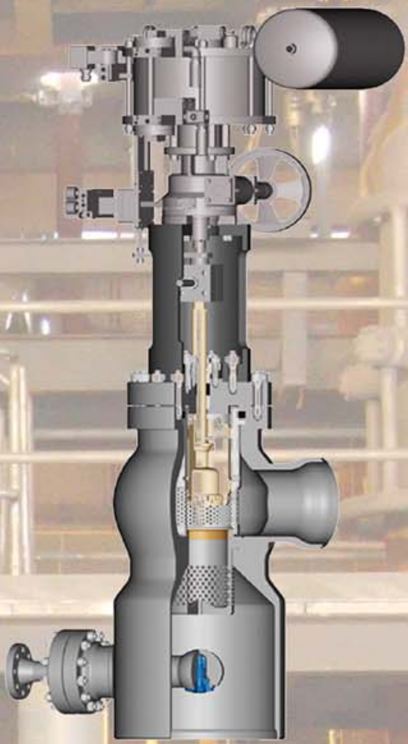
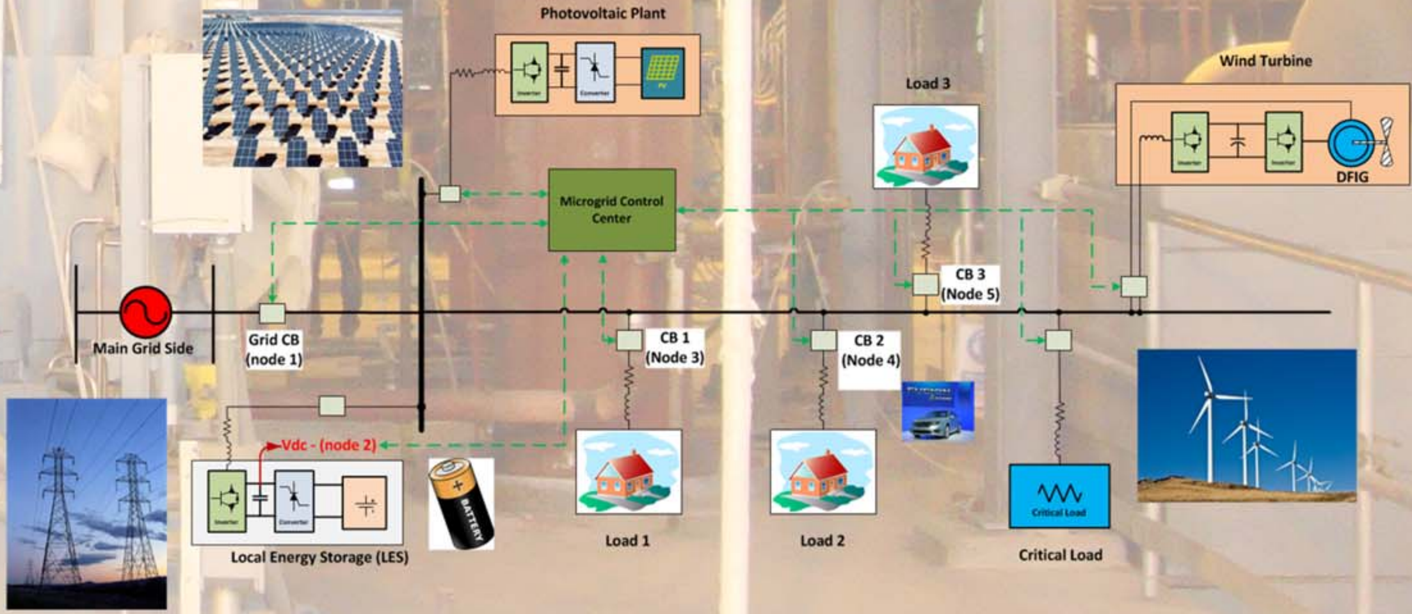
PGESCo Engineering Newsletter

ISSUE V April,2013





CONTENTS

April
2013

Picture represents a model of the pressure reducing and desuperheater steam assisted valves installed in Sokhna super critical power station

Distributed Generation (DG) Protection Overview

Distributed Generation (DG) is loosely defined as small-scale electricity generation. For many DG applications the generation facility is co-located with the loads (at the point of consumption of the energy produced). The connection can be to the distribution network or on the customer side of the meter. For most DG the customer uses all of the output from the DG with any surplus delivered to the distribution system. If the customer requires more power then available from the DG, power is taken from the distribution system. The deployment of renewable energy systems is bringing DG into utilities often as hybrid systems consisting of multiple generators in constructed as a MicroGrid as shown in Fig. 1.

The DG type can be divided into traditional and non-traditional generators. The traditional generators are based on combustion engines and are further divided into: Low Speed Turbines, Reciprocating and Diesel Engines and Micro-Turbines (MT). The non-traditional generators are divided into: Electrochemical Devices (such as fuel cells), Storage Devices (batteries, flywheels, etc.), and Renewable Devices (PV, wind, small hydro). [1, 3, 9]

DG Protection Overview:

One of the drivers behind this movement is the need to integrate renewable energy sources into the distribution system. Traditional protection schemes used is the distribution system need to be re-evaluated with the integration of DG associated with customer loads. The interconnection protection varies widely depending on factors such as:
generator size, point of interconnection to the utility system (distribution or sub-transmission), type of generator (inductor, synchronous, asynchronous) and interconnection transformer configuration. Newer DG systems are utilizing electronic power converters which results in special consideration for DG protection. [1]
The following protection issues must be considered when DG is being considered to be integrated with the utility: Short Circuit Power; Islanding; Reduced Reach of Impedance Relays; Reverse Power Flow; Voltage Profile; Auto Reclosure; Ferro-resonance; Grounding; and Safety.

Typical Protection scheme:

The IEEE 1547 standard only provides limited real guidance and highlights only the important requirements. Newer standards are being developed towards more detailed requirements for the integration of DG with the distribution system. The current standards require the following:

- Not cause over-voltages or loss of utility relay coordination
- Disconnection when no longer operating in parallel with utility
- Not energize the utility when the utility is de-energized.
- Not cause objectionable harmonics

