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izvorima električne energije**

**9th International Conference on Renewable
Electrical Power Sources**



Beograd, 15. oktobar 2021
Belgrade, October 15, 2021

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**Predsednik Društva za
obnovljive izvore
električne energije
pri SMEITS-u**

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Prof. dr Zoran Stević

Za izdavača

Vladan Galebović

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PREDGOVOR

Ubrzani napredak nauke, tehnologije i industrije dovodi do poboljšanja kvaliteta ljudskog života, ali i do stvaranja novih rizičnih situacija. Čovečanstvo je suočeno sa rizicima kakvih u ranijoj ljudskoj istoriji nije bilo. Globalno zagrevanje je tipičan primer. Jedan od glavnih problema vezanih za nove rizične situacije jeste – pitanje odgovornosti. Vlade država u svetu ne smeju teret odgovornosti prepustiti isključivo naučnicima i ekspertima, ali takođe ne smeju same odlučivati i preuzimati (ne)odgovornost. Trebalo bi da se konsultuju sa ekspertima i da dobro procene kada i kakve mere treba preduzimati. Potrebna je jaka politička inicijativa da bi se počeli rešavati ozbiljni ekološki problemi kao što je globalno zagrevanje, ali i lokalno zagađenje životne sredine. Politički dogovori na svetskom nivou koji su do sada postignuti u okviru Kjoto protokola, nedovoljni su za zaustavljanje ovog fenomena. Čiste tehnologije - tehnologije koje su dizajnirane da obezbeđuju superiorne performanse za nižu cenu dok istovremeno kreiraju manji gubitak energije od konvencionalnih ponuda - imaju velike šanse da budu motorna snaga koja će obezbediti ekonomski rast.

Nauka, naravno, pre svih uočava probleme opstanka planete i života na njoj. Ona takođe pokušava da ih reši i uspeva onoliko koliko je to realno moguće, imajući u vidu političke, socijalne, ekonomske i tehnološke faktore. Može se konstatovati da su praktično svi prioriteti posvećeni očuvanju života na Zemlji. Nauka i razvoj tehnike i tehnologije mogu tome doprineti u više segmenata:

- obnovljivi izvori energije;*
- energetska efikasnost;*
- smanjenje količine otpada;*
- smanjenje štetnosti otpada;*
- reciklaža;*
- prečišćavanje zemlje, vode i vazduha;*
- neutralizacija preostalog otpada.*

Bitan faktor za donošenje političkih odluka je i javno mnjenje. Zato je jako važno podizanje opšte svesti i što šira edukacija stanovništva o neophodnosti prelaska na obnovljive, ekološki prihvatljive izvore energije, što je jedan od dugoročnih ciljeva ove Konferencije.

Ovaj međunarodni skup po deveti put organizuje Društvo za obnovljive izvore električne energije (DOIEE) Saveza mašinskih i elektrotehničkih inženjera i tehničara Srbije (SMEITS), uz suorganizaciju Instituta za arhitekturu i urbanizam Srbije (IAUS).

U Beogradu, oktobra 2021.

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HERMENAUTIKA I VIZUELNA PREDSTAVA POLITEHNIČKOG PROMIŠLJANJA

HERMENEUTICS AND VISUAL PERFORMANCE OF POLYTECHNICAL THINKING

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Hermeneutički i politehnički pogledi na tehnološki oblikovanu egzistenciju savremenog čoveka, ukrštaju se u politehničkom muzejskom okruženju, na planu simboličke sublimacije. U ovom radu, predmet istraživanja su operativno-tehnički aspekti prezentacija konceptualnih pozicija u stvaranju muzejskih predstava politehničnosti, a u kojima je centralno pitanje konceptualna primena u vizuelnoj prezentaciji mašinskih delova ili elemenata, pa i mašina u celini. Prikazane su dve studije sa Interneta, koje karakterišu različite tehnološke pristupe u materijalizaciji politehničkog promišljanja o tehnološkom univerzumu naše civilizacije.

Ključne reči: muzej, politehnika, hermeneutika

Hermeneutic and polytechnic views on the technologically shaped existence of modern man intersect in the polytechnic museum environment, in terms of symbolic sublimation. In this paper, the subject of research are operational and technical aspects of the presentation of conceptual positions in the creation of museum representations of polytechnics, in which the central issue is the conceptual application in the visual presentation of machine parts or elements, and machines as a whole. Two studies from the Polytechnic Museum in Moscow are presented, which characterize different technological approaches in the materialization of polytechnic thinking about the technological universe of our civilization.

