

Министерство науки и высшего образования Российской Федерации  
Федеральное государственное бюджетное образовательное учреждение  
высшего образования  
Санкт-Петербургский горный университет

Кафедра иностранных языков

## ДЕЛОВОЙ ИНОСТРАННЫЙ ЯЗЫК

ТЕПЛОЭНЕРГЕТИКА И ТЕПЛОТЕХНИКА  
(ТЕХНОЛОГИИ ПРОИЗВОДСТВА ЭЛЕКТРИЧЕСКОЙ  
И ТЕПЛОВОЙ ЭНЕРГИИ)

*Методические указания для практических занятий  
студентов направления 13.04.01*

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ENGLISH FOR SPECIFIC PURPOSES

THERMAL ENGINEERING  
(PRODUCTION OF ELECTRICAL AND THERMAL  
ENERGY)

САНКТ-ПЕТЕРБУРГ  
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**ДЕЛОВОЙ ИНОСТРАННЫЙ ЯЗЫК. Теплоэнергетика и теплотехника (технологии производства электрической и тепловой энергии):** Материалы и методические указания для практических занятий / Санкт-Петербургский горный университет. *Сост. К.В. Малин. СПб, 2022. 49 с.*

Методические указания предназначены для практической работы студентов направления подготовки 13.04.01 «Теплоэнергетика и теплотехника (технологии производства электрической и тепловой энергии)». Предложенные материалы направлены на формирование словарного запаса, развитие навыков перевода, диалогической речи, межкультурной коммуникации, а также навыков аудирования.

Рецензент доц. А.А. Радюшкина (Государственный педагогический университет им. А.И.Герцена)

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## ПРЕДИСЛОВИЕ

Методические указания предназначены для самостоятельной работы студентов по направлению 13.04.01 «Теплоэнергетика и теплотехника», а также студентов, обучающихся по смежным специальностям, а именно «Нефтегазовое дело», «Стандартизация и метрология», «Электроэнергетика и электротехника», «Автоматизация технологических процессов и производств», «Машиностроение». Тесная связь указанных дисциплин обусловлена характером технологических процессов, которые реализуются на объектах топливно-энергетического комплекса. Для обеспечения подобных процессов используется комплексное оборудование, в монтаже, наладке и эксплуатации которого одновременно участвуют технические специалисты указанных профилей.

Настоящие методические указания рекомендуется использовать совместно с методическими указаниями для самостоятельной работы студентов направления 13.04.01 «Теплоэнергетика и теплотехника».

Структура учебных материалов состоит из пяти уроков. Каждый из уроков разделен на две части: аудирование и говорение. В разделе «Аудирование» приведены аутентичные обучающие видеоматериалы, снабженные глоссарием. После глоссария следуют упражнения на перевод для отработки новых слов и выражений. В разделе «Говорение» приведены ситуации из практики, требующие осмысления и поиска оптимального решения вопроса с учетом культурно-языковых особенностей говорящих. Характеристика участников ситуаций содержится в разделе «Проектный персонал». Каждый из разделов снабжен списком рекомендованной литературы в помощь студентам для выполнения заданий.

В Приложении А приведены стенограммы видеофильмов для облегчения работы над их содержанием. В конце методических указаний дана библиография.

Ссылки на библиографию указаны в круглых скобках, например (6:3). Первая цифра обозначает номер источника согласно библиографическому списку, вторая цифра соответствует номеру страницы, при наличии.

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## Course Overview

The scenes are laid out in a natural gas compressor station in Russia. Gas turbines and centrifugal compressors (together referred to as *compressor trains*) for this compressor station are supplied by an Italian company known as Global Engines under a contract with a Russian manufacturer RusMash. These machines are to be pre-commissioned and commissioned on site by RusMash in close cooperation with Global Engines. The owner of the compressor station is Transgaz, a Russian oil&gas company. Below is the list of personnel engaged in this project. Some of the personnel are described by the level of expertise in their discipline. Five levels are offered: novice, advanced beginner, competent, proficient, and expert.

The stories, all names, characters, and incidents portrayed in this course are fictitious. No identification with actual persons (living or deceased), places, buildings, and products is intended or should be inferred.