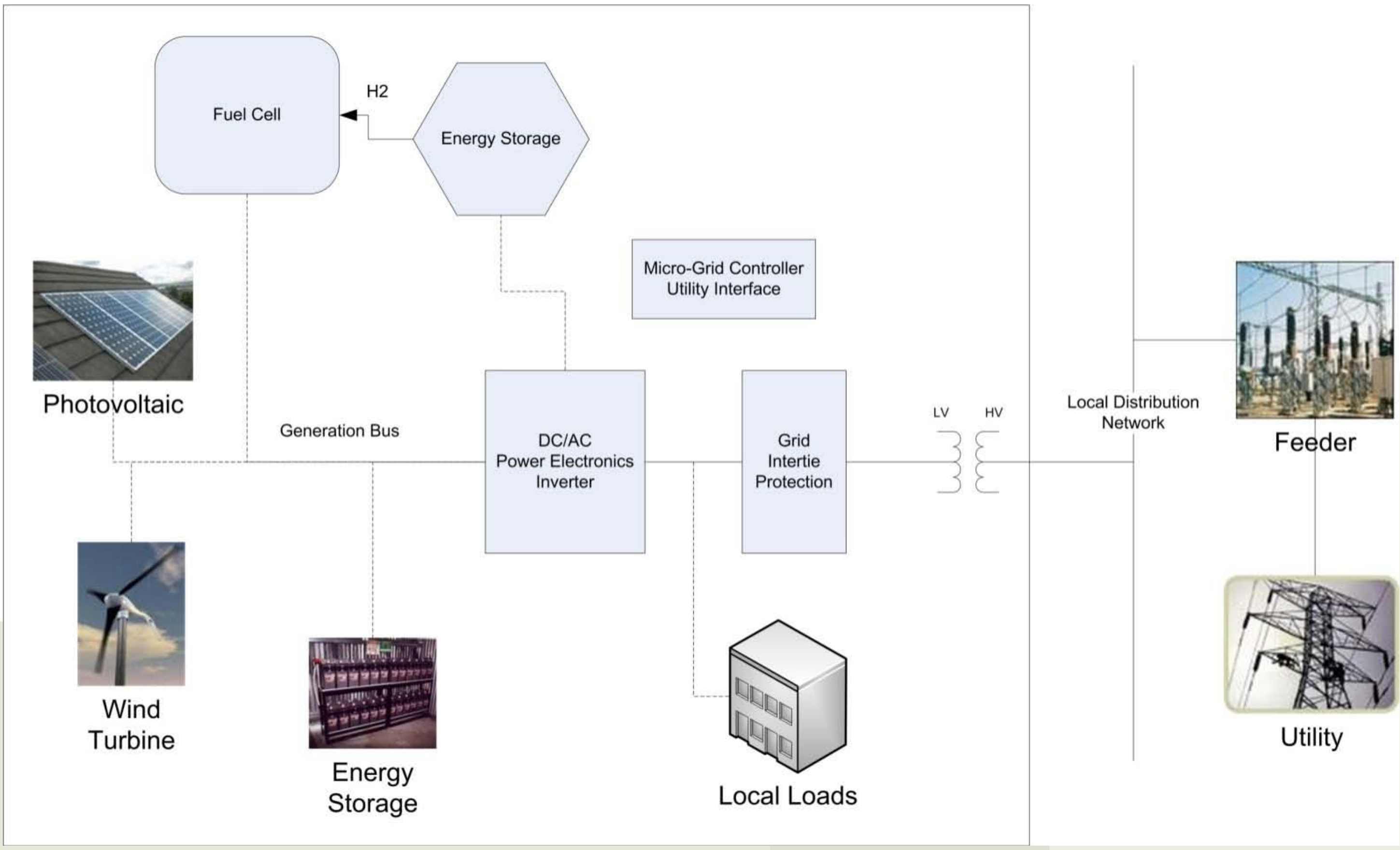


Fig. 1 MicroGrid Based Distributed Generation

- Not cause loss of synchronization
- Not cause over-voltages [1, 3]

1. Generator Protection

The purpose of the generator protection is to protect the DG from internal faults and abnormal operating conditions. Fig. 2 Show a scheme for generator Protection.

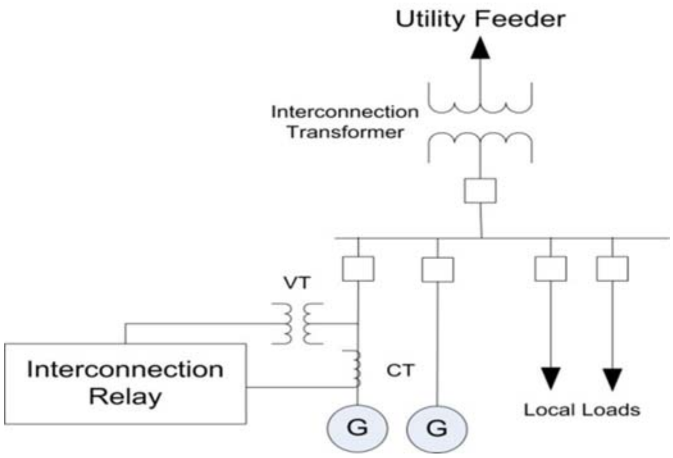


Fig. 2 Generator Protection

2. Interconnection Protection

The purpose of the interconnection protection is to protect the grid from the DG unit on the grid-side during parallel operations of the DG and the grid. Fig. 3 show a two type of interconnection protection. The interconnection protection requirements are normally established by the utility and include:

- Disconnect the generator when detecting an “islanding” condition (no longer operating in parallel with the utility)
- Protect the utility from damage caused by the DG (fault current, transient over-voltages, etc.)
- Protect the DG from damage caused by the Utility (automatic reclosing, etc.)

Interconnection Protection Objective:

- Detection of loss of parallel operation with utility System
- Fault back-feed detection (phase faults and ground faults)
- Detection of damaging system conditions
- Abnormal power flow detection
- Restoration

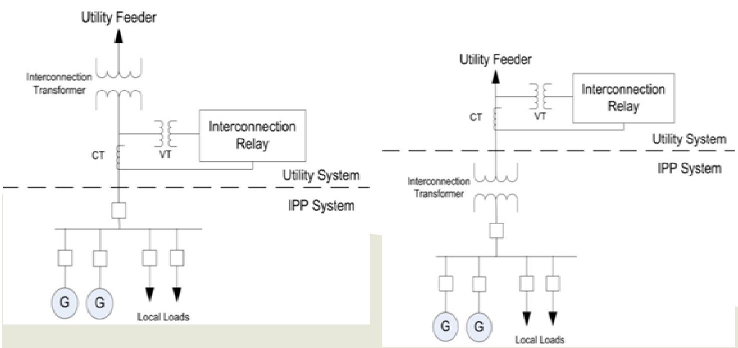


Fig. 3 Interconnection Protection

2.1 Simple Protection Scheme:

The system must return to its steady state (normal) conditions before restoring the system to parallel operation.

