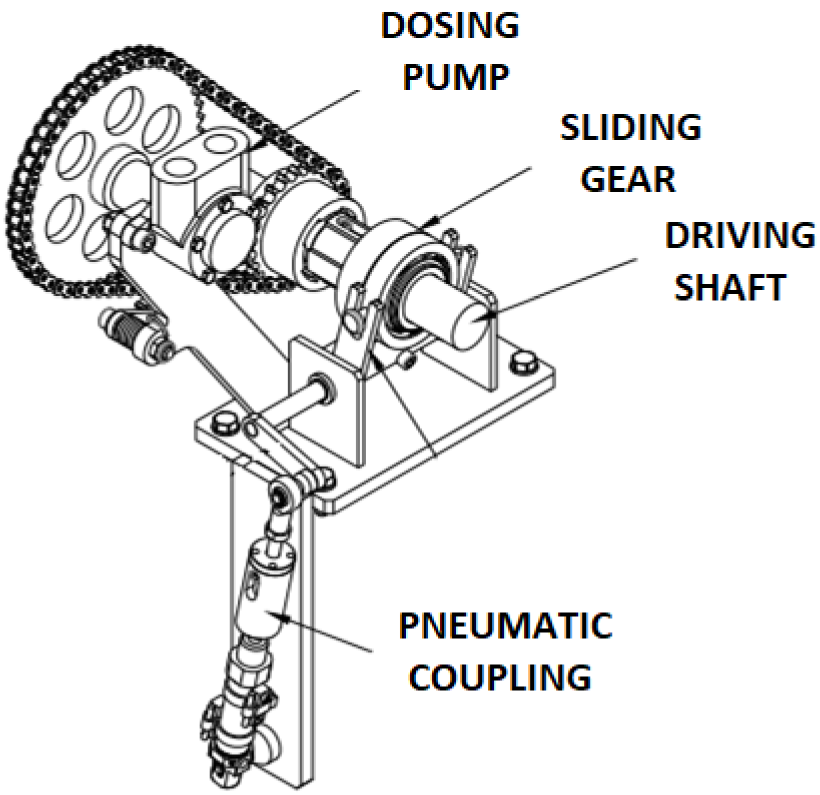


At the opposite end of the driving shaft motor, an encoder with a resolution of 360 pulses per rotation is installed, which monitors the rotation of that axis, providing an accurate volumetric dosage for each component to be dosed.

Each metering pump is individually coupled to the shaft through a pneumatically operated gearing mechanism, eliminating any possibility of "slipping" as observed in clutch systems.

In this way, the electronic drive system has full control over which pumps are to be driven and in which situation, depending on the formula of the product to be dosed.