## Project Personnel

MARCO – *mechanic FSE* from “GLOBAL ENGINES” (works on-site, oversees mechanical repair, installation, commissioning, servicing, and purchase of mechanical equipment and parts). Italian, late 30’s, level of expertise: expert;

SANTINO – *control FSE* from “GLOBAL ENGINES” (works on-site, oversees repair, installation, commissioning, servicing of control systems and purchase of various control equipment and parts). Italian, mid 30’s, level of expertise: expert;

EUGENIO - *mechanic FSE* from “GLOBAL ENGINES”, Italian, lives in Sardinia, mid 30’s, level of expertise: competent;

ALEXEY – *owner* from “TRANSGAZ” (works on site. Controls and updates the overall time schedule in co-operation with his project management and Contractors' site management. Oversees contract execution (EHS, quality, schedule, milestones, costs, quantity) in close co-operation with his project management. Maintains an intensive relationship with contractors). Late 40’s, Russian;

ALEXANDER – *site manager & mechanic FSE* from RUSMASH (works on-site, oversees mechanical repair, installation, commissioning, servicing, and purchase of mechanical equipment and parts). Russian, mid 30’s.

## Contractual Structure

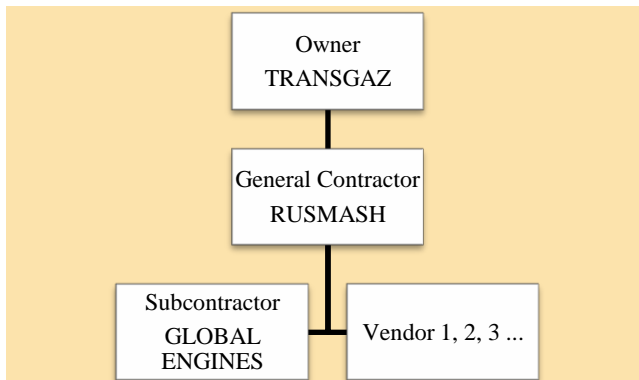


Fig.1. Contractual structure of compressor train project

Fig. 1 shows the contractual structure of the project where the general contractor has a single contract with the owner and several contracts with his main subcontractor and miscellaneous vendors.

## Scene 1 - Mobilisation

### Part A – Listening

Ex. 1. Before travelling to a new project site as a field service engineer, you need to make certain arrangements. What kind of arrangement do you need to make? Make two lists of items: the first list is for the items you must have (must have items) e.g. a laptop, working clothes, medicines, etc. The second list is for the items you must not have (must not have items) e.g. any fuels, flammable, toxic, alcoholic or corrosive substances, etc.

Ex. 2. Watch a video “TRUMPF Career: Field Service Engineer“ about Dan Nietzel describing his typical mobilization procedure. Compare your lists with the information which you can infer from the video (<https://www.youtube.com/watch?v=ok7X9VeDeKk>).

### Vocabulary

- |   |  |
|---|--|
| 1 <b>customer's place of business</b><br>объект заказчика   | 7 <b>to develop analytical and problem solving skills</b><br>развивать аналитические навыки и умение решать вопросы                      |
| 2 <b>to identify a problem with a machine</b><br>выявлять неисправность оборудования                            | 8 <b>to be in close contact with service scheduling department</b><br>тесно взаимодействовать с отделом планирования работ по шефналадке |
| 3 <b>to get a machine running again</b><br>наладить оборудование; устранить неисправность в работе оборудования | 9 <b>to keep smb in the loop</b><br>держат в курсе; уведомлять   |
| 4 <b>assignment</b><br>распоряжение о направлении работника в командировку                                      | 10 <b>to work on a mission</b><br>работать над проектом  |
| 5 <b>to make a repair</b><br>произвести ремонт  | 11 <b>to restore a machine to production</b><br>восстановить работу оборудования   |



6	<b>to provide an instruction</b> давать указания	ния	12	<b>field service engineer (FSE)</b> инженер по шефмонтажу и шефналадке; шеф-инженер
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Ex. 3. Learn the vocabulary and retell the video.

Ex. 4. Use the vocabulary to translate the sentences.

1. В период приемо-сдаточных испытаний шефперсонал должен вести наблюдение за работой **оборудования**, а при необходимости должен **давать указания**, являющиеся обязательными для персонала заказчика, если эти указания не противоречат правилам технической эксплуатации электрических станций и сетей и правилам техники безопасности (3:7).

2. После заключения договоров на шефмонтаж и шефналадку и согласования срока начала работ предприятие-изготовитель должно командировать (to mobilize) **шефперсонал** на **объект заказчика** в сроки, обусловленные договором (3:5).

3. **Работы по восстановлению** оборудования, поврежденного в результате неправильной эксплуатации или несоблюдения требований ведения пусконаладочных работ, оговоренных в технической документации Исполнителя (contractor), выполняются силами **Заказчика** и за его счет по указанию **шефперсонала** Исполнителя (3:47).