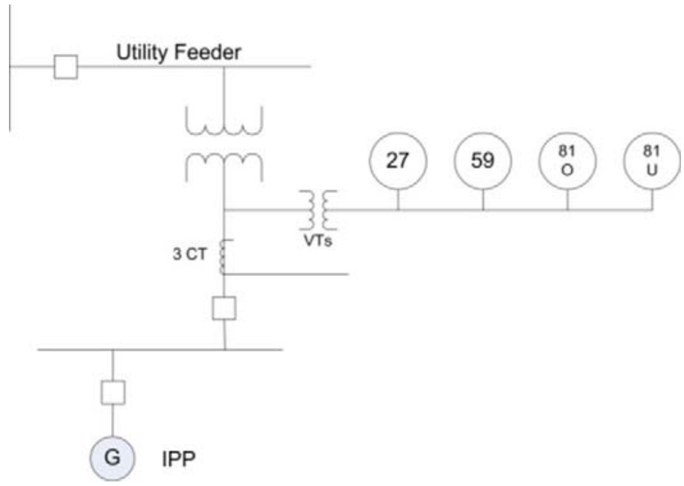


Fig. 4 Interconnection Simple Protection

2.2 Advanced Protection Scheme:

Additional protective functions are added to the simple protection scheme to increase the level of protective elements to enhance the detection of harmful currents while operating in parallel. [2, 3, 4, 9]

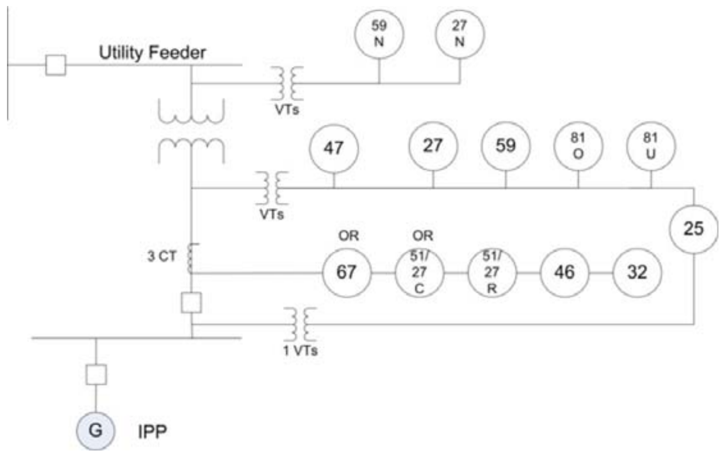


Fig. 4 Interconnection Advanced Protection

3. Utility Required Protection

The utility shall provide detailed requirements in the following areas:

- Winding configuration of the interconnection transformer
- General requirements of utility-grade interconnection relays
- CT and VT requirements
- Functional protection requirements
- Settings of some interconnection functions
- Speed of operation [7]

4. Anti-Islanding Protection

Islanding is the condition when the DG is no longer operating in parallel with the utility system as shown in Fig. 6. The operation of the protection equipment will need to react differently when operating in parallel with the utility and when operating as a stand-alone island as the fault current will drastically change between connected and isolated modes and impact protection schemes that are based on short-circuit sensing. The DG protection scheme will need to consider:

- Numerical relays using alternative setting groups for island operation.
- Communication-based protection practices to yield an adaptive protection scheme that can fit both modes of operation.
- Under-voltage protection which can provide time delayed protection if conventional over-current protection will not operate.
- Re-synchronizing the islanded system.
- Utility breakers or circuit reclosers are likely to reconnect the island to the greater utility system when out of phase.

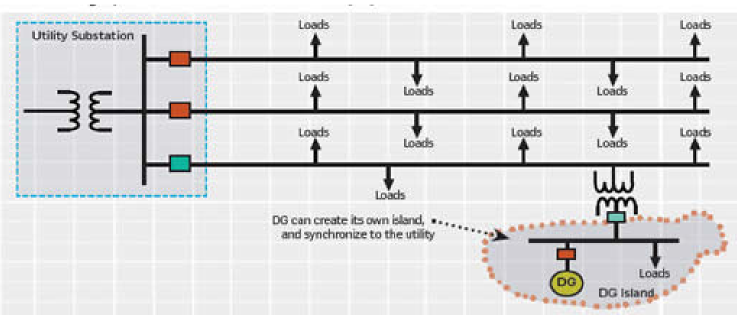


Fig. 4 Islanding Operation of DG with the utility system

The critical issue with island operation is when the DG operates in its normal parallel mode of operation even when the connection with the utility system has been lost. [1, 6]

4.1 Anti-Islanding Protection Scheme:

The area of islanding detection is area of much research and study. The following sections discuss some of the current techniques used for islanding detection.

A. Communication Schemes:

Methods not determined within the inverter are generally controlled by the utility or have communications between the inverter and the utility to affect an inverter shut down when necessary. Some of the communication based methods include: Transfer Trip, Impedance Insertion, Power Line Signalling and Supervisor Control and Data Acquisition.

B. Passive Detection Scheme:

Passive methods for detecting an islanding condition basically monitor selected parameters such as voltage and frequency and/or their characteristics and cause the inverter to cease converting power when there is a transition from normal specified conditions. The following are examples of passive detection methods:

- Over / Under Voltage
- Over / Under Frequency
- Voltage Phase Jump
- Detection of Voltage Harmonics
- Detection of Current Harmonics

C. Active Detection Scheme:

Active methods for detecting an islanding condition introduce deliberate changes or disturbances to the connected circuit and then monitor the response to determine if the utility grid with its stable frequency, voltage and impedance is still connected. The active methods include the following:

- Impedance Measurement
- Detection of Impedance at a specific frequency
- Slip-mode Frequency Shift
- Frequency Bias
- Sandia Frequency Shift
- Sandia Voltage Shift
- Frequency Jump

Summary:

When connected to the utility grid, distributed generators need to be protected not only from short circuits, but from abnormal operating conditions. Many of these abnormal conditions can be imposed on the DG by the utility system. Utilities, on the other hand, are generally concerned with the installation of the power generators. Their concerns include personnel safety, the necessity that generator operations not cause harm or damage to the utility.

References:

1. IEEE 1547 –2003, Standard for Interconnecting Distributed Resources with Electric Power Systems
2. IEEE C37.95-1989 Guide for Protective Relaying of Utility-Consumer Interconnections
3. IEEE 929-2000 Recommended Practice for Utility Interface of Photovoltaic (PV) Systems
4. IEEE 1547 –2003, Standard for Interconnecting Distributed Resources with Electric Power Systems.
5. Distributed Generation: definition, benefits and issues, G. Pepermans, et. al., Energy Policy 33, 2005, pp 787– 798
6. Instruction Manual, General Electric, 2001 “Generator Protection Needs in a DG Environment”
7. “Protection of Power Systems with Distributed Generation: State of the Art”, Swiss Federal Institute of Technology 20, July 2005
8. Presentation “Distributed Generation – Control And Protection”, Arindam Ghosh, Australia
9. Interconnect Protection of Dispersed Generators, C.J. Mozina, Beckwith Electric Co. Inc

Author Bibliography
Wael Hamdy Mahmoud Yousef
Electrical Engineer

How Administration & Local Procurement Department Shares Other Departments In Success?

This article describe in short words the rule of the Administration department in sharing the effort performed by PGESCo team targeting Company goal and sharing all departments success. Effort is extending to all divisions Purchasing, Elec. Doc. Support, Mail, Photocopying, Inactive record center, Maintenance, Assets tracking, inventory, Guest Housing, ..etc.

Everyone works as team to support and maintain the company's competitive advantage.