COUPLING MECHANISM FOR METERING PUMPS

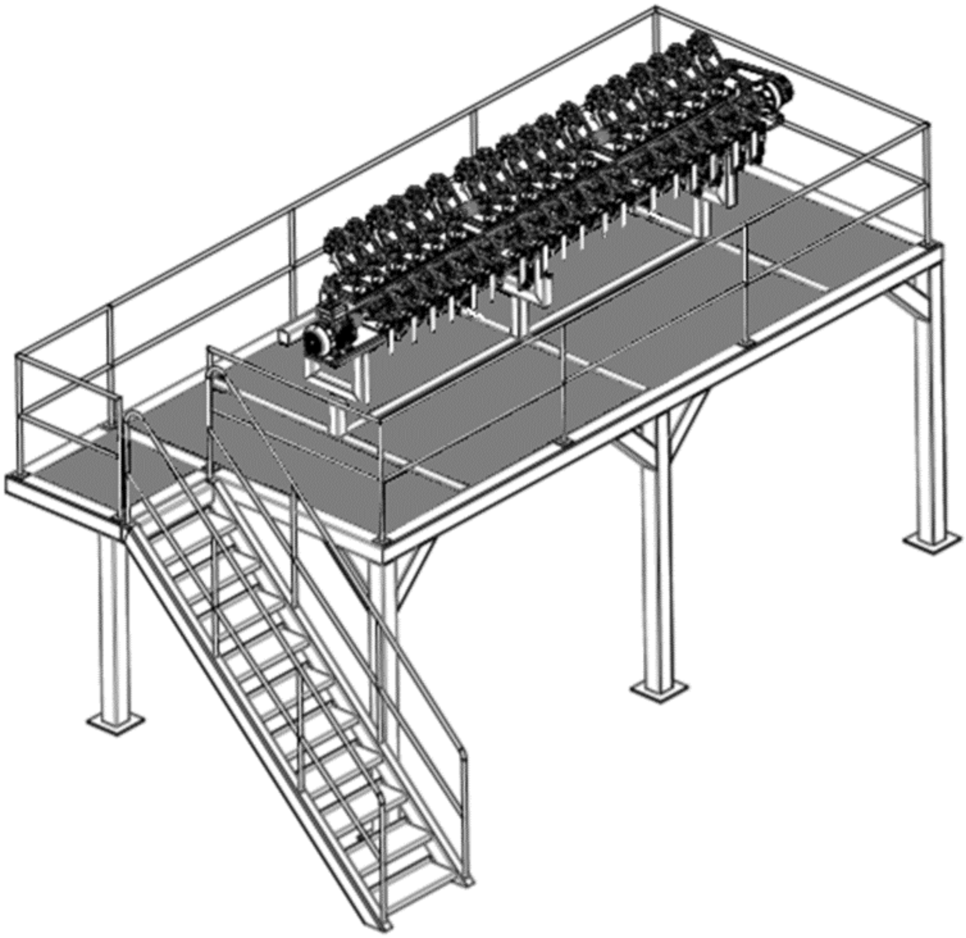


The system for synchronizing the pumps to the driving shaft is made by means of chain, which allows extremely fast maintenance in case the pump needs to be replaced.

The metering pumps preferably installed in the SMART DISPENSING MACHINE RMA are of the VIKING type with a mechanical seal which guarantees high dosing accuracy in the most diverse ranges of rotation and viscosity.

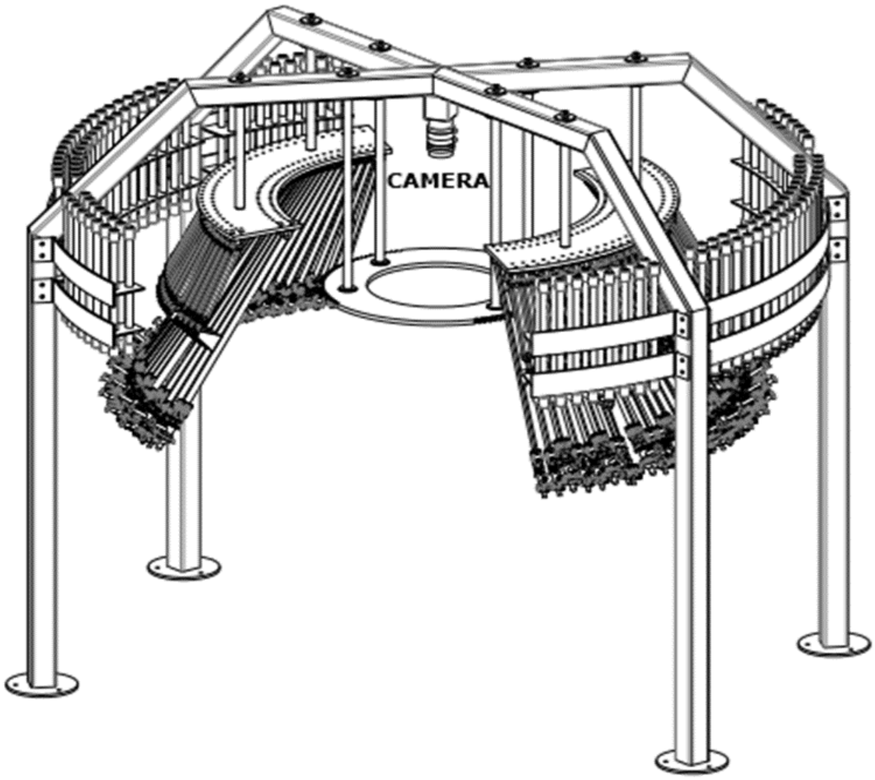
Each drive set (metering pumps arranged on a single driving shaft) is arranged on an elevated platform, facilitating its access for maintenance and eventual inspections by the operational team.

