NRC MOV Course

Periodic Verification

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ASME Code Case OMN-1

Background

- *The operation, maintenance and testing of MOVs used in nuclear power plants are covered under the ASME OM Code.*
- *The MOVs covered include those required to perform a specific function in*
  - *shutting down a reactor to the safe shutdown condition*
  - *maintaining the safe shutdown condition*
  - *mitigating the consequences of an accident*

Background Continued

- *There are many approaches to component operation, testing and maintenance*
  - *operate to failure then replace or repair*
  - *deterministic based testing and maintenance*
  - *performance based testing and maintenance*
  - *risk based testing and maintenance*
  - *risk informed testing and maintenance*

Background Continued

- *For safety-related equipment at nuclear power plants, the option of operating to failure and then taking corrective action is inappropriate and is not an acceptable option.*
- *The OM Code requirements for MOVs were put in place to require Owners to regularly assess the operational readiness of certain MOVs within their facilities.*

Development of ISTC for MOVs

- *The ASME Code that is applicable to MOVs was developed in the 1970's and early 1980's.*
- *At that time, deterministic based testing and maintenance was considered to be the best available approach.*
- *This deterministic approach was implemented in the ASME OM Code, and specifically in Section ISTC, "Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants."*

Deterministic Based Testing

- *A deterministic approach is one where components or systems are classified or coded according to pre-established criteria.*
- *The components or systems in a classification or category are required to meet a predetermined program of testing and maintenance.*
- *In the case of MOVs, the criteria was whether it had a specific function in*
  - *shutting down a reactor*
  - *maintaining the safe shutdown*
  - *mitigating the consequences of an accident*

ISTC Requirements for MOVs

- *The MOV testing requirements were chosen based on testing strategies adopted before the development of MOV diagnostic testing equipment.*
- *ISTC requires the following for applicable MOVs.*
  - *position verification*
  - *quarterly exercising*
  - *stroke-time acceptance criteria for the quarterly exercise*
  - *leak rate testing(if required for the particular MOV)*

USNRC MOV Activities

- *In the early 1980's, the nuclear industry began to develop an awareness of problems with MOVs.*
- *The USNRC issued numerous concerns and cautions, and issued a series of documents that resulted in utilities developing MOV programs.*
- *These included*
  - *IEB 85-03 (Use of MOV diagnostic testing)*
  - *GL 89-10 (MOV program development)*
  - *GL 89-10 Supplements*
  - *GL 96-05 (Periodic verification)*

USNRC MOV Activities Continued

- *The nuclear industry's MOV programs included:*
  - *design basis analysis*
  - *diagnostic testing technologies*
  - *design basis testing*
  - *determination and control of MOV setpoints*
  - *preventive maintenance program changes*
  - *post maintenance and post modification testing*
  - *retest requirements*
  - *trending analysis*
  - *periodic retest program*

Development of OMN-1

- *During the early 1990's, the ASME OM-8 Working Group developed Code Case OMN-1 to bring the OM Code up to date with the industry.*
- *This was driven by the development of technologies and testing strategies that needed to be addressed in the OM Code.*

ASME Code Case OMN-1

- *OMN-1 is performance based - testing requirements and frequencies are determined using MOV*
  - *classification (similar to ISTC)*
  - *design and capabilities*
  - *operational use and environment*
  - *maintenance programs*
- *Use of grouping was provided for and encouraged to take advantage of the similarities in the MOV population at nuclear power plants.*

ASME Code Case OMN-1 Continued

- *OMN-1 encourages the use of engineering evaluations when determining the testing strategy and frequency for each MOV or for groupings of MOVs.*
- *Testing frequency is based on MOV design, capability margin, and what the Owner knows about the degradation rates.*
- *OMN-1 replaces the ISTC requirements for quarterly stroke-time testing and position verification.*
- *OMN-1 also provides exercising requirements in lieu of the ISTC requirements.*
- *OMN-1 was the first ASME Code document to allow risk-informed techniques.*

USNRC Endorsement of OMN-1

- *Prior to the approval of OMN-1, utilities had to maintain dual test programs*
  - *one to meet the requirements of the ASME Code*
  - *one to meet NRC concerns (GL 89-10, GL 96-05)*
- *OMN-1 programs satisfy the concerns and requirements in both.*

Stroke-Time Testing is Flawed

- *Stroke-time testing was the best the industry had at the time it was included in the ASME Code.*
- *However, the industry now recognizes that it is flawed*