Each section is keen to raise the **Quality** , Reduce the **Cost** and **Time**:

One of the sections that we will be introduced, is the: Electronic Document Support (EDS) section is introduced below.

Major objectives

The main objective of this section is:

Upgrading the quality of the documents.

EDS are proud to deliver excellent performance every day .

EDS are building a better electronic system by doing it right the first time & every time.

EDS achieve the Main Objective through:

I.Maintain quality of documents

II.Saving Engineering time in modifications markups.

III.Reduce the number of hard copies

EDS are contributing to the submittals review process through conversion of Engineers mark-up and ensuring that the documents comes out to contractors in a clear manner.

EDS ease documents and drawings handling by conversion between different file formats (DGN, DWG to PDF, TIF) and vice versa. Also making documents searchable and with bookmarks with reduced file sizes as required this effort support the engineering activities for a great extended considered as part of the bases to deliver a good engineering works.

Increasing the quality of PGESCo deliverable through creating auto play CDs for contracts, designing contracts & tenders document covers.

This also play a rule in enhancing the communication with bidders contractors and specially owner during different phases of every project life.

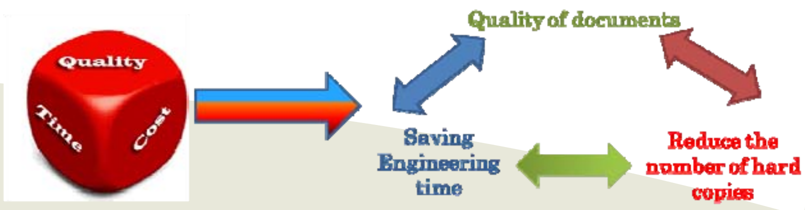


Fig 1: Performance base triangle

Figure 2 illustrates the cycle of documents within the section and some format convert document created.

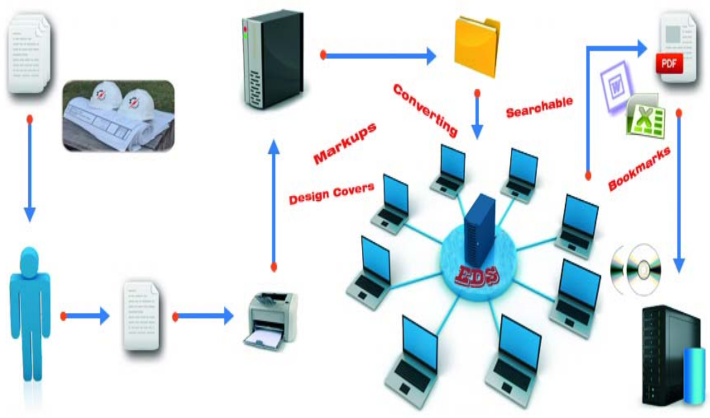


Fig 2: cycle of document within the section

This was a simple and concise definition for EDS section within the company

Author By Khaled Negm
Electronic Document Support (EDS)
Supervisor
He received Diploma in Business Management From Cambridge training college Britain & management form the American Chamber of Commerce in Egypt.
& Graphic diploma from Synergy Professional Services.

INTRODUCTION TO TURBINE BYPASS SYSTEM

1. Purpose of the next few pages is to highlight the Steam Turbine Generator (STG) bypass systems function, types, system capacity, and components.

Figure 1-WEIR Turbine Bypass Valve

2. Overview

In thermal power cycles, one of the basic major components is the Steam Generator (Boiler/HRSG). Effectively protecting this complex component from mechanical damage is a key concern from both technical and economic perspectives. For this reason, a bypass valve is installed at every steam turbine stage to enable independent activity of the Steam Generator (Boiler/HRSG) and main motive steam lines (Main steam, Cold Reheat (CRH), and Hot Reheat (HRH)) during start-up, STG emergency trip, load rejection, shutdown, and variable pressure operation. This autonomous operation protects the steam generator against the over-pressurization, protects the main motive steam lines against the steam hammering, reduces start-up and reloading times, and increases overall plant availability, and lifetime.

As the use of early turbine bypass systems increased, several problems were encountered. These problems fell into the following areas:

- Turbine damage due to impingement from improperly directed steam.
- Mechanical failure of the internal piping due to incorrect piping design or thermal expansion.
- Condenser internals erosion due to the location of the discharge.
- Condenser tube damage from discharged steam due to incorrectly located lines.
- Condenser internals overheating due to improperly conditioned steam.
- Mechanical damage to the condenser due to water hammer from improperly drained pipes.

Turbine bypass systems main job is called steam conditioning. It means pressure reduction and desuperheating of steam that has been produced by the steam generator but, due to transient or unexpected conditions can not flow through the turbine.

3. Bypass System Types

There are four basic bypass system types commonly used:

- Atmospheric Venting.
- Direct bypass to condenser.
- Cascade bypass between High Pressure (HP) main steam to CRH, and HRH to the condenser.
- Process bypass to a steam user header (Cogeneration applications).

3.1. Atmospheric Venting

The simplest type of bypass is the Atmospheric Vent Valve (AVV) or, as it is sometimes called, the Sky Valve. It is used to vent exhaust excess steam directly to the atmosphere to control drum or header pressure. This approach is frequently used for startup pressure control when an Auxiliary Boiler is not available.

The advantage of using an AVV over the use of an Auxiliary Boiler lies in both the lower cost of the AVV's and the reduction of maintenance due to the elimination of the Auxiliary Boiler.

The disadvantages of using an AVV lie the excessive loss of cycle water (chemically treated demineralized water) when the valve is open and the delay in the steam turbine start up while condenser vacuum is drawn.

3.2. Direct Bypass To The Condenser

This can be used for combined cycle systems regardless of whether the cycle includes a reheater. Typically, however, it is only used for conventional boilers that do not have reheaters; accordingly no cooling steam is required to the reheater tubes.

3.3. Cascading Bypass

Cascading bypass can be described in the following steps:

- HP Main Steam is reduced in pressure and temperature by the main steam bypass valve and discharged into the Cold Reheat (CRH) line.
- The steam then passes through the reheater for cooling becoming Hot Reheat (HRH) steam.
- The HRH steam is then reduced in pressure and temperature by the LP bypass steam conditioning valve to conditions that will permit it to be discharged to the condenser.

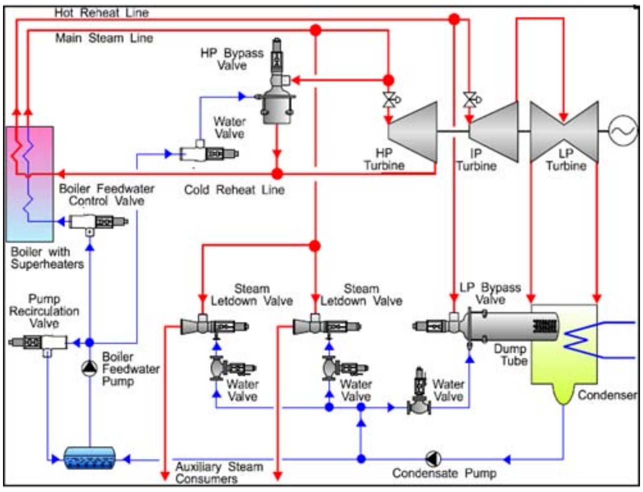


Figure 2- Typical Cascaded Turbine Bypass System

3.4. Cogeneration Applications

Cogeneration facilities are frequently configured without reheaters to reduce complexity and cost. In these facilities, steam may be taken from extractions on the turbine or from the discharge of a non-condensing turbine to supply steam to a steam user such as refineries, district heating units or pulp and paper plants. In these cases, the steam turbine bypass may be configured to provide steam to the steam user instead at the expense of power production.