Key words: museum, polytechnic, hermeneutics

1. Introduction

Polytechnics, as the content and quality of thinking and acting in various areas of life, characterizes modern civilization. Museums, especially those dedicated to polytechnics, in terms of content and symbolism, are determined to present a polytechnic view of the world. Therefore, the scientific question is important, in what way and with what instruments symbolic interactions are connected, with the question of polytechnics and identity of a modern man, and where in that relation the question of renewable energy sources can be inquired.

Various scientific sources show that very little modern research is dedicated to the role of technical elements, which belong to the fields of mechanical engineering and electrical engineering, in the realization of symbolic contents in museums. Therefore, methodologically, the understanding of the context of our research starts from the point of view of pragmatists George Herbert Mead and Herbert Blumer, who scientifically raised the question of symbolic interaction that is the essence of human action towards physical objects and other beings. These are actions that mark meanings derived from social interactions, whereby these meanings are determined through an interpretive process. As Blumer points out, the actor chooses, checks, maintains, regroups and transforms meanings in the light of the situation in which he is placed and in relation to the direction of his action [1]. In accordance with that, we connect the position of Joseph Bleicher, that the hermeneutic circle is an

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ontological condition of understanding, and that it originates from the community and obliges us according to tradition in general, and especially according to our object of interpretation. It also provides us with a connection between finality and universality and between theory and practice [2]. The context in which this actualization takes place is modernist, so in that sense we refer to the opinion of Kenneth Gergen, who believes that modernism is committed to the study of the world, for which facts exist independently of us as observers, and that we will, if we rational, to come to know them as they are [3].

Having in mind the above, these two selected, paradigmatic examples for the research of polytechnics and the identity of modern man (Fig. 1), are found on the Internet. Presented studies are focused on sublimations of polytechnic thinking of the XX and XXI centuries, in which machine elements or machines as a whole, are used on a symbolic level in the visualization of polytechnic thinking. The first study refers to a museum exhibit that was spotted on the website www.otdihinfo.ru, where it is connected with one of the oldest scientific museums in the world and the largest technical museum in Russia - the Polytechnic Museum in Moscow, founded in 1872, and whose holdings include over 200,000 items, including an 18th-century humanoid automaton. The exhibit we investigate in this paper (Figure 1a) is in our focus exclusively as a model in the domain of explicit representation of machine instruments as symbolic content, i.e., in the domain of symbolic use of machine assemblies and measuring devices. Therefore, we do not consider it as an author's work, i.e., the subject of historical-artistic analysis. Another example refers to the projects of Martin Messier, a Canadian composer and video artist (Figure 1b) who performs in many world centers, showing his unusual orchestras made of machines. It is a combined instrumentation, with a modified function of machines, where the energy of the source also has a functional role in the construction of symbolic content.

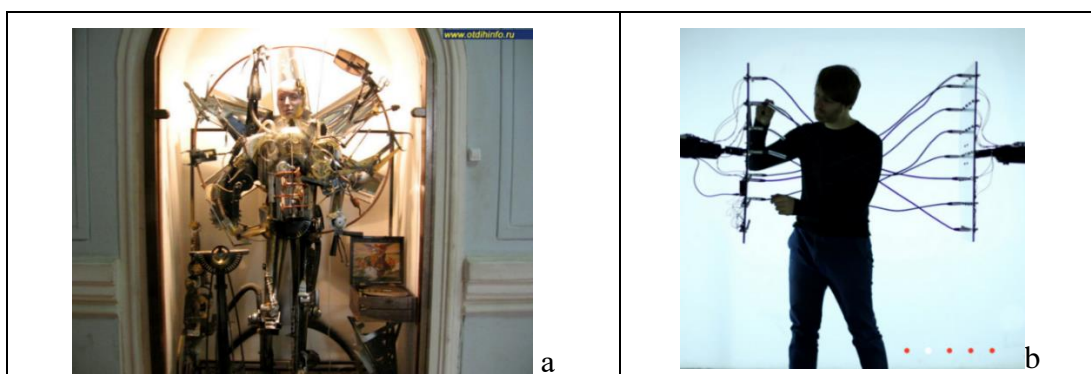


Figure 1. Two sublimations of polytechnics in the Polytechnic Museum in Moscow: exhibit as an instrument of polytechnic thinking (a) [5]; Polytechnics in the Movement of Martin Mesier, a Canadian composer and video artist, at the Moscow Polytechnic Festival (b). [6]