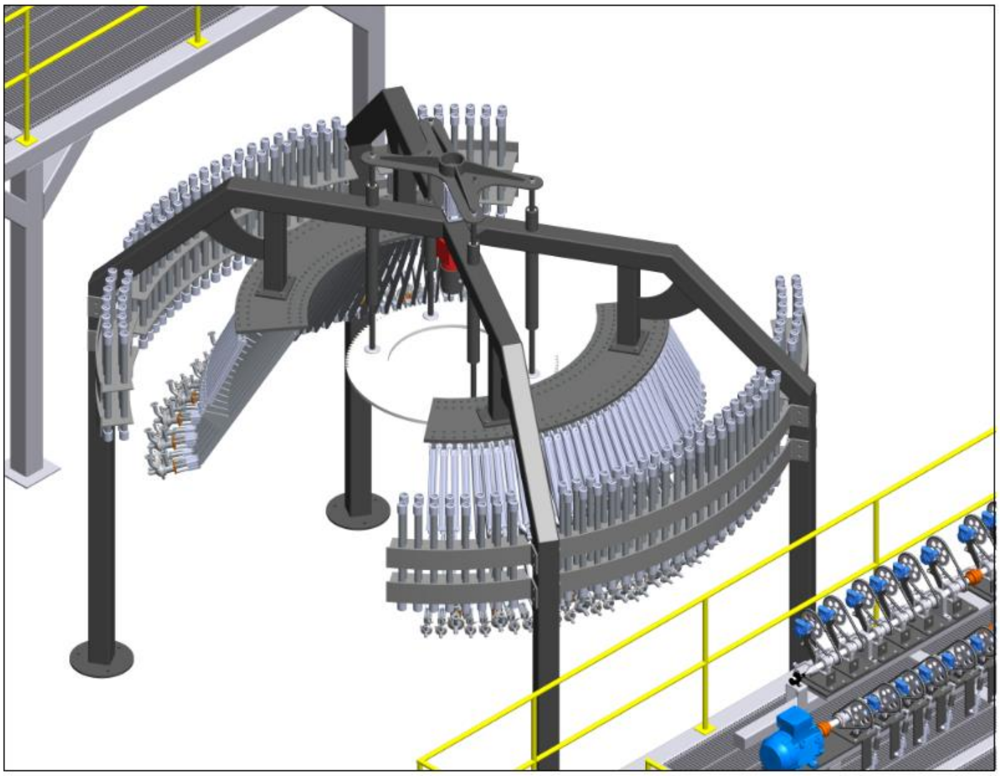
DOSING PUMP PLATAFORM



Completing the set of equipment that makes up the RMA's SMART DISPENSING MACHINE we also have the Volumetric Dosing Unit, where a semi-circular metallic structure with several articulated dosing arms arranged along the structure.

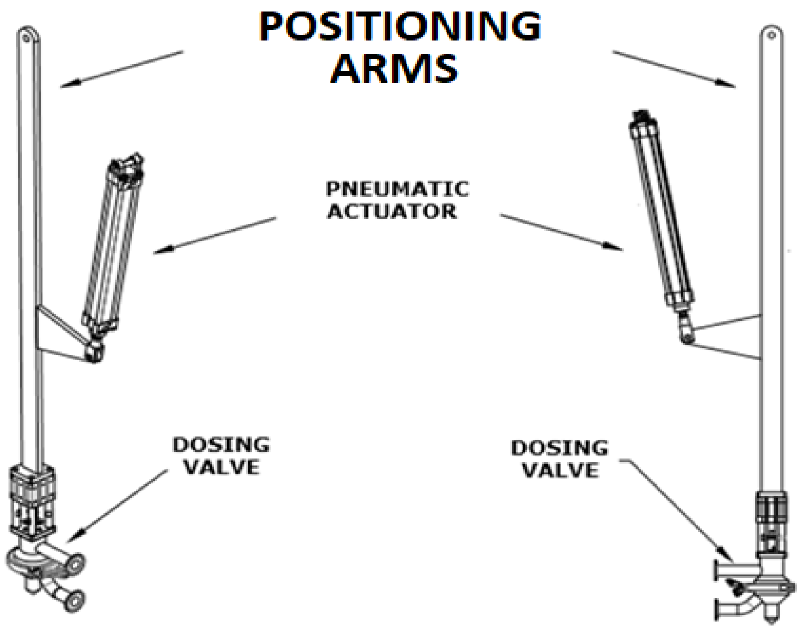
The articulated arm system of the Volumetric Dosing Unit allows up to 12 components to be dosed simultaneously without the valves touching each other when traveling to the container that will be receiving the dosage.