4. Capacity

The steam flow capacity of the bypass system is governed by the following variables:

- Heat distribution in the steam generator.
- Turbine rotor diameter.
- Condenser internals.
- Startup, loading, unloading, and shutdown practices and requirements for the unit.
- Safety considerations.
- Economics.

The possibilities to size the bypass system are as following:

- A bypass system that matches the steam to turbine metal temperatures should be sized for 15 percent of maximum continuous rated (MCR) flow at valves wide open. This system reduces the startup time by about 30 minutes.
- A bypass system that handles the difference between the generated and consumed steam flows during upset or transient conditions should handle 40 percent of MCR flow at valves wide open or should have a greater size range.
- A bypass system that keeps the steam generator running at full load without blowing the safety valves in case of a turbine or generator trip at full load should handle 100 percent of MCR flow at valves wide open.

For a conventional boiler, even though it is desirable to size the cascade bypass to pass 100 % of the flow required when the steam turbine trips at the full load condition, it is not always economically justified in a competitive design. Therefore, the bypass is sometimes designed to work in conjunction with a large Power Operated Relief (POR) valve (this could be either electrically (ERV) or pressure operated (PRV)). The POR would be designed to pass some fraction of the flow for the period of time necessary to reduce the firing rate of the boiler to match the capacity of the cascade bypass system.

5. Bypass System Components

5.1. Primary Components are the minimum required equipment's to do the process of steam conditioning and they are as follows

- Pressure reducing valve
- Desuperheater
- Spray water control valve
- Spray water block valve
- Turbine Bypass control system
- Turbine Bypass instrumentation

The upcoming issues of PGESCo engineering newsletter will pay attention to the considerations shall be followed in sizing, selection and installation each of those components to have a proper bypass system.

5.2. Components Specific for HP bypass

HP turbine reverse flow valve may be necessary to prevent excessive windage heating of the HP turbine blades during a hot restart if initial loading is accomplished using the IP section.

During IV throttling the main steam inlet valves are closed and the HP turbine is protected from windage heating by passing cold reheat steam through the reverse flow valve, backward through the HP turbine stages and discharging to the condenser through the reverse flow discharge valve.

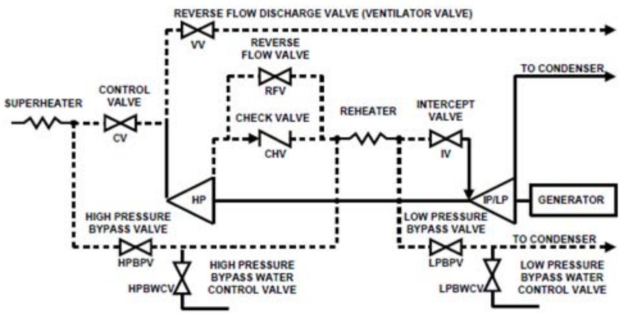


Figure 3-GE Steam Turbine Cascading Bypass System

5.3. Components Specific for IP/LP bypass

Back pressure Sparger is installed to provide backpressure for a turbine bypass valve, to limit steam line velocity, to protect condenser tubes, and to reduce overall turbine bypass system noise.

The sparger should be designed to distribute steam flow with respect to the condenser's structural layout and heat sensitive surfaces. This prevents the possible spray of the steam and water directly onto the condenser tubes, thus extending the life and limiting maintenance on the condenser. Flow area is designed to either inject steam out of the end as shown in figure 3, or spray out the sides as shown in figures 4 and 5.

Figure 4-Spargers Designed to Spray Out the End to Eliminate Steam Impinging Upon the Condenser Tubes

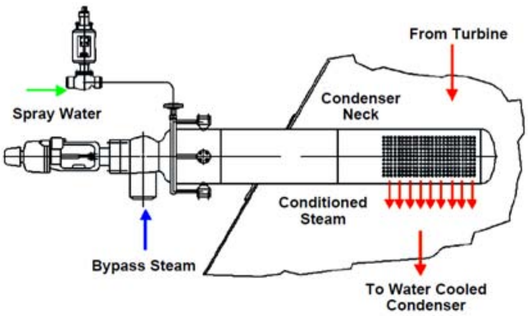


Figure 5-Low Pressure Bypass Condenser Dump with Water Cooled Condenser

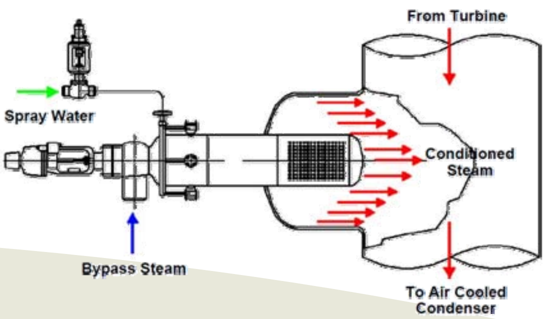


Figure 6- Low Pressure Bypass Condenser Dump with Air Cooled Condenser

References:

1. Fossil Fuel Power Plant Steam Turbine Bypass System ANSI/ISA–77.13.01
2. 100DHPTM CCI DRAG® Control Valve For High Pressure Turbine Bypass.
3. Weir Valves & Controls - Turbine Bypass Valves and their Application, 2005.
4. Bechtel Design Guide - Turbine Steam Bypass Systems
5. GE Power Systems - Turbine Description
6. EMERSON/FISHER - Turbine Bypass Applications, 2002.

Author Bibliography

By: Maged Samir Ahmed Kassab
Instrumentation & Control Engineer
PGESCo Control Valve Committee Member

CONTROL VALVES IN POWER GENERATION FIELD

Introduction

In Power generation field, control valves are used in modulating/throttling and isolation applications. This section presents a general discussion regarding the control valve performance characteristics and features. As will be shown, most control valve problems are caused by improper selection, sizing, and/or installation.

Fig. 1 Control valves in SIDI KRIR Power Station

Most existing control valve application problems can be resolved and could be avoided if accurate application data and operating conditions were established and provided before selecting and sizing the valve.

Globe valves are the most extensively used valves for modulating service, for conditions such as high Pressure, temperature, and differential pressure applications. Compared to ball and Butterfly valves, globe valves present a higher flow resistance. The flow capacity of globe valves is about one-third that of low-resistance valves such as ball and butterfly.