2. Symbolic correspondence and polytechnics

We observe the polytechnic model (Fig. 2) at the level of basic correspondence, without investing in historical-artistic analyzes. We refer to the work of Dionysius the Archaeopagite, *On the Heavenly Hierarchy*, ie to the interpretation of this work given by Dmitry Marchenko, with the view that the human mind can understand the heavenly hierarchies only on a symbolic level [7]. On the other hand, the model also corresponds to the anthropometric research of two prominent representatives of polytechnic thought: Marco Vitruvius Polonius, a Roman writer, architect and engineer, as well as the studies of Vitruvius, Leonardo da Vinci, an artist and researcher who corrected Vitruvius' measures and whose creative influence lasts to this day [8].

A comparative view of different traditions (Figure 3) indicates a symbolic reference to the selected polytechnic model, the archetypes of the circle (cosmos, sign of the absolute, eternity) and square (earth, perfect harmony and order in space) in which we recognize the symbolic constitution of human interest in knowledge, as written by Marshall Salins (Sahllins) [12].

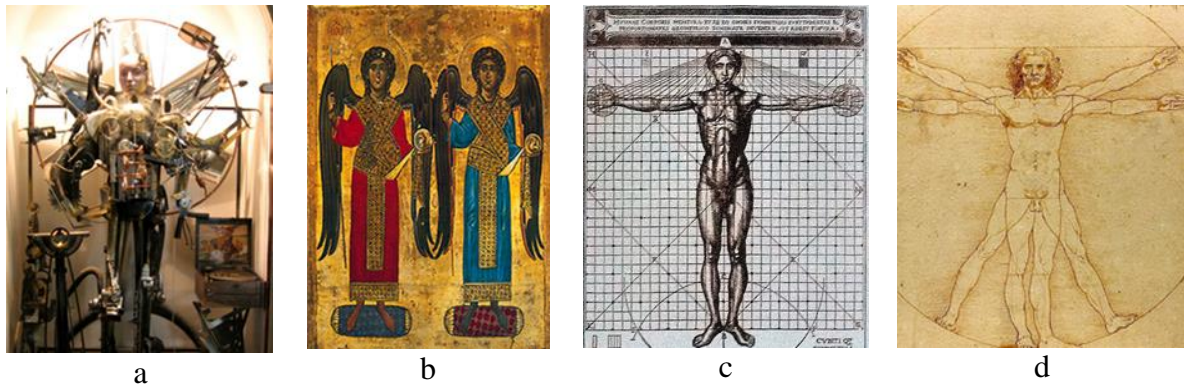


Figure 2. Polytechnical model (a) [5], Winged Angels in Togas, Basilica of Santa Maria Maggiore, Rome (432-440)[†] (b) [9]; Vitruvian Man[‡], illustration in the edition from 1521[§] (c) [10]; analysis of Vitruvius' man Leonardo da Vinci from 1487^{**} (Cosmografia del minor mondo) (g) [11]



Figure 3. Comparative view - polytechnics and Byzantine, Russian and Hindu tradition: detail of exhibits from the Moscow Polytechnic Museum (a) [5]; mosaic detail Archangel with labarum and state^{††††}, Byzantine mosaic XI century, St. Sophia Cathedral, Kiev. (UNESCO World Heritage List) (b) [7]; details of the depiction of a Hindu deity - the god Shiva (v, g.) [15], [16]

On the other hand, the exhibit, as an object de connaissance, with a pronounced internal structure, cannot be fully understood without an analysis of its construction [13]. It should be borne in

[†] Winged angels in togas, Basilica di Santa Maria Maggiore, Rome (432-440)

[‡] Marcus Vitruvius Pollio, (1st century BC), author of the famous Roman architectural treatise "De architectura, libri decem". The third book contains three complete measures of the human body

[§] Dell'architettura di Vitruvio; Edizione illustrata di Cesare Cesariano, 1521.,