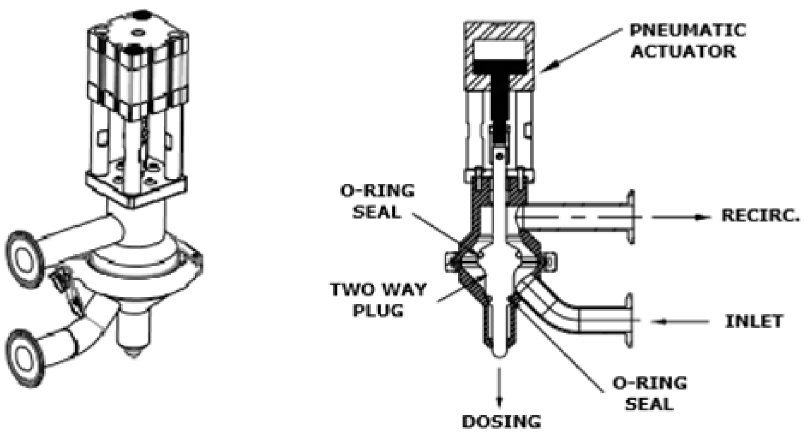


Each arm supports a Dosing Valve specially designed for a specific flow rate of material to be dosed, taking into account its density and viscosity and minimizing the occurrence of splashes when they are dosing the material or drips when they are blocked.

These valves, in addition to direct dosing in the containers, allow the material to be recirculated to the original tank, thus preventing the sedimentation of materials from occurring in the lines.



RMA DISPENSING MACHINE DOSING VALVE



All the static internal seals of the valves are manufactured in TEFLON and the dynamic seals in PERFLUORELASTÔMERO (Kalrez®), thus guaranteeing a perfect seal and total chemical resistance for any type of solvent present in the compositions of the various materials to be dosed.

A single double-action plug, internal to the valve, has the function of directing the flow of the material to be dosed either to the nozzle of the dosing valve or to the recirculation mode where the material recirculates to the original tank.

A pneumatic double-acting cylinder, connected to the obturator shaft is responsible for selecting the valve's operating mode.

Dosing Valves can be supplied in three different sizes, adapting to the demands of the components to be dosed, such as viscosity, flow rate, material rheology, etc.

Due to the innovative design of this Dispensing Machine, there is no need for the Dosing Valves to have two or more “cutting” stages, as observed by the main manufacturers of this type of equipment.

The innovative dosing control system makes the dispensing valves of the RMA Dispensing Machine behave like variable opening (continuous) dosing valves.

This is possible because the final dosage of the material to be dosed, occurs at low and decreasing speeds of the dosing pumps, ensuring extremely accurate dosages as in Gravimetric Dispensing Machines, however with the productivity of the Volumetric Dispensing Machines, due to simultaneous dosages.

All this versatility results from a set of control drives, associated with dosing algorithms and other routines that run simultaneously on the control PLC.

To facilitate understanding, imagine that a certain product to be produced through the Dispensing Machine RMA, uses five different components (A, B, C, D and E).

In this case, the preliminary information that the PLC must receive to load the components in the Dispensing Machine is the product formula and the volume to be produced.