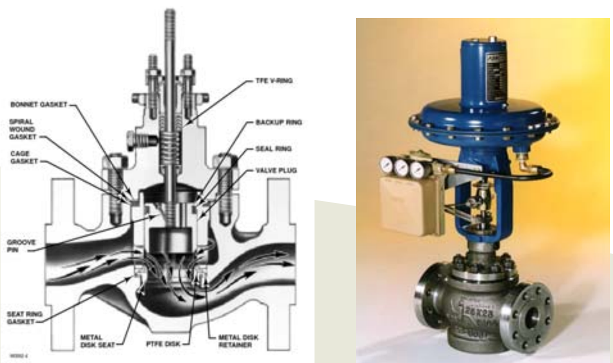


Fig. 2 Standard Control valve (Globe Type)

The goal of this paper is to highlight important items regarding the sizing and selection of control valves as used for the power generation field.

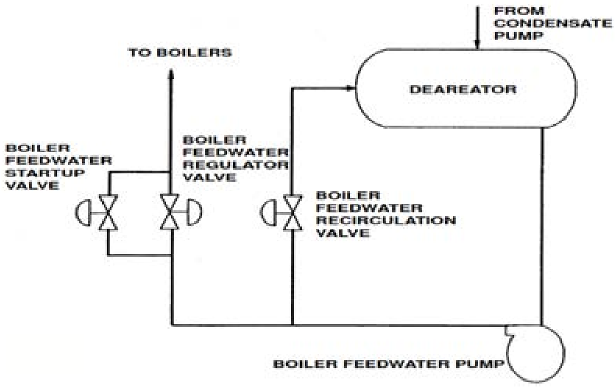


Fig. 3 Using control valve in power generation application

Control Valve Differential Pressure

How system pressure is controlled by the control valve: [Figure 4]

Control valve pressure drop is the difference between the pressure at the control valve inlet and the pressure at the control valve outlet for a given flow rate. The control valve pressure drop varies with flow rate at certain opening.

Inlet pressure: pressure available after piping and equipment resistance between the source (ex. Pump discharge) and the control valve at a given flow rate.

Outlet pressure: pressure which results after piping and equipment resistance between the receiver (final element in the loop) and the control valve at a given flow rate. This is depicted in Figure 4.

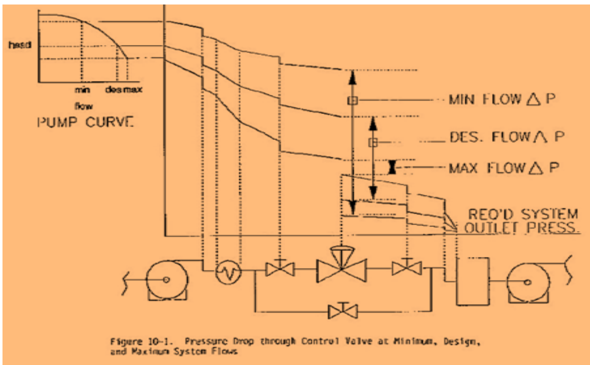


Fig. 4 Pressure drop through a control valve at minimum, design, and maximum system flow

In summary, the control valve does not dictate the DP in a fluid handling system, but it provides a variable restriction to dissipate the difference between the system head (by a pump or upstream tank) and the system head loss (other than the control valve) at a given flow rate. Thus, for a given flow rate, the pressure drop across the control valve should satisfy the following equation:

$$\Delta P_{control\ valve} = P_{source} - \Delta P_{system}$$

If the actual pressure drop across the control valve (at a given disc opening) is smaller than the above value, the valve is oversized.

If the DP assigned for the control valve during system design is less than the DP available in the actual installation, the valve could be oversized. Over estimation of the control valve pressure drop results in oversizing the pressure source (for example, pump), can result in a considerable waste of energy over the life of the system.

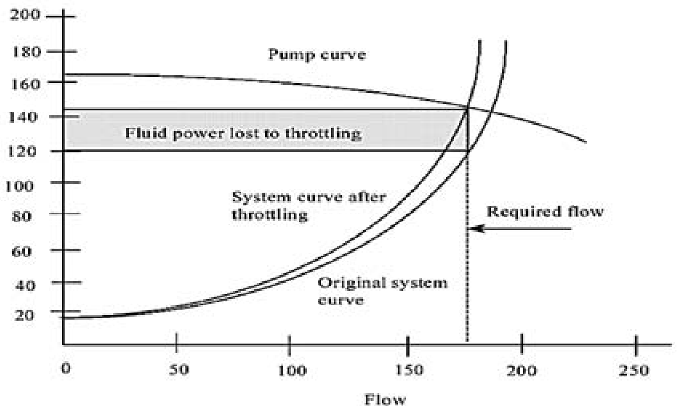


Fig. 5 Controlling system pressure by control valve

The following guidelines are used for the allocation of pressure drop across the control valve [EPRI guidelines]:

1. In a pumped circuit, the pressure drop allocated to the control valve should be equal to 33% of the dynamic loss in the system at the rated flow or 15 psi, whichever is greater.

2. In a system where static pressure moves liquid from one pressure vessel to another, the pressure drop allocated to the valve should be 10% of the lower terminal vessel pressure, or 50% of the system dynamic losses, whichever is greater.

3. Valves in steam lines to turbines, reboilers, and process vessels should be allocated 10% of the design absolute pressure for the steam system or 5 psi, whichever is greater.

Control valve sizing:

Most often, the size of the control valve is too large for the application, which results in control problems including instability. Furthermore, oversized control valves may have to be throttled to small openings, which can result in cavitation, flashing, and/or choking.

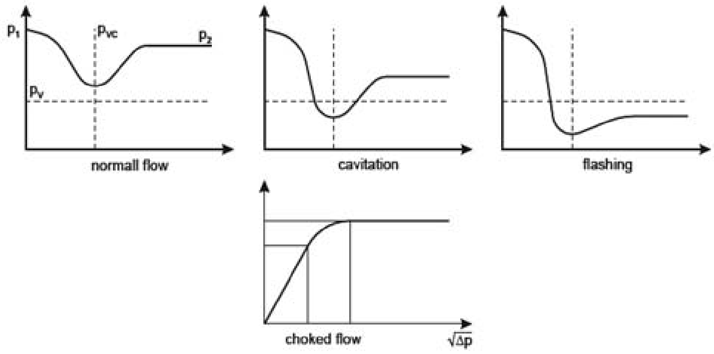


Fig. 6 Cavitation, Flashing and Chocking through a water control valve

Under some circumstances, such as highlighted in the following items may result in an installed or actual DP so high that control under the designed minimum flow requirements may become impossible:

1. A pump with flow capacity greater than that required will develop a higher discharge head than anticipated for a given flow.
2. Over estimation of the piping/system pressure drop i.e. addition of safety factors to flow requirements will increase actual DP to the system

Avoiding cavitation:

It is not always possible to ensure that the pressure drop across a valve and the temperature of the water is such that cavitation will not occur. Under these circumstances, one possible solution is to install a valve with a valve plug and seat especially designed to overcome the problem. Such a set of internals would be classified as an 'anti-cavitation' trim.