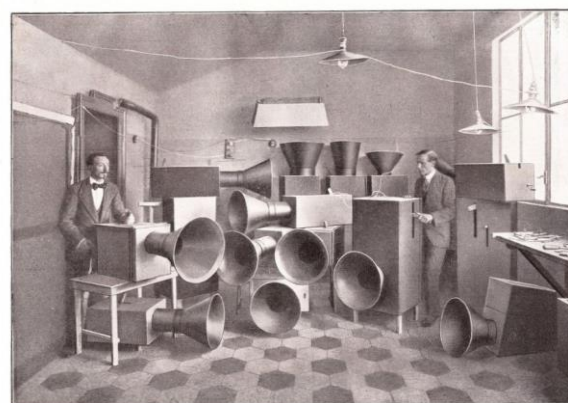
^{**} "The law of proportions" or less frequently "Proportions of man", published in Delle opinioni di Leonardo da Vinci intorno alla simmetria de Corpi Umani, 1811

^{††} Архангел с лабарумом и державой;

^{†††} Labarum - Roman war flag during the reign of emperors from the later period of the empire; after Constantine the Great, with the sign of the cross and the Greek initials of Jesus Christ

mind here that in the physiocratic domain, according to the Merleau-Ponty system, the visual perception of the observer refers not only to visible phenomena, but also to absent forms [14]. Therefore, the understanding of the construction of the exhibit, in this case the machine tools, apart from the symbolic one, also belongs to the literal facticity.

In that sense, the museum exhibit is both a deductive-inductive structure and a rational form that is subject to intellectual control, firmly determined geometric shapes, which are placed in an explicit space of stylistic pluralism. The well-known thought of Merleau-Ponty, that in the gesture of the hand that rises towards an object, there is a reference to the object, not as a presented object, but as a specificity according to which we project [17], is literally materialized here and seems to of the museum exhibit, as a second-degree thought process, can be found in Descartes' philosophy^{§§***} [18], [19]. It helps us to distinguish qualitative differences in the articulation of a clear sensitive experience of the archetypal, from the intellectual experience that arises here by a cognitive understanding of the functions of the presented machine tools in the achieved quality of technology.



LUIGI RUSSOLO Nel Laboratorio Degli Intonarumori a Milano. UGO PIATTI

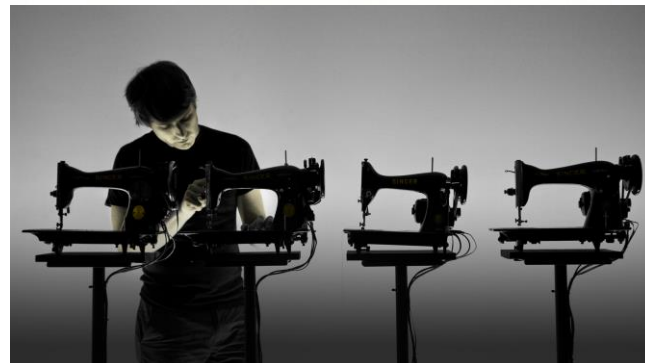


Figure 4. Noise as part of the sound image: instruments built by Russo [21]; machines that make up Martin Mesier's orchestra in the composition of the Sewing Machine Orchestra (b) [22]

On the other hand, it is also about the techno - scientific foundation of the modern visual representation and its functional problematization in the thematization of the human representation. In that sense, this cognitive capacity built into the polytechnic performance has a crucial role in the experience of visual phenomena, where, unlike metaphysically motivated correspondent examples, a significant role is played by secular, highly technological content, based on numerous relations that are also part of sound phenomenon. It should be taken into account here that Mesier's primary goal is to work on machine sound. It is clear that machines or machine parts in this case are not individually important in themselves, but are important in their function in the logic of the whole, and therefore we are talking about a deductive structure. However, unlike the presented static museum exhibit, the performer who is a significant component of the visual performance, here is a dynamic entity that introduces numerous variables from the phenomenological, semiotic and historical-artistic holdings

^{§§} Principles of Philosophy (Principia philosophiae) from 1644

^{***} Reflections on the first philosophy (Meditationes de prima philosophia) from 1641

of knowledge, managing the purposefulness of machines. Instead of machine functions they get semiotic ones. These functions are determined by an autonomous artistic view of the world and are part of a broader contextualization in which the author builds temporal-spatial relations, establishing both polytechnic and stylistic dialogue with many phenomena from the recent or distant past.