> *"Since 1989, it has been recognized that the quarterly stroke-time testing requirements for MOVs in the Code are not sufficient to provide assurance of MOV operability under design-basis Conditions."*

Federal Register, Sept. 1999, 10 CFR Part 50.55a, Section 2.3.2.5 Modification

USNRC Endorsement of OMN-1 Continued

- *GL 96-05 identified the OMN-1 Code Case as one approach for meeting the requirement of that GL.*
- *Based on the 2000 modification to 10 CFR 50.55a Section 2.3.2.5 and Section 2.5.3.1, OMN-1 was approved for use without a pre-approved valve testing relief request for changing a plant's ISTC program.*
- *The ISTC testing became an unneeded burden.*

Development of OMN-11

- *As the ASME risk informed initiatives progressed in the 1990's, the OM-8 Working Group submitted another Code Case to expand the existing risk initiative section of OMN-1*
- *In order to apply OMN-11 the Owner must be using OMN-1.*
- *OMN-11 allows the Owner to relax the OMN-1 grouping criteria found in Section 3.5 or OMN-1 for LSSC MOVs.*
- *Existing groups of MOVs can have LSSC MOVs associated with them for the purpose of reducing the overall test burden.*

Lack of OMN-1 Use

- *Several reasons for reluctance to implement OMN-1*
  - *regulatory responsibility shift between plant staff and organizations*
  - *at some plants, MOV populations differ between ISTC and NRC GLs*
  - *lack of confidence in the NRC's response to using OMN-1 in lieu of ISTC*
  - *cost of changes needed in plant procedures and technical specifications*
  - *exercising requirements not included in NRC GLs*

Revision 1 of OMN-1

- *The scope of OMN-1 is an IST scope which differs from the scope of MOVs mandated by the NRC in GL 89-10 and GL 96-05. The scope impact has been addressed as far as ASME can go through making the Code Case applicable to Active MOVs required for safe shutdown of the plant.*
- *The revision continues to stress the importance of engineering evaluations and justifications in the determination of testing methods and frequencies.*
- *Prescriptive elements, including confusing diagrams, that were part of the original code case have been removed.*

Revision 1 OMN-1 - Continued

- *The use of torque vs thrust has been clarified.*
- *Code Case OMN-11, MOV Risk Based Initiative, has been fully incorporated into the revision of the OMN-1 Code Case.*
- *New testing strategies, such as Motor Control Center diagnostic testing, were added.*
- *Quarter turn plug and ball valves have been specifically addressed.*

Use Of OMN-1

- *Currently being implemented at 9 sites*
  - *Wolf Creek*
  - *Comanche Peak*
  - *South Texas*
  - *San Onofre*
  - *Palo Verde*
  - *Diablo Canyon*
  - *LaSalle*
  - *DC Cook*
  - *Beaver Valley*
- *Sites planning to implement Appendix III when complete*
  - *Exelon (9 sites)*
  - *Southern Nuclear (6 units)*
  - *Duke Power (3 sites, 9 units)*
  - *TVA (3 sites, 5 units)*

Response to Concerns

- *Regulatory responsibility shift - "change is hard"*
  - *plant MOV groups interact with NRC while IST groups interact with ASME Code*
  - *these groups are usually not under same management - reorganizations are expensive*
  - *the cost savings and elimination of excessive and redundant testing need to be understood*

Response Continued

- *MOV populations differ between ISTC and NRC GLs*
  - *Some plants have MOVs with ISTC requirements that are not part of their MOV Program*
  - *OMN-1 provides the option of using engineering evaluations and justifications for determining the type and frequency of testing for a particular valve*
  - *For MOVs not in the MOV Program, the existing ISTC performance criteria could be used to determine how to proceed with that MOV*

Response Continued

- *Lack of confidence in the NRC's response to using OMN-1 in lieu of ISTC*
  - *questions regarding NRC's confidence in OMN-1 were clearly addressed in the September 1999 Federal Register of 10CFR50*
  - *this should no longer be an issue*

Response Continued

- *Cost of changes in plant procedures and technical specifications*
  - *the cost to change plant procedures and technical specifications are real and need to be considered*
  - *the cost of maintaining separate ISTC and MOV Program testing requirements far exceeds the cost of changes to plant program documentation*

