

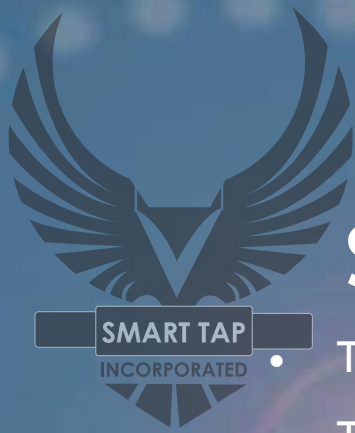


Eliminating
Medical Gas Shutdowns
for 10 years



Smart Tap is a tool used by hospitals. It has been used OVER 5000 TIMES to accomplish:

- Relocation of Bulk Gas Systems
- Relocation of zone valves
- Tie-ins of new additions and new buildings
- Tie-ins of new medical gas risers
- Capping off medical gas for renovations
- Additions and deletions within a zone without effecting patients in the adjoining rooms, especially in NICU &



SMART TAP Patented Procedure

- The Smart Tap procedure as well as most of the equipment are patented.
- The Shape Memory Alloy Couplings (SMA) are made of Nickel/Titanium by Smart Tap Inc. and have been included in NFPA Standards since 1985. SMA Coupling exceed a 1000° F brazed joint. Their melting temperature is 2200° F and have a burst pressure in excess of 7500 psi. at which point the copper fails

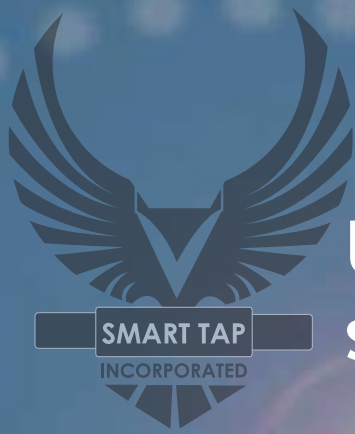


- All tools and pipe assemblies are cleaned for oxygen at are facility which is certified NASA Spec 10. This certification is far superior to “cleaned for oxygen service”. We have manufactured zone valves for most of the medical equipment providers
- All NFPA Standards for installation of new piping are followed by our certified technicians



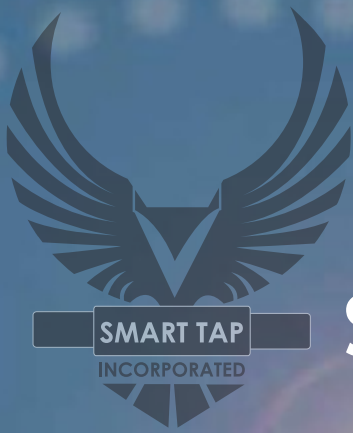
A Normal Medical Gas Shut Down Requires:

- Months of planning
- Countless meetings and memos
- Coordination of hospital staff
- Ordering & coordinating medical gas deliveries, regulators & tank carts
- Delivering the medical gas to the patient rooms and setting up the back up.
- Shutdowns usually occur in the early mornings of a Saturday or Sunday
- This means overtime and hospital personnel doing jobs other than taking care of the patients



Using the SMART TAP instead of a shutdown

- Hospital has to receive our equipment and backup gas which is delivered to the facility
- We provide the staff & equipment to move and set up the back up gas
- Hospital has to provide two or more locations each with 2 patient outlets of the gas being worked on downstream of the Smart Tap to plug in backup
- Notify the facility personnel that work is being done on the medical gas system
- Hospital patients remain on the medical gas system with no change in their care
- The hospital staff remains doing their normal jobs
- Smart Tap is done during normal weekday hours of operation