Figure 5. Visual correspondence: a detail from Martin Mesier's project *Unheard sounds* (a) [6], *The Angel Holding the Candelabra*, Michelangelo Buonarroti, 1495 (b) [23], detail *Two Adoring Angels*, 1427-1438, Victoria and Albert Museum, London (v) [24]; *Kneeling Angel*, Bukhara School (c. 1555–1560) [25]

3. Operational and technical aspects

Both studies show how machines and technical devices were used in the creation and execution of a work that reflects artistic and philosophical ideas in the context of polytechnics on several levels. The engineering view in constructions notices academic compositional schemes and different aspects of engineering aesthetics, ie aesthetics of adaptation in designing mechanisms with artistic - functional requirements, regardless of whether they belong to the same morphological line, in order to achieve integrity as a reflection of dominant principles of symbolist phenomenology.

Both in the static exhibit and in the performance, these studies can discuss how machine elements give visual features to compositions, primarily having in mind the noticeable rhythm of element arrangement, harmony and communication, mass arrangements and structural details and their role in machine synthesis. assembly, between formalistic reduction and technological improvement, that is, between belonging to a technological tradition or a futuristic projection. It is on this plane that we find the need for a place of hermeneutic observation, where we see that a technological problem corresponds to a philosophical one, in the way Hans Georg Gadamer describes it when he speaks of the problem of understanding, that is, of the perceptual character of a work. [26]

This internal necessity, in the studies we are considering here, must be harmonized with the technological necessity of realizing the technological meaning and logic of a function according to a disciplinary canon, but also with universally thought-out constructions of historical development, which in technological history as well as in art history and in this case, they fall under the compulsion of cultural determinism. Therefore, the grounding in the essence of things and the creator must be excluded from the arbitrariness of the artist's construction, which would probably build a different

idea of the adequacy of machine and electrical elements and assemblies, as means of expression, their proceduralism and performativity.



Fig.6. Details of the museum exhibit: machine elements, assemblies, measuring devices, as expressive means of the polytechnic image of the world in the exhibit from the Polytechnic Museum in Moscow [6]

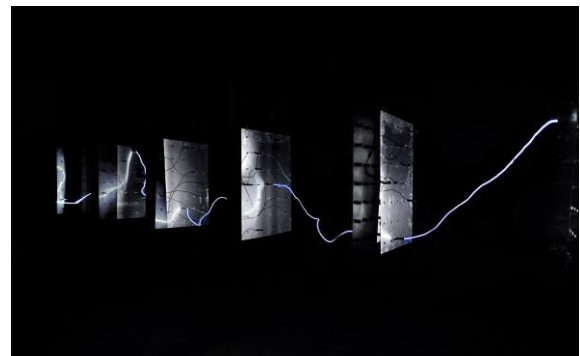


Figure 7. Energy in performance: ECHO CHAMBER project (ultrasound and resonance as means of expression) and IMPULSE project (dismantling of energy circulation), author Martin Mesier [22]

When it comes to performance in which electromechanical and digital devices are part of the concept by which the author explores the connections between sound and material (in order to examine the relationship between visible and invisible), as well as presence in relation to absence (in order to examine potentials in these relationships) for the creation of metamorphoses through the transformation of objects), the operational-technical requirements of performance, as well as the philosophical view whose performance is reflection, give a new connotation to the question of energy use.

If we see the knowledge of energy as one possibility of knowing reality, then the research of energy and its sources becomes a necessity for creating a more credible picture of the polytechnic view of the world. Bearing in mind, however, that Mesier does not modify the basic and real sound of a machine or device, but computer-models the volume or visually demonstrates the flow of energy, here the question of quantity as a technical and as an expressive element of performance symbolic content. Thus, the performer brings us back to the question of the classic Aristotle's concept of mimesis, according to which music, as Friedrich Tomberg emphasizes, should be a mimesis of practice, not nature. Tomberg also points out that, according to Aristotle, aesthetic imagination is realized where, from knowing (syllogizestai) and learning (mathanein) what a work of art offers, joy (chairesis) or pleasure (hedoné) results. Of course, as this author comments, it is about Aristotle's belief, "that learning is not only the greatest joy for the philosopher, but also for other people" [27]. Since in the operational-technical domain this is primarily about the knowledge that museum experts and artists should have about energy, in the society of the XXI century, special knowledge about

renewable energy sources is considered a primary requirement, and hence a necessary condition for knowledge about renewable energy. With energy sources, he more actively enters museums and polytechnic festivals of artistic performances, so that the polytechnic picture of the world, on which modern man builds his identity, is closer to the spirit of his time.