Hypothetically imagine that it is necessary to produce 100 liters of a product with the following formula:

- A = 54.80%

- B = 28.95%
- C = 9.86%
- D = 5.48%
- E = 0.91%

In this case, the first routine that the PLC program would execute would be to transform these values into volumes to be dosed. As the batch size to be dosed (assigned to the example) was 100 liters, we would have:

- Component A dosage = 54.80 Liters
- Component B dosage = 28.95 liters
- Component C dosage = 9.86 Liters
- Component D dosage = 5.48 Liters
- Component E dosage = 0.91 Liters

In a second step, the PLC routine would search the Correlation Table (Dosing Pump x Pumping Capacity) in its memory, previously discussed (for example):

- Pump A = 32.0 ml / Revolution
- Pump B = 28.2 ml / Revolution
- Pump C = 15.2 ml / Revolution
- Pump D = 13.2 ml / Revolution
- Pump E = 5.4 ml / Revolution

With the individual volumes of the components to be dosed plus the values in the Correlation Table (Dosing Pump x Pumping Capacity), the PLC would calculate the number of revolutions that each dosing pump should perform, for the dosing of each component:

- Number of Pump Revolutions A = 1712.50 Revolutions
- Number of Pump Revolutions B = 1026.60 Revolutions
- Number of Pump Revolutions C = 648.68 Revolutions
- Number of Pump Revolutions D = 415.15 Revolutions
- Number of Pump Revolutions E = 168.51 Revolutions

With this information in view, considering that all pumps will be geared to the same Driving Axis, the PLC would establish the following simultaneous dosing program, however obeying the following order of acceleration and deceleration of the Driving Axis, which has its motor driven through a Frequency Inverter:

1. Activate Dosing Arms A / B / C / D / E;
2. Couple the A / B / C / D / E pumps to the Driving Axis;
3. Start the pump in recirculation mode for a period of 15 seconds and at a speed of 50 RPM on the Driving Axis (system pressurization);
4. Simultaneously open all the metering valves and start counting the number of revolutions performed by measuring the encoder;
5. Accelerate the Driving Axis by an increment of 120 RPM / Second^2 until the speed of 400 RPM is reached;
6. Count the number of revolutions performed and when 25 revolutions are missing for the end of the dosage of the first component (component E = 168.51 revolutions), start the deceleration at the same rate (- 120 RPM / Second^2) until reaching 40 RPM;
7. With low RPM (40 RPM), wait until 168.51 revolutions are reached and when it reaches, activate the Dosing Valve of component E for the "recirculation" mode;
8. Accelerate the Driving Axis by an increment of 120 RPM / Second^2 until the speed of 400 RPM is reached;

9. Count the number of revolutions performed and when 25 revolutions are missing for the end of the dosage of the second component (component D = 415.15 revolutions), start the deceleration at the same rate (- 120 RPM / Second^2) until reaching 40 RPM;

10. With low RPM (40 RPM), wait until 415.15 revolutions are reached and when it reaches, activate the Dosing Valve of component D for the “recirculation” mode;

11. Accelerate the Driving Axis by an increment of 120 RPM / Second^2 until the speed of 400 RPM is reached;

12. Count the number of revolutions performed and when 25 revolutions are missing for the end of the dosage of the third component (component C = 648.68 revolutions), start the deceleration at the same rate (- 120 RPM / Second^2) until reaching 40 RPM;

13. With low RPM (40 RPM), wait until 648.68 revolutions are reached and when it reaches, activate the Dosing Valve of component C for the “recirculation” mode;

14. Accelerate the Driving Axis by an increment of 120 RPM / Second^2 until the speed of 400 RPM is reached;

15. Count the number of revolutions performed and when 25 revolutions are missing for the end of the dosage of the fourth component (component B = 1026.60 revolutions), start the deceleration at the same rate (- 120 RPM / Second^2) until reaching 40 RPM;

16. With low RPM (40 RPM), wait until 1026.60 revolutions are reached and when it reaches, activate the Dosing Valve of component B to “recirculation” mode;

17. Accelerate the Driving Axis by an increment of 120 RPM / Second^2 until the speed of 400 RPM is reached;

18. Count the number of revolutions performed and when 25 revolutions are missing for the end of the dosage of the fifth component (component A = 1712.50 revolutions), start the deceleration at the same rate (- 120 RPM / Second^2) until reaching 40 RPM;