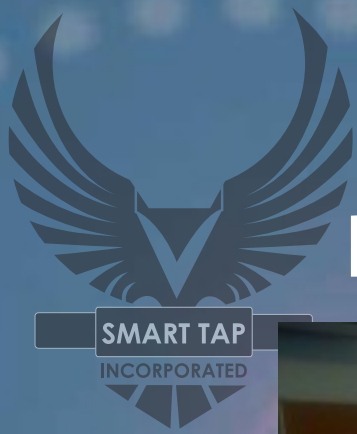
Smart Tap Technology

- Saves Money by leaving the Respiratory, Nursing and Maintenance staff alone - doing what they are paid to do - patient and facility care. Not worrying about gas cylinders, regulators or running out of supply
- Maintains patient care without change
- Saves time - all of the meetings and coordination
- Requires very little interface to get the job done



Smart Tap Personnel and Equipment

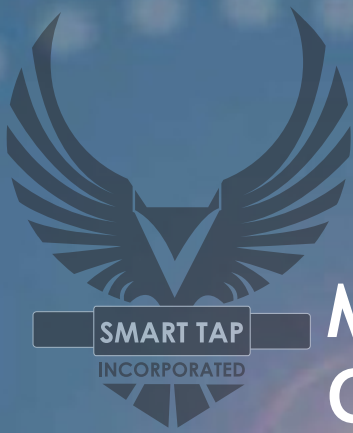
- Our personnel are highly trained in medical gas systems with a minimum of 18 years experience
- Our Quality Control Personnel are meticulous in the preparation of the equipment, valve assemblies and Shape Memory Couplings
- Our equipment is inspected and re-cleaned after each use
- Our staff coordinates all deliveries of equipment and backup medical gas
- From the Hospital's perspective, our procedure is a "turn Key" process



Back up Procedures



- **Oxygen** - We have designed and perfected a liquid oxygen back up that consists of an oxygen dewar that contains 150,000 ml of oxygen delivered through a vaporizer and dual line regulators
 - One or more dewars are set up depending on size of back feed
 - A duplication of the hospital's bulk system PLUS RESERVE



Medical Air and other types of Medical Gas back up

- One or more high pressure manifolds with dual line regulators are connected to the appropriate number of cylinders
- Each manifold has connected (in use and reserve cylinders) to provide an uninterrupted supply



Smart Tap Procedure

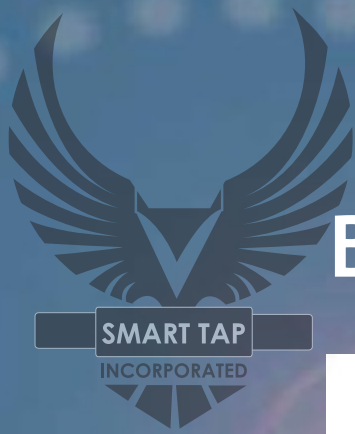
- The location of a new valve or valve assembly is established
- Back up (if needed) is placed downstream of this point
- Blocking valves (one or two) are placed on the line. The amount of blocks is determined by whether the downstream side to be taken out of service (one block) or needs to be maintained (two blocks)
- One block is closed if the downstream piping is being demoed then the downstream pipe is cut away and replaced with a medical gas valve
- If the downstream piping is remaining and has patients connected the backup gas is allowed to run and pressure is monitored, if need be the block can be opened and backup can be adjusted
- When it is determined that the back feed is functioning properly then the second blocking valve is closed and the piping is cut in- between the two blocks