Response Continued

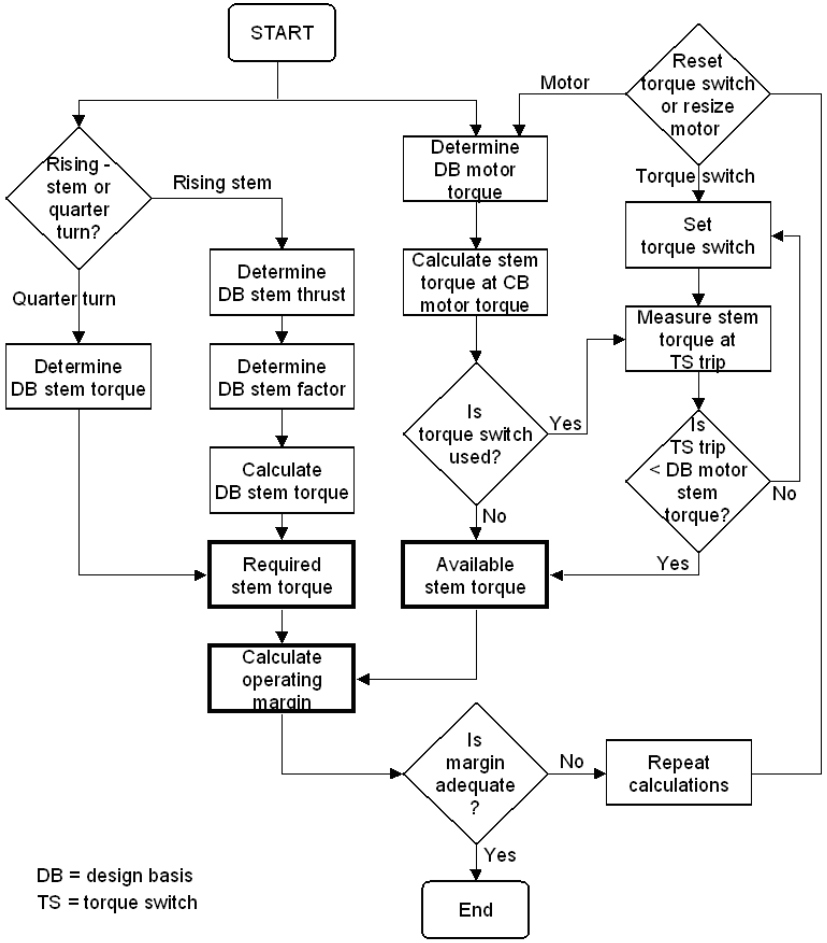
- *Exercising requirements not included in NRC GLs*
  - *OMN-1 requires that each safety-related MOV be exercised at least once during each fuel cycle*
  - *in most cases, MOVs are operated during plant startup, shutdown, safety train swap, or other plant evolutions*
  - *those operations satisfy the OMN-1 exercising requirement*
  - *existing ISTC programs already require exercising MOVs quarterly*

Current Status

- *The 2009 OM Code was published in March 2010.*
- *It includes Mandatory Appendix III and has removed the stroke time testing in ISTC.*
- *ISTC refers users to Appendix III for IST requirements for MOVS.*
- *For users of older versions of the Code, the 2009 OM Code includes OMN-1 and OMN-1, Rev 1.*