19. With low RPM (40 RPM), wait until 1,712.50 revolutions are reached and when it reaches, activate the Dosing Valve of component A for the “recirculation” mode;

20. Disconnect the drive motor from the Driving Axis;

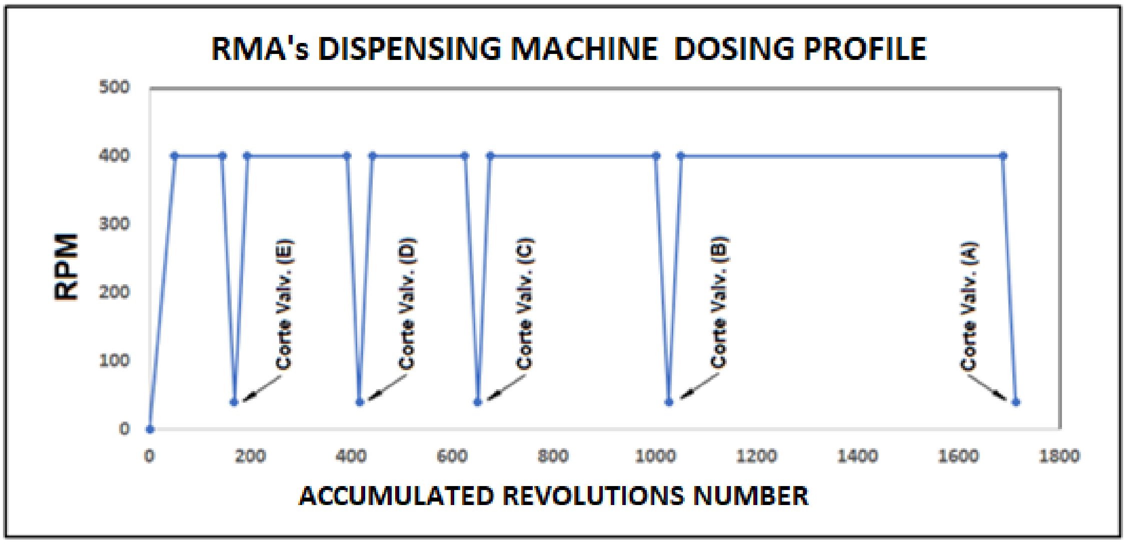
21. Disengage the A / B / C / D / E metering pumps;

22. Collect the A / B / C / D / E dosing arms;

23. Restart a new dosing cycle.

Note: *For the example above, we consider the maximum speed established for the Driving Shaft at 400 RPM and the speed at which the component will be “finished” at 40 RPM (10% of the nominal dosing speed).*

As previously described, this dosing strategy that occurs simultaneously, but allowing the fine “cut” to happen extremely smoothly and precisely at a minimum flow rate (about 10% of the nominal), causes the error due to the reaction time of the pneumatic actuator for the opening or closing of the metering valve, in relation to the flow rate of the component being metered, ends up being extremely low, making the metering valves, even of simple action, behave like valves of proportional action, eventually used in high precision Gravimetric Dispensing Machines.