Blocking Valve in Place



- One blocking valve means the downstream piping is being taken away



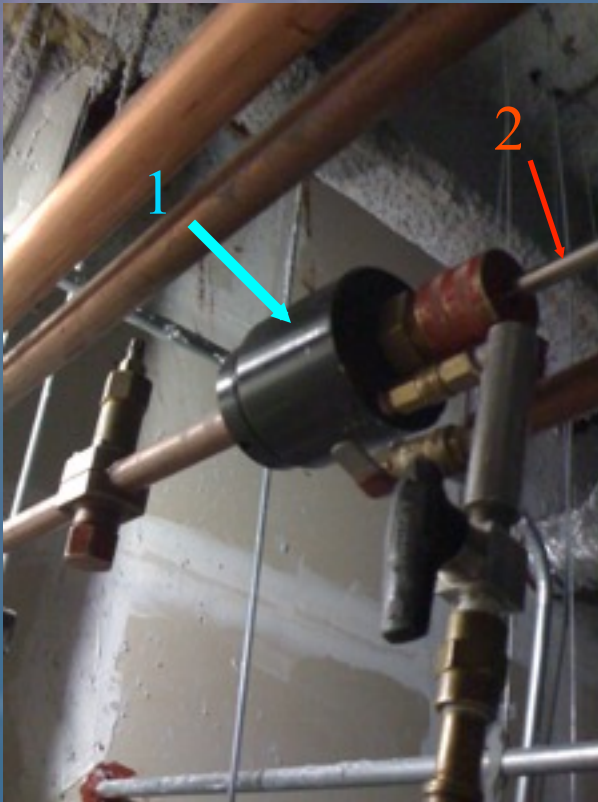
Blocking valve is closed



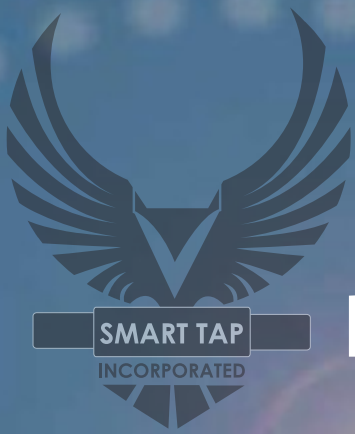
- At this point the downstream flow of gas is shutoff
- If back-up is in place it is tested to make sure it is capable of maintaining house pressure
- If not the blocking valve is opened and back-up is adjusted
- Once the medical gas system is functioning normally



The piping is cut free



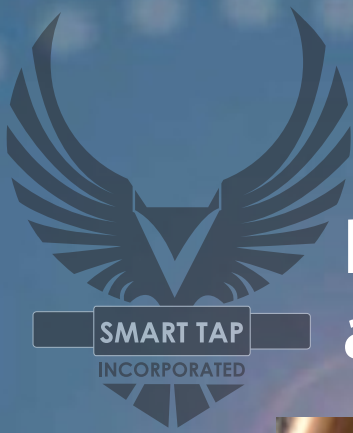
- A pneumatic end cap (1) with a linear block (2) is placed on the piping
- This end cap and linear block seals the end of the cut pipe
- This allows for the next step to take place



Blocking valve is opened ⁽¹⁾



- The linear block ⁽²⁾ is then slid into the pipe past the blocking valve & engaged
- It is now possible to cut the blocking valve off the pipe



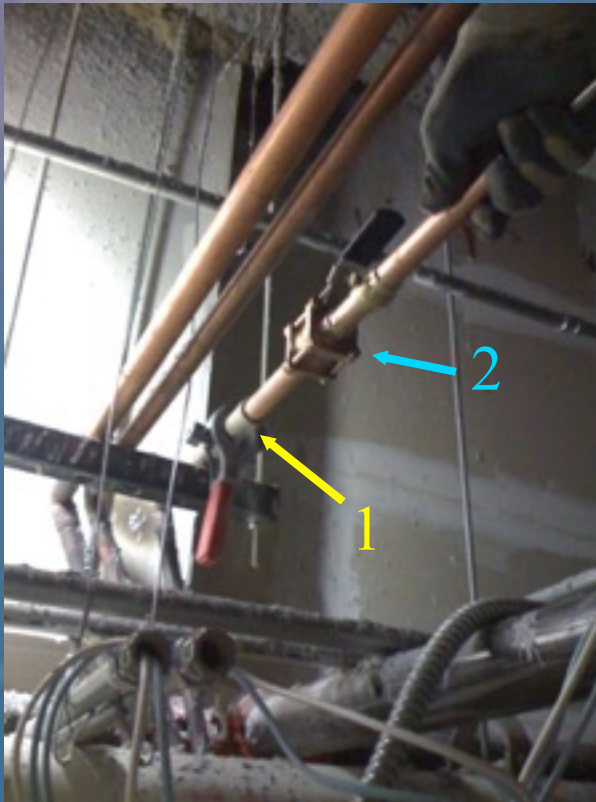
Blocking valve and pneumatic end cap are cut away & removed