Periodic Verification

Functional Margin Flow Chart



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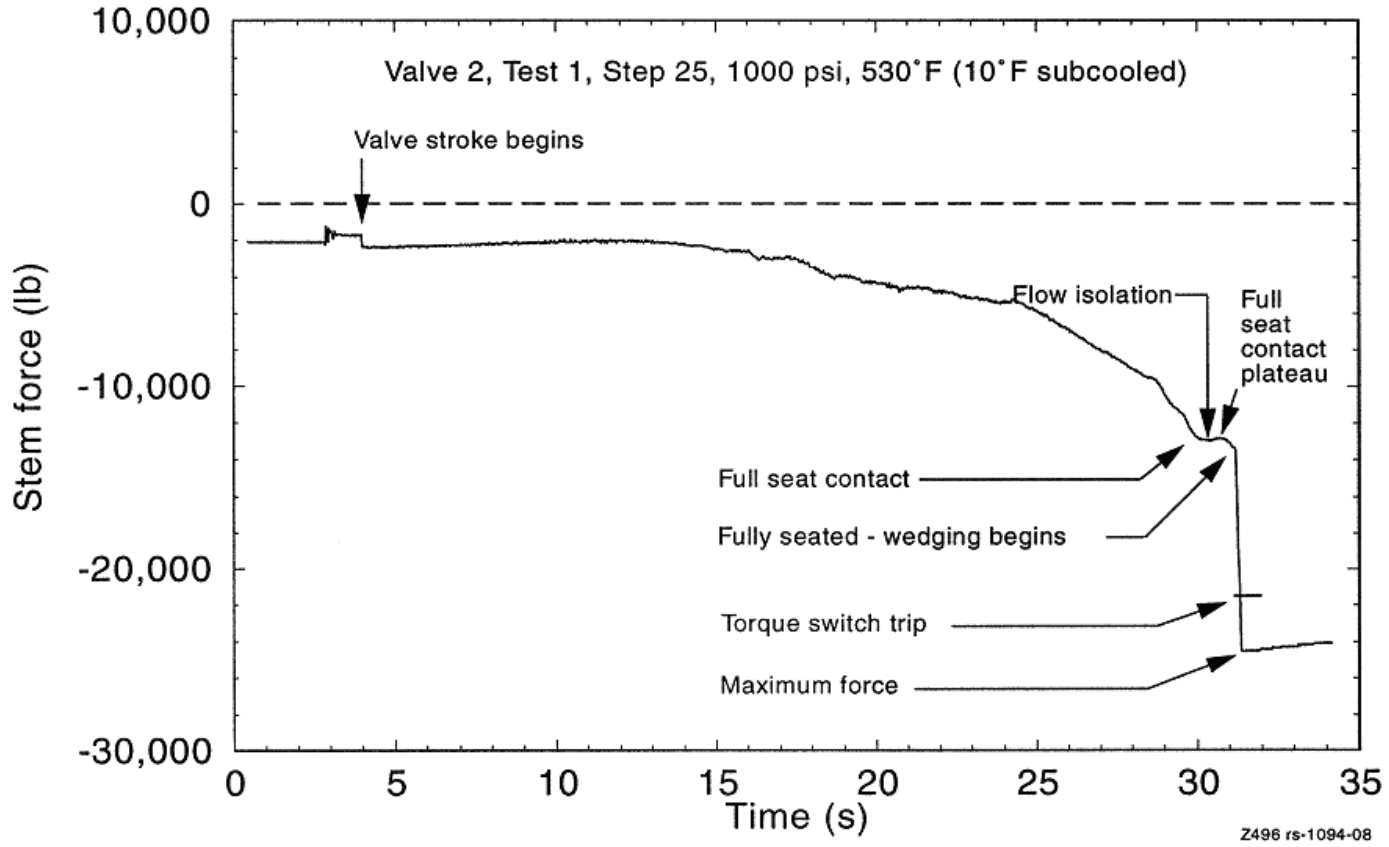
Typical Gate Valve Closure Thrust