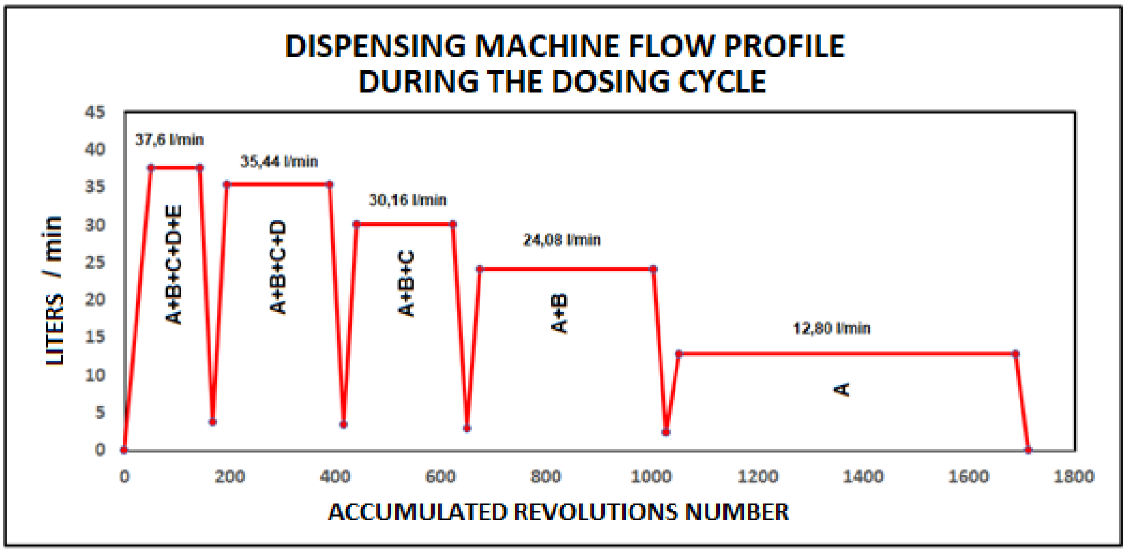
Note: *The graph above shows the RPM profile developed by the Driving Axis throughout the dosing process.*

In this case, the Driving Shaft spent most of the time operating at 400 RPM, only decelerating when there was a need to cut the dosage of one of the components at a low speed, thus increasing the "cutting" precision.

As soon as the "cut" has taken place, the Driving Shaft is again accelerated to recover the loading flow until it reaches the cut point, of the next component to have its dosage finalized.

This causes the system to obtain high dosing accuracy, due to the "cuts" occurring at low speed of the metering pumps.

In parallel with the productivity gain obtained through simultaneous dosing, the maximum loading flow is always pursued during the stages when the process is in a steady state.



Note: *The graph above shows the profile of the total flow of loading of the container where the various components are being dosed throughout the entire dosing cycle.*

We can observe that as time elapses, and with the end of the dosages of the components, the loading flow gradually decreases until it completely ceases with the end of the dosage of the last component.

In this hypothetical situation, the total material load of the respective batch was carried out in about 4 minutes.

To estimate the Dosing Error associated with the system, we basically take into account two factors, the first being linked to the probable variability between the opening and / or closing time of a metering valve (estimated at ± 100 milliseconds), resulting from the "scan" of the PLC plus the mechanical and pneumatic delays of the valve actuators.

The second factor that must be taken into account is the flow of the dosing component in process, at the moment when the opening or closing of the valve should occur.

As previously explained, for the beginning and the end of the dosage of each component, the DISPENSING MACHINE RMA control system deliberately reduces the pumping flow to about 10% of the nominal flow, thereby reducing the error by approximately 10 X potential associated with this type of event.

Based specifically on the premises previously presented, the simplified formula that measures the associated theoretical error for the dosage of a component, can be expressed by:

$$\boldsymbol{Maximum\ Error}\ (\%)\ = \frac{\boldsymbol{Qb}}{\boldsymbol{4,5\ x\ Vd}}$$

Where:

Qb = Nominal flow of the metering pump at full capacity (Liters / min)

Vd = Volume to be metered (liters)

Obs. (1): It is worth noting that the formula above already considers the potential errors resulting from the dosing processes associated with the two events related to the opening and closing of a respective metering valve for a given component.

Obs. (2): Computer resources of ***"learning machine"*** (Artificial Intelligence), incorporated in the control software, during the calibration and dosing processes, monitor the opening and closing times of the dosing valves. This information provides predictive adjustment parameters so that the control system, through the “learning machine” routine, continuously incorporating correction factors in the calculation of the volume to be dosed in each valve, significantly reducing the “theoretical error associated with dosing”, described in the formula previously presented.

TEMPERATURE COMPENSATION

In order to further increase the dosing accuracy, in the case of RMA’s SMART DISPENCING MACHINE, a volumetric dosing, the automatic temperature compensation was added to the machine concept, individually for each component to be dosed.

For this purpose, the control and supervision software has provision for entering data related to the densities and expansion coefficients of each material to be dosed, making an automatic compensation of the material load to be dosed for each dosing pump depending on the temperature that each material is found at the time of dosing.