4. Conclusion

This research is placed on three basic supports that make up the areas of symbolic interactions, hermeneutics and modernism. Comparative analyzes, which represent the next methodological step, provided insights into the corresponding traditions, intending to determine the presence of continuous lines of visual identities on the selected samples. Based on the obtained results, in the third phase of this research, the analysed operational and technical characteristics, which are necessary for the symbolic presentation of polytechnics, were performed. Results of the research showed that the expression of a polytechnic view of the world, in museums and contemporary art takes place on a complex symbolic level, where hermeneutics and technology intersect against the background of diverse knowledge, both about tradition and new technologies and energy. On a broader scale, in the time of highly technological civilization, these results show that polytechnics are a complex phenomenon in which technological knowledge must be introduced into the continuity of cultural traditions and historical development, to be plausible in building the identity of modern man.

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VAŽNOST PREGLEDA I ODREĐIVANJE PREOSTALOG VEKA TRAJANJA CEVOVODA NA NAFTNOJ PLATFORMI

IMPORTANCE OF INSPECTION AND DETERMINATION OF REMAINING LIFE OF PIPELINE IN OIL PLATFORM

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Naftna platforma je velika građevina sa objektima za bušenje bušotina za istraživanje, vađenje, skladištenje i preradu nafte i prirodnog gasa koji leži u stenovitim formacijama ispod morskog dna. Bušenje na otvorenom moru predstavlja izazove za životnu sredinu. Iako, srećom, nije bilo mnogo nesreća na oil platforms, šteta koja nastane je ogromna i u ljudskom i u materijalnom i u smislu zaštite životne sredine. Iz tog razloga, inspekcija opreme pod pritiskom je od velikog značaja. The risk to the pressure vessel in service can be failure due to material degradation. Jedan od tipičnih mehanizama degradacije materijala je korozija. U ovom radu će biti prikazana važnost inspekcije opreme pod pritiskom. Na konkretnom, praktičnom primeru će biti predstavljena inspekcija pipeline i određivanje corrosion rate i remaining life u cilju sprečavanja otkaza i materijalnih I ljudskih gubitaka.

Ključne reči: cevovod, ispitivanja bez razaranja, brzina korozije, preostali vek trajanja

The oil platform is a large structure with facilities for drilling wells for exploration, extraction, storage and refining of oil and natural gas lying in rock formations under the seabed. Offshore drilling poses environmental challenges. Although, fortunately, there have not been many accidents on oil platforms, the damage that occurs is enormous, both in human and material terms, and in terms of environmental protection. For that reason, the inspection of pressure equipment is of great importance. The risk to the pipeline in service can be failure due to material degradation. One of the typical mechanisms of material degradation is corrosion. This paper will present the importance of inspection of pressure equipment. On a concrete, practical example, pipeline inspection and determination of corrosion rate and remaining life will be presented in order to prevent failures and material and human losses.

Key words: pipeline, nondestructive testing, corrosion rate, remaining life

1 Introduction

Pipelines are the most efficient way of transporting oil, gas, water, chemicals, etc. Today the offshore pipeline system is highly efficient, safe and environmentally friendly because the possibility of pipeline failure is extremely small. However, if a malfunction occurs, it can have a great impact on the environment as well. Most operations in the process industry take place at temperatures and pressures that differ from normal atmospheric conditions. These operations are often dangerous and endanger the environment. These structures have their limitations according to the material of construction, the method of design and construction, maintenance schedule and their age. Any defect or deficiency in these aspects would mean that these structures would not do their role perfectly, and accidents would occur. The mechanical designer must ensure that the construction guarantees reasonable safety for a reasonable period and does not fail despite continuous or moderate difficulties conditions according to its construction structure (1, 2). Although pipelines are one of the safest modes of transport and have failure rates much lower than rail or highway, failures do occur and sometimes

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