

from Tealgate Limited

There has been no major advance in the peening and blasting process since the development of the vacuum cleaner with a blast nozzle up its middle, and the centrifugal discharge wheel, and that has taken about 50 years. However, there have been some significant new products, such as electronic control of the feed rate.

We think the new "AccuFeed" system is such a major advance—only time will tell. The "AccuFeed" system has been designed to provide consistent feed rates of better than +/- 5% over the full range of the feed valve operation, or within +/- 1% of the set feed rate, with ANY material currently available for the process of impact service treatment using dry particulate solids.

The names "AccuFeed", "MagnaValve" and "PreciFeed" are trade marks, and the electronically controlled feed valves used in the system are either patented or patents have been applied for. The design of the "AccuFeed" system is copyright.

The system may be used on any application from the most basic hand operated cabinet to the most advanced, computer controlled, automatic machines. It is suitable for simple cleaning operations, dry paint stripping, and shot peening. The system offers totally independent control of the media feed rate and the blast air pressure. This enables the optimum combination of blast air pressure and media feed rate to be adjusted, and accurately repeated.

A prototype of the system was constructed, and has been on trial with a number of end-user firms over the past twelve months. These trials have been satisfactorily completed and the unit has gone back to school. It now resides with Dr. David Kirk, School of Materials, Coventry University, Priory Street, Coventry CV1 5FB, England; he will put it to good use in peening research.

The prototype unit was constructed of a pressure vessel with "pop-up" type transfer valve, an inner storage hopper that ensured a balanced air pressure all around the media, and a Model 368 MagnaValve. By its design this enables the manually controlled MagnaValve to maintain a consistent and accurate feed rate that was completely independent of the regulated blast air pressure.

SYSTEM PHILOSOPHY

The concept of the system was to provide as near a complete package as possible for any OEM (Original Equipment Manufacturer) to incorporate into their machines the means of very accurately controlling the media feed rate, where such control was independent of the regulated blast air pressure, and satisfy the requirements of the MIL-S-13165C. This would give the OEM the opportunity to purchase the pressure vessel

and feed system as a guaranteed package in much the same way he would purchase a fan unit.

The design philosophy in the control of the media was one of gentle persuasion rather than force. Force tends to cause wear of component parts of the machines and denigrates the integrity of the blast media. The media moves through the system following the rules laid down by Mother Nature; she gives us the tools and all we can do is make the best use of them.

The media is guided through the system; it is supported and held until released in the quantity required then allowed to fall into the moving air stream.

The system makes use of two methods for controlling the media feed rate: For ferrous media it applies the well-known MagnaValve, and for non-ferrous media it incorporates the PreciFeed. Both devices limit the freedom of the media in order to control the flow rate, they do not use force to pass the media through a restrictive orifice or convoluted path. The control exercised by the valves is in restraint of the natural movement of the media, and in regulating the release of this restraint to provide the feed rate that is required.

The system uses full-bore control; this means that the media flows through the system with no restriction in the flow path that may become blocked by a cluster of oversize particles or debris that passed through the debris screen. Full-bore flow also means less wear in the flow path because particle velocity and turbulence are minimal. The release of the media into an air stream where both the media and the air are moving in the same direction also reduces the machine wear; there is no high tangential velocity and the air flow forms a natural cushion between the media and the wall of the duct. The discharge from the AccuFeed system is a gentle bend to help retain this characteristic.

THE ACCUFEED SYSTEM

The AccuFeed system is complete as an assembly of three parts: (1) a pneumatically operated media transfer valve of novel design, (2) a pressure vessel which incorporates an internal media storage hopper, and (3) an electronically controlled feed valve assembly. Each part is completely self contained and designed to combine into the most accurate, repeatable, and reliable system for any ferrous or non-ferrous impact treatment process that is available today. The system utilizes the latest technology with electronic controls and the capability of interfacing with main machine computer or PLC control. However, the technologically advanced design is economically sound for consideration in even the most rudimentary blast system.

The media transfer valve is a novel design, for which a patent is pending, and is constructed with a nonmetallic cone which is lifted and lowered by the operation of a pneumatic cylinder. The cone seals on a double action rubber ring, the first action of the seal ring is to remove static media from the air seal face before the valve cone contacts it; the second is to provide an air seal. The support for the pneumatic cylinder also acts as a load shedder for the valve cone. The air control for the transfer valve is provided by the user and made through ports on the side of the valve flange housing. The end user's control system should sequence the valve to close when pressure air is applied for blasting, and open when the blast sequence is ended. The system may be used with single shot or continuously cycling systems.