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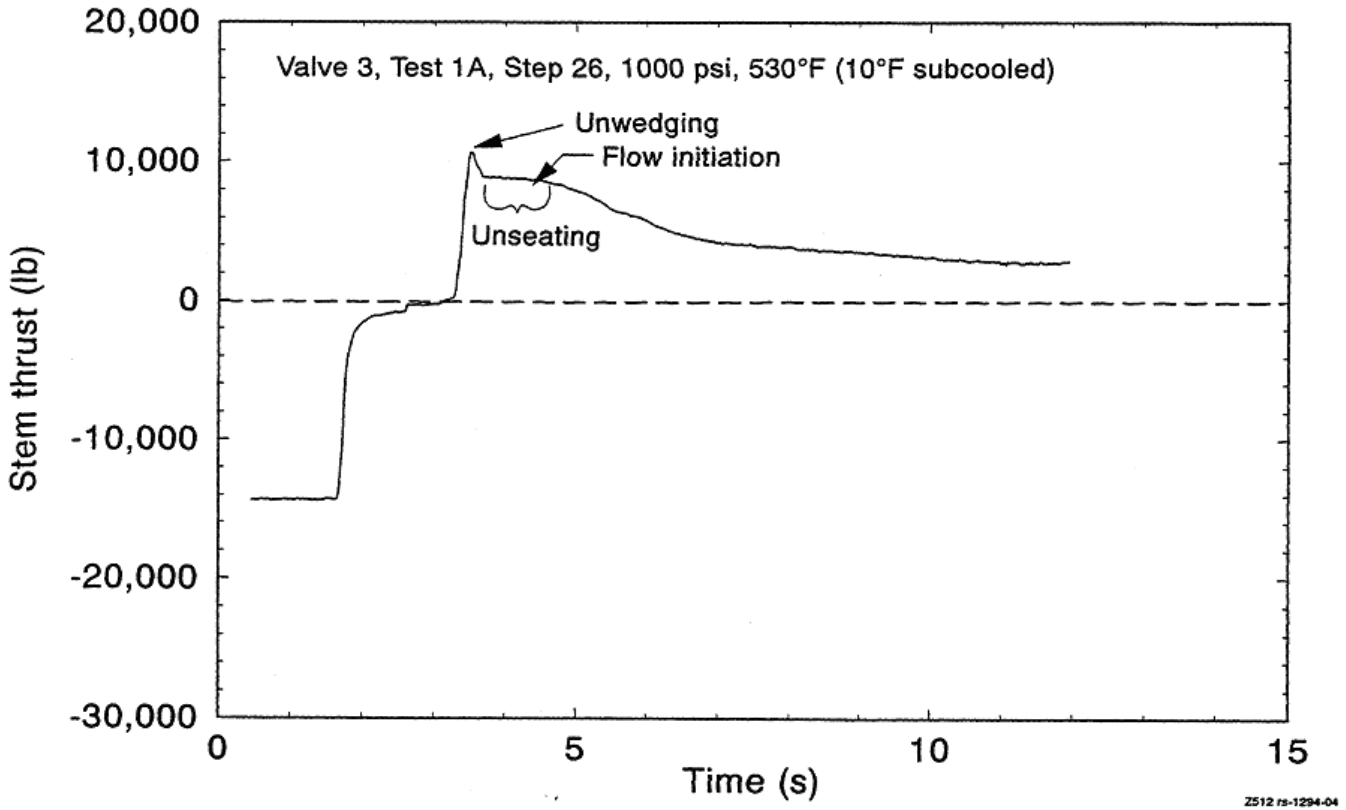
Typical Opening Stroke Stem Thrust Measurement



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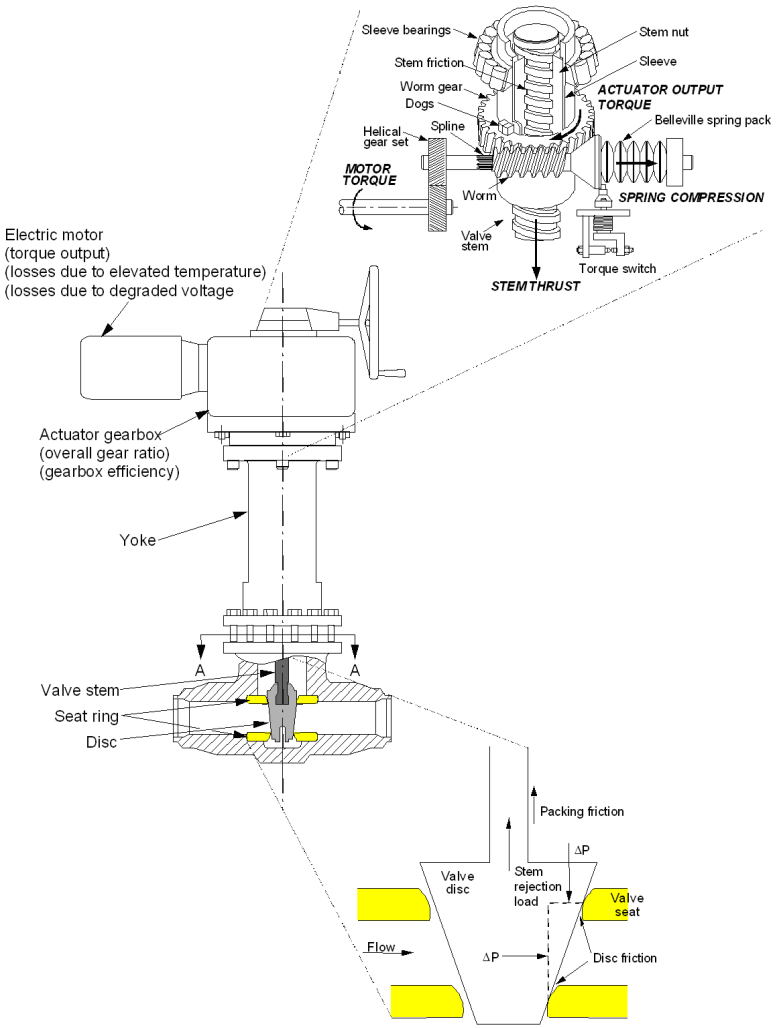
Limitorque Actuator With A Flexible Wedge Gate Valve