Fig. 7 Effect of Cavitation on the valve trim

The anti-cavitation trim is used in control valves to stage the pressure drop through the valve, which will prevent the cavitation from occurring as shown in figure 8. This is usually accomplished by causing the fluid to travel along a torturous path or through successively smaller orifices or a combination of both.

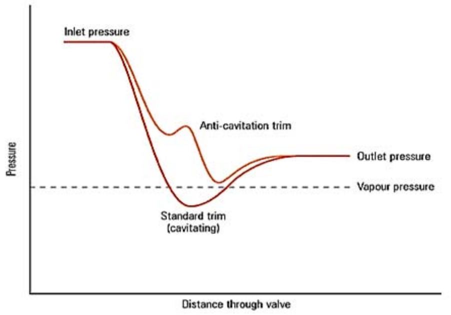


Fig. 8 Cavitation is alleviated by anti-cavitation valve trim

For example, typical characterized plug and cage is shown in Fig 9. The pressure drop is split between the characterized plug and the perforated cage which limits the pressure drop in each stage and hence the lowest pressures occur. The multiple flow paths in the perforated cage also increase turbulence and reduce the pressure recovery in the valve. These effects both act to prevent cavitation occurring in case of minor cavitation, or to reduce the intensity of cavitation in slightly more severe conditions.

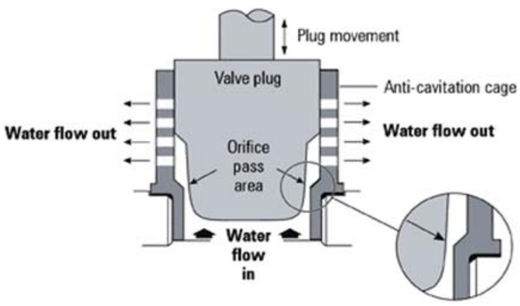


Fig. 9 Typical anti-cavitation trim

<u>Case study:</u>

Service water pump [vertical type] operates at different static head:

With this control method, the pump runs continuously and a valve in the pump discharge line is opened or closed to adjust the flow to the required value. To understand how the flow rate is controlled, see Figure 10.

With the valve fully open, the pump operates at the required flow rate [the blue color curve]. When the static head is changing the system curve is shifted down to another operating point [green color curve], accordingly the valve will be partially closed in order to introduce an additional friction loss in the system, which is proportional to flow squared. The new system curve [Purple color curve] cuts the pump curve at the required flow rate, which is the new operating point. The head difference between the two curves is the pressure drop across the valve.

It is usual practice with valve control to have the valve 10% shut even at maximum flow.

Energy is therefore wasted overcoming the resistance through the valve at all flow conditions.

There is some reduction in pump power absorbed at the lower flow rate (see Figure 10), but the flow multiplied by the head drop across *the valve, is wasted energy. It should also be noted that,* while the pump will accommodate changes in its operating point as far as it is able within its performance range, it can be forced to operate high on the curve, where its efficiency is low, and its reliability is affected.

References:

1. Valve Application, Maintenance, and Repair Guide Volume 1, TR-105852v1 Final Report, February 1999.
2. Bureau of Energy Efficiency technical paper.
3. Control Valve Fisher Sourcebook Power & Severe Service
4. ABB High Technology Control Valves Their Selection and Application.
5. Control Valve Sizing for Water Systems from Spirax-Sarco

Author Biography:

Mohamed Farag Morsy: He received graduated from Helwan University in 2007,

Mechanical power department

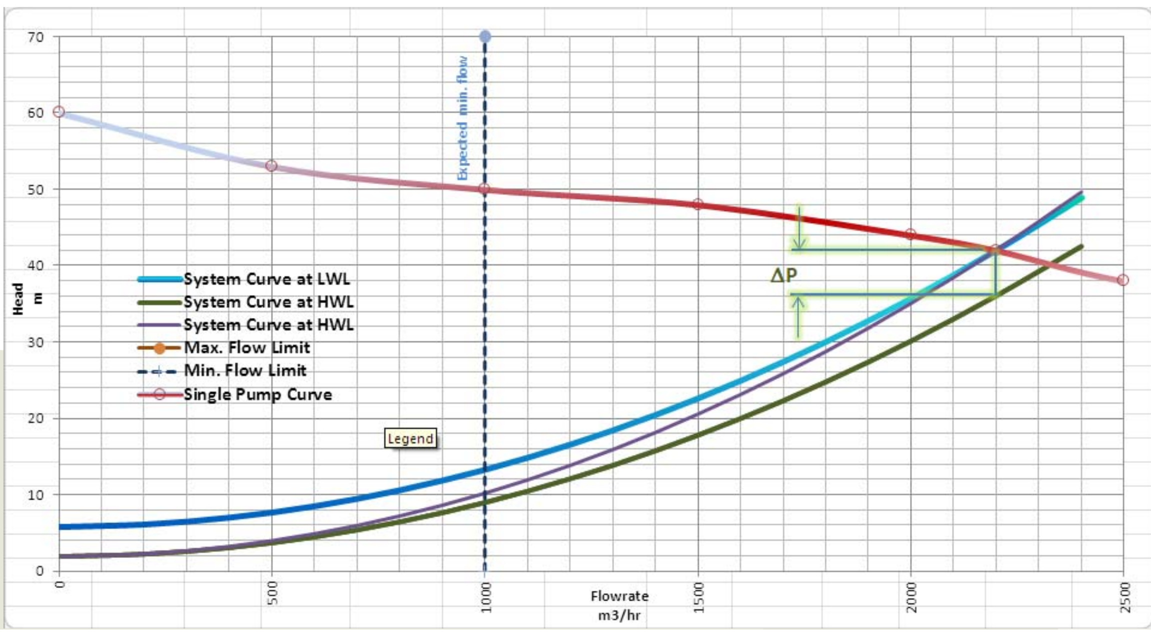


Fig. 10 Control of Pump Flow by Changing System Resistance Using a Valve

Quality Control-Misconceptions

Which would you prefer to buy?

A newspaper printed on top-quality paper coasting LE 10, or same newspaper printed on ordinary newsprint priced at LE 0.5?

A top of the range camera coasting LE 1000, or an ordinary camera coasting LE 100 which is perfectly adequate for family snapshots.

As the above examples suggest

People will not buy products that are out of their price range, no matter how good the quality (in its narrow sense) might be.

Conversely, they will not buy a product that doesn't do its job, no matter how cheep it is.

Quality is an interesting concept. People struggle

when trying to define what quality is, without resorting to using examples of opposite things that are of" High quality" and things that are not.

For example, a car from KIA is of lower quality than one from Audi.

The common misconception of quality is that we associated it with the "Best Products" & "Top of the Line" items. The mistake here is that we start to associate quality with premium, which is not consistent with its definition.