The pressure vessel is designed to BS5500, and is provided with two 1 1/4" BSP ports on the side of the cylindrical section. One port is used for the regulated air supply and the other is plugged, or used for balancing air pressures on a continuously cycling transfer system. Fitted to opposite sides of the outer wall of the cylinder are two brackets, these may be used to support and locate the pressure vessel assembly by bolting within the user's frame structure.

APPLICATION

The system may be adapted to any size pressure vessel; however initial experience suggests that the size range may be limited because large pressure vessel storage may be a thing of the past. It is accepted that there will be a requirement for special sizes, and they can be accommodated within the system. An existing installation has three specially designed pressure vessel assemblies of only 5 litre capacity on an automatic plant; this gives the user a very neat and compact machine with accurate and instantaneous control of each independent blast line.

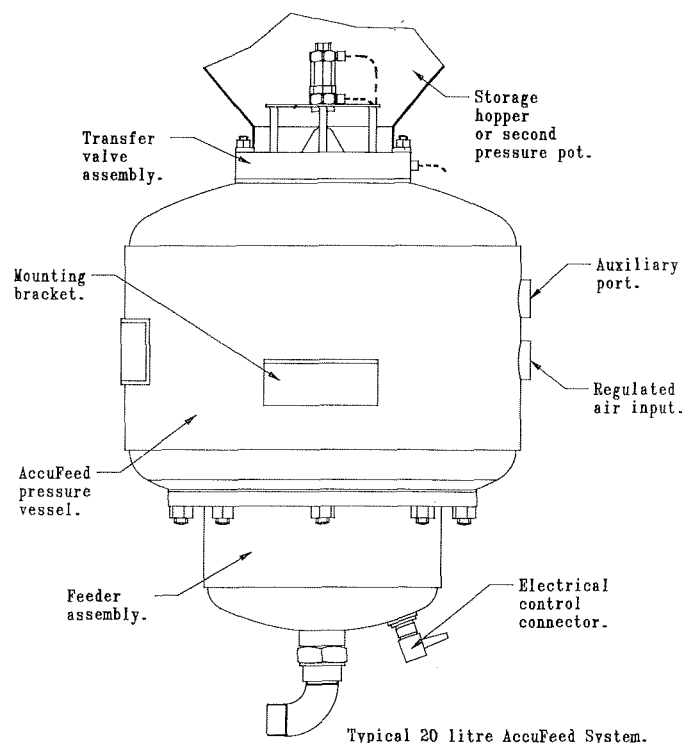
The system offers the opportunity to radically rethink the design of machines to recover, clean, and discharge, under pressure, the media used in abrasive blasting, shot peening and similar processes. Automatic machines are particularly open to simplification by use of the AccuFeed system. To consider the AccuFeed system in the same manner that one would appraise a sieve system, a PLC or computer, that is "a bought-in complete" package may represent a radical rethink for some designers; however, the advantages are equally significant. The system also reduces stock-holding by the OEM; the component parts of the system will be available through Tealgate.

MARKETING

The intention is to provide an assembly that can easily be incorporated into any special or standard machine which will guarantee a controlled feed rate and enable the OEM to satisfy the relevant specifications. It would absolve the OEM from concern in establishing and maintaining media feed rates and allow them to concentrate on product handling, manipulation and overall machine control.

By providing such a package of components, we can guarantee the maintenance of a constant and repeatable feed rate. The economic advantage in using the AccuFeed system will be evident on consideration of the cost of design, manufacture and stock-holding. The simplicity inherent in the design produces a clean uncluttered system with ONE inlet for pressure regulated air, NO bypass lines, NO mixing chamber, NO shut-off valves in the air/media flow path, operator position media feed adjustment with instant control and accurate repeatability. Add to this the on-site engineering cost to attain Mil-Spec accuracies (which are guaranteed by the system) and the use of the system becomes even more sensible.

Our predominant motive is the desire to provide our customers with a trouble-free package, to guarantee consistent and accurate feed rates, and one that can easily be incorporated into their machines.



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