PT-100 temperature sensors incorporated in the recirculation lines have the function of accurately measuring the temperature of each material, informing the PLC the operating temperature at the time of dosing.

Having the temperature information associated with the material density at 25 ° C and also the data related to the Linear Expansion Coefficient of the material, the PLC will calculate the respective volume correction for each component to be dosed in each formula, thereby reducing significantly the error associated with this variable.

VISION SYSTEM (Digital Image Processing)

RMA’s SMART DISPENCING MACHINE has a dosage monitoring control controlled by a Vision System.

This dosage monitoring system works from digital image processing (Vision System), allowing an interesting simplification in the installation of the equipment, since it significantly reduces the number of sensors needed for the various dosing mechanisms such as Positioning Arms, monitoring of valve stems, etc.

The Vision System basically consists of a high-resolution digital camera, installed on top of the RMA DISPENSING MACHINE structure, and which has the function of observing and interlocking the action of all the dosing devices associated with the components to be dosed.

Monitoring also makes it possible to identify and film the entire loading process for each batch of material produced at RMA SMART DISPENSING MACHINE, thus obtaining a trackable history of what happened in each batch produced, from the point of view of images (film).

The Vision System software is able to identify the individual movement of each dosing arm up to its dosing position and also the performance of each dosing valve used.

CONTROL / SUPERVISION AND MONITORING SYSTEM

RMA's SMART DISPENSING MACHINE has its entire control system based on a PLC from the most famous manufacturers in the market, using the ELIPSE E3 Supervision Software for supervising the process and integrating with other systems, communicating directly to system databases. ERP of paint manufacturers, both for automatic loading of formulas, inventory controls, generation of production reports, among others.

Thus, we believe that RMA SMART DISPENSING MACHINE translates into the new paradigm in industrial dosing systems for paint manufacturers, incorporating the most advanced dosing concept, seeking to guarantee extreme accuracy, high productivity, low cost of implantation and floor connectivity. factory with the various corporate systems, gathering the basic characteristics to the materialization of INDUSTRIA 4.0 to the paint sector.

QUALITY OF INPUTS FOR SMART DISPENSING MACHINE

We have observed that the major paint manufacturers have been investing heavily in systems based on INDUSTRIAL DISPENSING MACHINES, forgetting, however, that the quality of the inputs is fundamental so that this equipment can actually demonstrate a real productivity gain.

After all, what is the use of gaining 20 or 30% speed in the "assembly" of a paint in an Industrial Dispensing Machine, if this stage of the process (dosage), corresponds only to about 10% of the total cycle time "lead time" of the process ?

In that case the gains would be small and the return on investment very unattractive ...

The paradigm of the "adjustments and controls" stages in the paint industries, which consume 70% of the production lead time, are in reality the great anchor that has kept this type of industry paralyzed in terms of process technology for centuries when compared to other industrial segments.

In order for us to move, with real leaps in productivity and to benefit from sophisticated, highly productive and precise systems, it is essential that all the inputs that feed Industrial Dispensing Machines are pre-qualified so that after a simple dosage of these components, when they are simply mixed, lead to perfect products and without the need for further adjustments, thus reducing the manufacturing lead time of a product by 50% or more ...

To this end, in order to support this concept and maximize the benefits of this concept, ***RMA TECNOLOGIA INDUSTRIAL*** idealized the equipment called TRANSMICELL that leads to the previous qualification of Bases, Colorants, Tintings, etc., ensuring that SMART's potential DISPENSING MACHINE, object of this proposal, can achieve the integrality of its objectives, thus enabling the long-dreamed **4.0 INDUSTRIA** model for the paint segment.

The idea presented additionally in this edition of PAINT DE FUTURE 2020, with the name **[*TRANSMICELL* - The missing link for the Paint Industries to implement the 4.0 INDUSTRY model],** then complements the idea presented in that panel on the title **[*SMART DISPENSING MACHINE RMA* - Accelerating manufacturing with intelligence and metering precision. Towards "Industry 4.0" in the paint world],** thus enabling real and sustainable gains in productivity and quality for paint manufacturers, under a new technological paradigm.