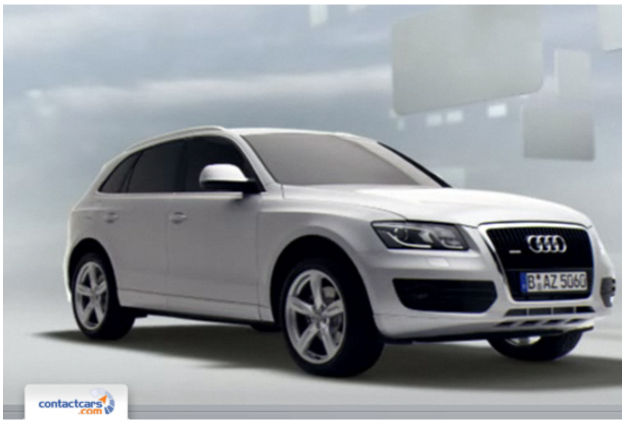
The answer of that question lies in explaining anther concept- "G R A D E"

Going back to our car example

A KIA has the potential to be high quality vehicle, just as much as an Audi, as long as it satisfies manufacturing requirements, while KIA's and Audi's can be at the same quality level, they are in very different grades.

A luxury car like Audi is expected to last much longer and match higher performance standards than KIA.

Same product (car), different grades. What we call "Luxury vs. Economical"



A quality product is one that matches the requirements that were defined at the outset.

While grade talks about the characteristics and features of a product (a car of high grade is one that has lots of features and benefits).

Quality talks about the degree that the 'inherent characteristics' of a product fulfill its requirements.

Quality talks about integrity of a product, while grade talks about the fancy foulness of the product.

Use Automobile as an example.

Lexus and Mercedes are examples of high grade car

Hyundai is an example of lower grade brand

We are not talking about quality here, we're talking standard features such as stability control, antilock brakes etc.

Does this make sense?

Mercedes & Hyundai both know the expectation of their customers, which is why are both successful

Let us take another example "Cell Phone"

You bought a cell phone, cheap, simple and basic model, It doesn't have any advanced features (low Grade), for your normal usage.

Although it doesn't have any advanced features, but

- Satisfies your needs
- It never gives you any trouble
- Always works
- It is defect free

No problem at all

In other words, you can say that: the quality of this cell phone is very high, although, it is low Grade, but it keeps you happy and satisfied.

Anther cell phone: Costly, premium model has all advanced features (High grade), touch display, Wi-Fi, Bluetooth, photo camera, video camera etc...

But, what would happen when it doesn't perform well? I mean, touch screen struck while navigation

Photo and video quality is poor, software doesn't recognize you.

You would be frustrated because:

> You have bought a high grade (high-end) product, but it doesn't perform as it should be.
>
> It means, quality of this cell phone is very poor and this would not be accepted

It is perfectly acceptable for a product to be a low Grade, as long as fulfill its stated requirements

- Please note that:-

  Low quality doesn't equal low grade.

  Low grade is never a problem and it is acceptable.

  Low quality is always a problem and it is not acceptable.

  Low quality is never desired.

  Every product must be of high quality regardless of its grade.

  A high grade product can have a low quality and vice versa

Now, let me refresh your memory

- Quality is the degree that the inherent characteristics of a product fulfill its requirements
- Quality is not a singular characteristic or attribute
- It is multi-dimensional and can be possessed by a product or a process
- While Grade is product owner's responsibility, the Quality is project team's responsibility
- Product quality is concentrated on building the right product
- Whereas process quality is focused on building the product correctly
- Quality also includes identifying the measures and criteria to demonstrate the achievement of quality & the implementation of a process to ensure that the product or service created by the process, has achieved the desired degree of quality & can be repeated and managed

***Note*: a product is something you can tangible, while a service is an action performed by someone (intangible). If you buy a new battery for your car, that's a product. The installation of that battery is a service.

Who Owns Quality?

A common misconception is that: - Quality is owned by/or responsibility of one group

This myth is often perpetuated by creating a group, sometimes called "Quality Assurance"-other names include "Test", "Quality Control" and "Quality Engineering", and giving them the chatter and the responsibility for quality.

Quality is/and should be responsibility of every one

Achieving quality must be integral to almost all process activities, instead of a separate discipline, by making every one responsible for the quality of product/or service they produce and for the implementation of the process in which they involved.

Everyone shares in the responsibility and glory for achieving a high quality product
Or in the shame of low-quality product

Managing Quality
Someone, however, must take the responsibility for managing quality; that is providing the supervision to ensure that quality is being managed, measured and achieved.
The responsibility for management quality is the role of "The Project Manager".

If you think that quality can be added to/or "tested" into product
You need to think again.
Just as a product can't be produce if there is no description of what it is, what it need to do, who uses it and how it's used
Quality and its achievement can't be attained if it is not described, measured and part of the process of creating the product.
If you think that quality is a single dimension of, attribute, or characteristic, and means the same thing to everyone. You need to think again
Quality is not a single dimension, attribute, or characteristic
Quality is measured in many ways:-
Quality metrics and criteria are established to meet the need of project, organization, and customer
Quality can be measured along several dimension
Some apply to process quality
Some apply to product quality
Some to both
Quality can be measured for:

- Progress-such as use cases demonstrated or milestones completed
- Varianc**e**- difference between planned and actual schedule, budgets, staffing requirements, and so forth
- Reliability-resistance to failure (crashing, hanging, memory leaks, and so on)
- Performance- the artifact executes and respond in a timely acceptable manner, and continues to perform acceptably when subjected to real-world operational characteristics such as load, stress and lengthy periods of operation

Quality can't happen by itself
Our goal is to ensure the product/service of high quality that meet the needs of our end uses, within a predictable schedule and budget.
Remember: Quality start and end with education

Some misunderstanding about QC:

- QC consists of preparing control charts
- QC means making standards
- QC means studying something difficult
- QC is something the QC section doing
- We are making a profit at the moment, so we don't need anything like QC
- QC is statistics
- QC costs money
- QC is nothing to do with me.

What benefits are obtained when a company implements QC in earnest throughout its organization?

- Quality becomes more uniform, and the volum of complaints decrease
- Reliability increase, confidence in the product improves and customer's trust is obtained
- A QA system is established
- Wasteful work disappears, rework decrease and efficiency improve
- Inspection and testing coasts decrease
- People begin to speak a common language and to understand each other better
- Human relations improve, and barriers between departments are broken down
- Research and development is speeded up and made more effective
- Costs decrease

Now: we can turn the page but the book still open.

Author Bibliography

Ahmed Maarouf
Operation, Maintenance, Construction, and Project Field Engineer

Your comments & options are welcomed, call or E-mail the editor:
Tel: 26185643 E-mail: mhbanhaw@pgesco.com
You are also encouraged to blog your opinion in PGBLOG, under links & references in PGESCo Information getaway

www.pgesco.com