4. Количественный состав **шефперсонала** определяется предприятием-изготовителем (ОЕМ) в зависимости от типа **оборудования**, при этом предприятие-изготовитель при необходимости имеет право изменить численность и состав **командируемых специалистов** без ущерба для выполнения договорных обязательств и **уведомить заказчика**; при этом сроки и стоимость работ, указанных в договоре, сохраняются (3:6).

5. **Шефперсонал** имеет право запрещать ведение монтажных и пусконаладочных работ, требовать от **заказчика** прекращения испытаний или эксплуатации оборудования для устранения **выявленных нарушений** и отступлений в ведении этих работ, а при необходимости - также и ревизии оборудования, вплоть до вскрытия самых крупных сборочных единиц, резки труб, коллекторов и других работ, если **выявленные нарушения** влекут за собой опасность по-

вреждения **оборудования** или снижения его гарантийных показателей (3:10).

6. Цель шефмонтажа - квалифицированное и оперативное **решение вопросов**, возникающих в ходе монтажа оборудования (3:2).

## **Part B – Speaking**

Ex.5. Managing cultural differences

**Overview:** You are Eugenio. You received a call from home saying that your father-in-law is seriously ill. You are looking to demobilise from the site earlier than expected due to family reasons. Your back-to-back is to replace you only a week after your urgent departure. You asked the owner Alexey to let you go home but received a flat denial. You are the only mechanic FSE on site now and your leaving will cause a delay in commissioning. The customer denied you the opportunity to go home until the arrival of your back-to-back.

**Task:** As you think through your actions, consider the following:

- a) Will you pursue your own concerns at the expense of your customer's interests?
- b) Will you neglect your own concerns to satisfy the needs of your customer?
- c) Will you compromise your personal interests and tolerate annoyances rather than precipitate a conflict and risk an open confrontation with your customer?
- d) Will you sidestep the conflict and carry on with your work rather than openly confront your customer and defy him?

Prepare a dialog with your customer using the information from the text below. As a customer, prepare a list of lessons learnt to avoid similar problems in the future (e.g. Amending the contract to consider Italian and Russian cultural values, etc.).

**Tips:** Read the following information about one of the cultural values for doing business with Italians. Use it as a general guideline for your response.

### **Relationships: Family and Friends**

Italians identify themselves more with their region, their family, friends, or soccer team than with their job. Family ties, connections, and relationships are the bastions against the insecurities of life. Over the centuries, the system of family and connections evolved as a solution to problems imposed by foreign occupation. Today family is still the number one cultural value for Italians (2:564).

## Scene 2 - Man Camp

### Part A – Listening

Ex. 6. Operation of oil & gas fields requires thousands of workers and large scale camps to accommodate them. Normally such camps are temporary prefabricated structures (модули высокой заводской готовности). They are portable and can be moved, configured and customized easily.

If you were the owner of an oil & gas field, would you care about the comfort and happiness of your workforce? Would you agree with the statement that comfort of the workforce can drastically influence operation's progress? What kind of amenities would you offer to **man camp residents** to make their life more enjoyable?

Ex. 7. Watch a video “Williston ND - Inside a man camp” about Bear Paw Lodge, a man camp in Williston, North Dakota. Compare your suggestions with the existing conditions in the camp shown in the video (<https://www.youtube.com/watch?v=wTsOpI8Xtqk>).

### Vocabulary

13 <b>man camp</b> вахтовый поселок	25 <b>to get picked up at the airport</b> встречать в аэропорту
14 <b>camp residents</b> проживающие в вахтовом поселке	26 <b>to get dropped</b> заселять
15 <b>to cut the ground</b> рыть котлован	27 <b>basic amenities</b> товары первой необходимости
16 <b>to offer amenities</b> создавать жилищно-бытовые условия	28 <b>to get transported to a work site</b> доставлять к месту выполнения работ
17 <b>to give an inside tour</b> провести экскурсию по общежитию	29 <b>individual shower</b> отдельный душ
18 <b>mudroom</b> место для сушки рабочей одежды	30 <b>queen bed</b> двуспальная кровать

	ды, помещение сушилки		
19	<b>to get out of one's gear</b> снимать, оставлять спецодежду	31	<b>shortage of housing</b> дефицит мест размещения
20	<b>overalls</b> рабочий комбинезон	32	<b>salad bar</b> салат-бар
21	<b>booties, shoe covers</b> бахилы	33	<b>goodies</b> вкусняшки, печеньки
22	<b>to track mud and dirt into a room</b> разносить грязь; проходить в рабочей обуви, в грязной одежде в жилое помещение	34	<b>to have zero tolerance for</b> абсолютно не приемлать
23	<b>to keep it nice and clean</b> поддерживать чистоту и порядок	35	<b>to get a hold of a housing coordinator</b> связаться с координатором по заселению
24	<b>convenience store</b> буфет	36	<b>to create safe and secure environment</b> создавать комфортную и безопасную среду

Ex. 8. Learn the vocabulary and retell the video.