- The piping is sealed by this linear block
- This linear block is capable of holding 500 psig
- The piping is now ready for the new medical gas valve or valves



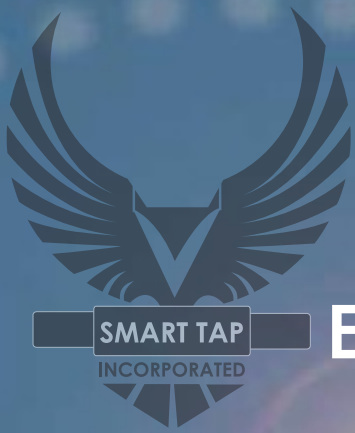
Shape memory alloy coupling (1) and Valve (2) is installed over linear block



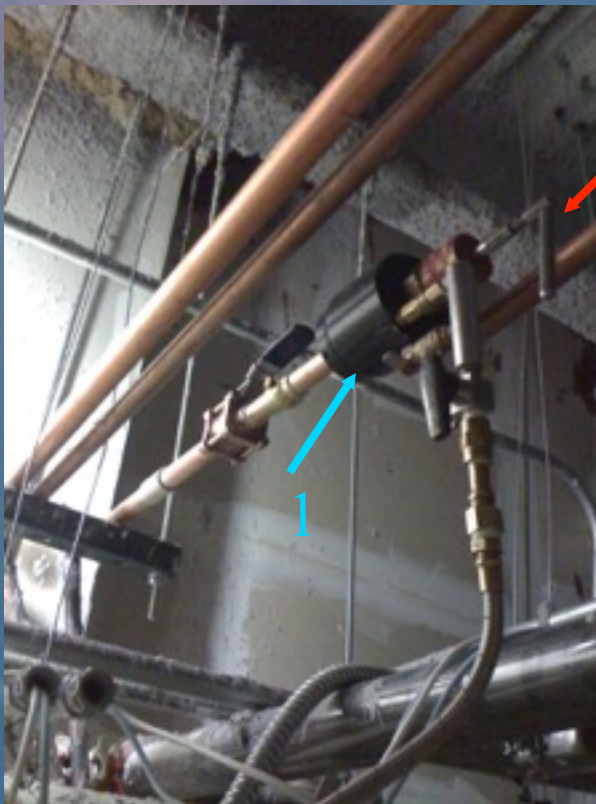
- The pipe cutter in this picture is acting as a stop for the proper placement of the coupling
- The coupling has 4 radial teeth - two in each half lengthwise



- In about 40 seconds the coupling seals the joint with 60,000 ksi of stress making a live crimp



End cap (1) is put back in place



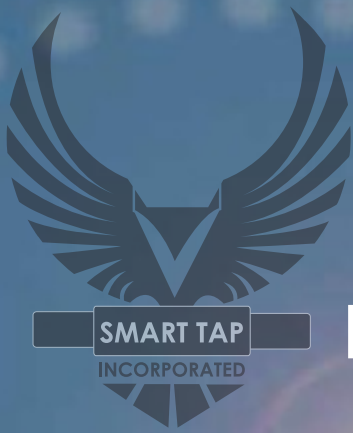
- The end cap is placed over the end of the piping , linear block (2) and valve pipe extension
- End cap (1) is energized to seal valve pipe extension & linear block (2)



The valve is closed



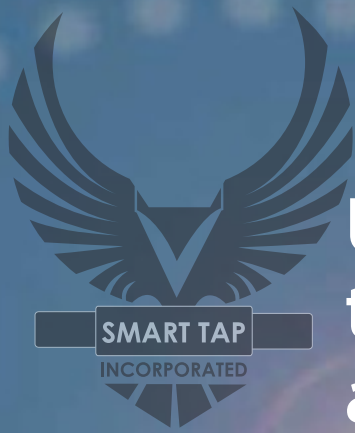
- The linear block ⁽¹⁾ is then released and slid out past the valve
- The valve is closed ⁽²⁾



