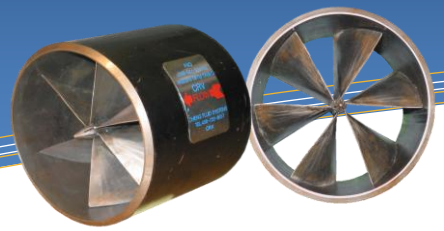
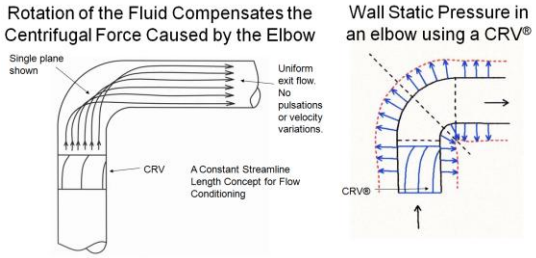
Cheng Rotation Vane® Is a safety Device for Nuclear Power Plants

Installing a Cheng Rotation Vane can prevent pipe burst events and it will also increase a plant's safety while reducing its down time. A Cheng Rotation Vane is the cheapest way to prevent erosion, insure plant safety, and increase profitability.



Solution: Plant & Worker Safety

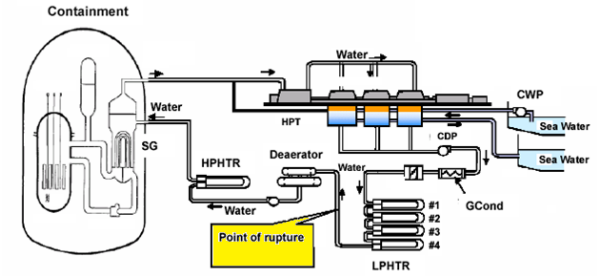
A CRV® placed prior to the bend would have prevented the erosion shown at the outlet of the elbow. It has been determined that if the flow streamlines travel an equal distance when going around the bend of an elbow, the fluid will not be subject to acceleration or flashing.



With a pre-rotation of the fluid by a set of stationary vanes (a Cheng rotation Vane), the measurement of this same pressure distribution shows that the stagnation pressure and the vacuum condition have been removed. With the pre-rotation of the fluid, the streamlines carry the particulates as if they are in a straight length of pipe, thus preventing erosion.

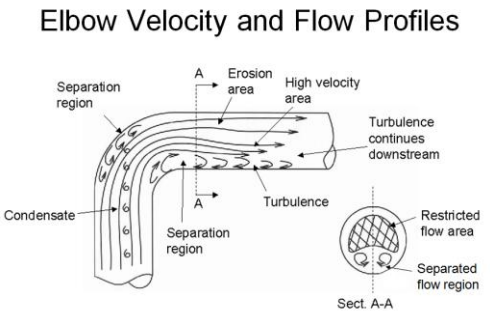
Problem: Pipe Thinning & Pipe Bursting

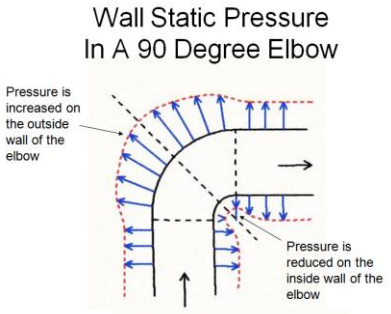
A recent accident involving a bursting steam pipe in a nuclear power plant killed four people. Pipe bursting is caused by corrosion and erosion of areas inside the pipe which cause the pipe walls to thin down and eventually burst under pressure. Commonly cavitation erosion occurs downstream of an elbow in piping systems and is caused by sudden flash of liquid into vapor bubbles followed by immediate collapse of the bubbles; the subsequent shock-wave generated by the flashing and collapsing of vapor or dissolved gas creates a stress erosion on the pipe wall.



Pressure Distribution through an Elbow

As fluid flows through an elbow, the centrifugal forces are inversely proportional to the radius of the elbow's curvature as shown below. A vacuum is created on the inside radius of the elbow and a high stagnation pressure appears on the outside pipe wall.





CHENG ROTATION VANE®

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