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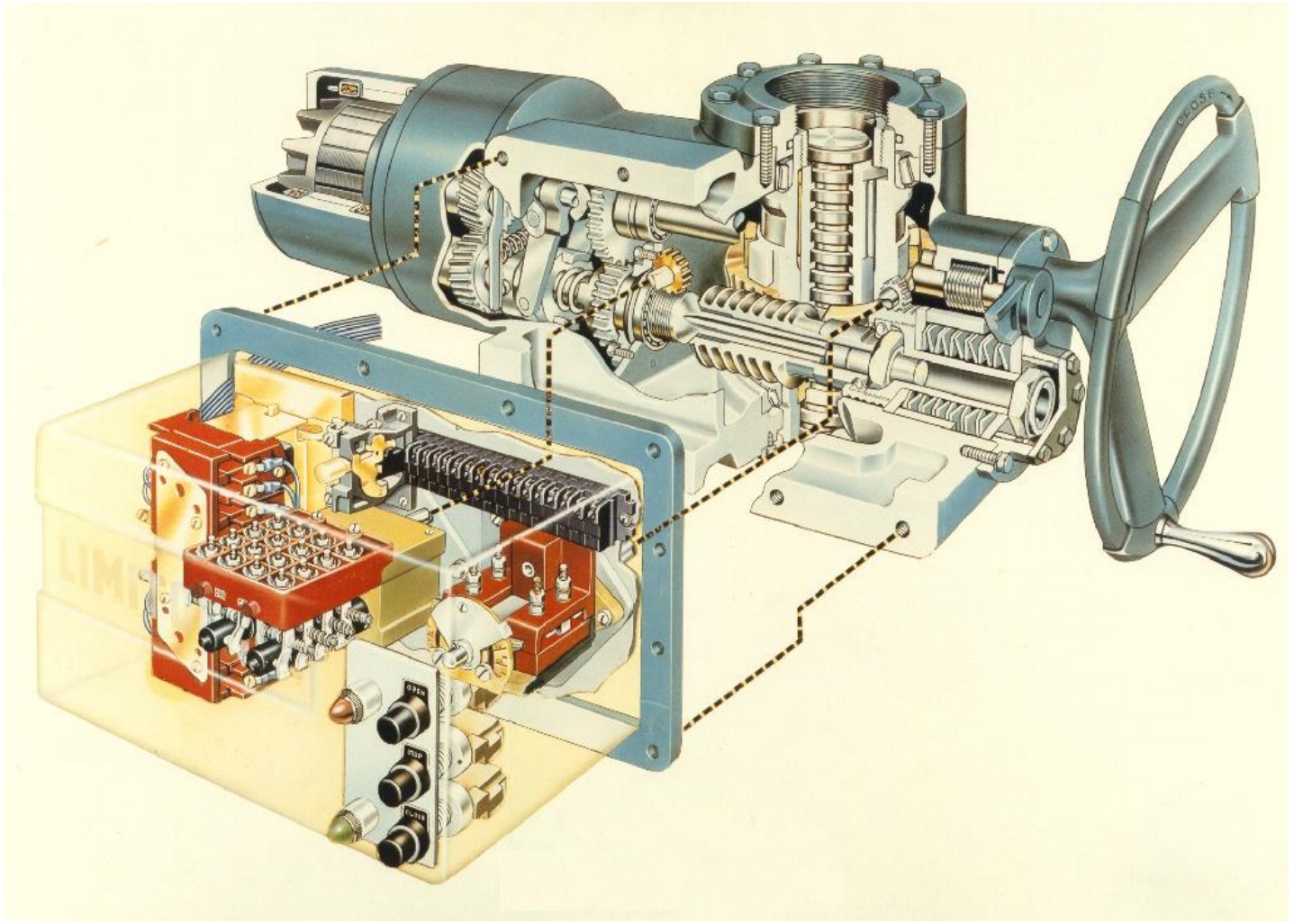
Limitorque SMB Actuator



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