End cap and linear block removed



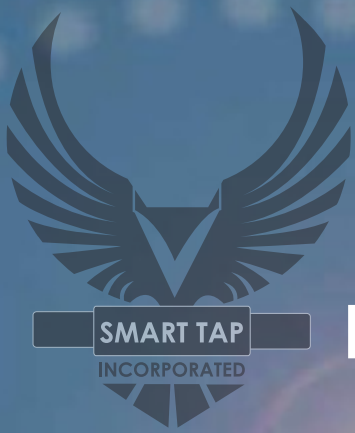
- The end cap and linear block are removed
- If the piping is going to be put back together the pipe would be blown out & another shape memory coupling would be installed
- Or the valve pipe extension could be capped for future use



Upstream piping would be done using the same procedure and future valve assembly would be installed



- This future valve assembly would be inserted on the downstream side of the second block
- You would now have a full port future valve



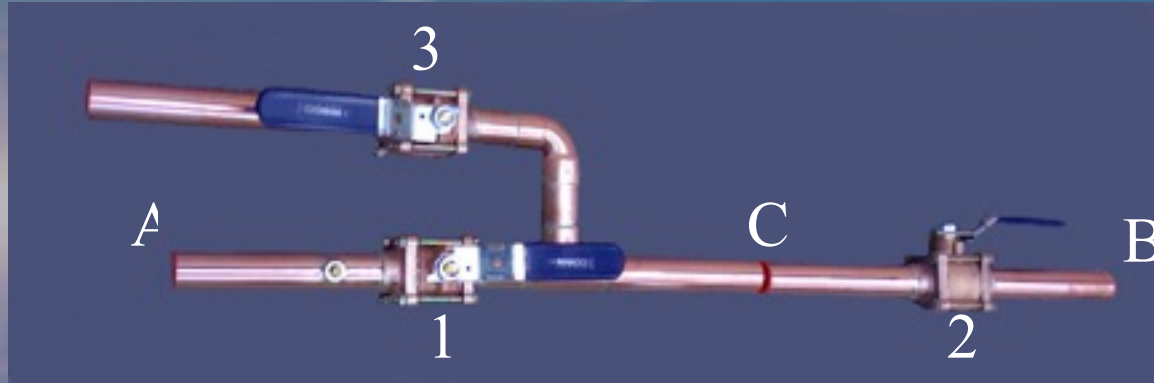
Future valve installations use 3 valves



- There would be a valve (1) that controls both the new inline valve to the old system (2) and the new valve (3) to the future piping addition
- Allowing for more control of your piping systems



Assembly purge

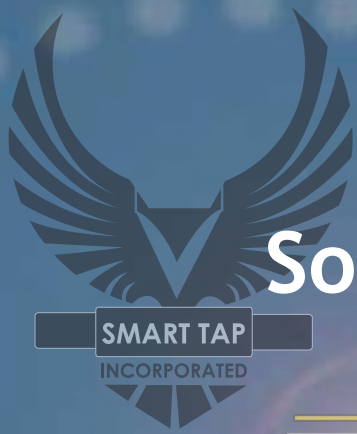


- A shape alloy memory coupling would be in place at location “A” & “B” there would be system gas pressure at both valves “1” & “2” which would be closed at this point of the procedure
- Valve 1 and valve 2 would be opened for a second to allow for system gas to purge at point “C”
- Location “C” would then be joined with a third shape memory alloy coupling
- Valve “3” would be opened and then valve “1” and “2” alternately would be opened to allow system gas to escape
- Valve “3” would then be closed and Valve “1” & “2” would be opened and the system would be placed back on line
- This procedure take approximately 40 to 80 minutes depending on size of pipe

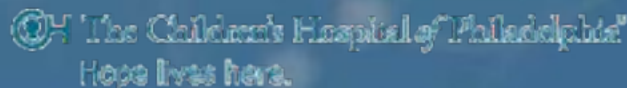


The Smart Tap Procedure

- Has control of the gas from beginning to end
- A very small amount of system gas 4 lpm is allowed to flow when inserting the linear block this allows for no contamination to get into the piping
- The piping is then purged using the newly installed valve or valves and placed back into service



Some of our Clients





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