Ex. 9. Use the vocabulary to translate the sentences:

1. Заказчик обязан создавать необходимые **жилищно-бытовые условия** для **работников, проживающих в вахтовом поселке** (4).
2. **Работникам, проживающим в вахтовых поселках**, категорически запрещается **проходить в жилое помещение в рабочей обуви, грязной одежде** (4).
3. Заказчик обязан организовать **места для сушки рабочей одежды, комбинезонов и обуви** (4).
4. **Работники, проживающие в вахтовых поселках**, обязаны **соблюдать чистоту** в жилых комнатах, **оставлять свою рабочую одежду и обувь в помещении сушилки** после окончания трудовой смены (4).
5. **Проживающие в вахтовых поселках** обязаны использовать **бахилы** для внутренних помещений и столовой (4).

6. Прибывающих поездом или самолетом работников **встречают «вахтовки»** – специальные автотранспортные средства, **доставляющие** их непосредственно на месторождения (5:171).

7. **Вахтовый поселок** рассчитан на **проживание** более 1175 человек.

8. Мы планируем снизить **дефицит мест размещения** до минимума в течение пяти лет. Сейчас одновременно строятся около 25 объектов (ТАСС).

## Part B – Speaking

Ex. 10. Managing cultural differences

**Overview:** You are Santino. In the man camp where you live (Fig.2), the video surveillance camera in the hallway records you entering an empty room and leaving it after a few minutes. This room is next to yours. Shortly after, the camp manager (комендант общежития) comes into the room and smells cigarette smoke in there. He raises a safety concern and reports to the owner. The owner asks you to come to his office and explain if and why you have smoked in the room.

**Task:** As you think through your response, reflect on the following:

- 1) What consequences will you suffer if you are found guilty of breaking the safety rule?
- 2) What were you doing in that room? Prepare a dialog with the owner using the art of arrangiarsi.



Fig.2 Typical man camp in oil&gas field

**Tips:** Read the following information about the art of *arrangiarsi*, one of Italian cultural features. Use it as a general guideline to shape your response.

### **The art of *arrangiarsi***

*Arrangiarsi* means to be able to make do, to get by, to work oneself out of any situation. This activity has been elevated to an art in Italy because most systems do not function as expected. The cause of this has historical roots, going back to the numerous invaders, conquerors, and imposed systems of foreign government. In business terms, this could be called “creative problem solving.” The Italians have learned to make do as a reaction to the formidable system of government, laws, and taxes. It is hard for Americans to understand this idea because they are used to having systems that actually work as expected. Instead, Italians have developed ways to get around the system and to accomplish what needs to be done in a creative way, via connections and family ties (2:564).

### Scene 3 - Process Pipe Connection

#### Part A – Listening

Ex. 11. Before watching the video, consider the up and downsides of **fabrication of items in a shop** vs. **fabrication in the field**, e.g. if fabricated in a shop, items can be tested before they are installed, shop fabrication has lower safety concerns due to controlled environment, etc.

Ex. 12. Watch the video “W.Soule & Co. API pipe fabrication“ and say which fabrication method was chosen by this company and why. Listen to Ned Hawkins, a quality control director of W. Soule & Co. In this video he demonstrates an API pipe fabrication project which they completed for a natural gas compressor station. (<https://www.youtube.com/watch?v=mYzLFPg83ds>).

#### Vocabulary

- |  |   |
|--|---|
| 37 <b>Kalamazoo, Michigan</b><br>г.Каламазу, шт. Мичиган                               | 54 <b>to operate within weld procedures</b><br>соблюдать технологию сварки  |
| 38 <b>shop fabrication</b><br>централизованное изготовление;<br>заводское изготовление | 55 <b>to change over from the RMD (regulated metal deposition) process to a pulse process</b><br>переключаться с режима управляемого переноса электродного металла на режим импульсной сварки |
| 39 <b>field fabrication</b><br>изготовление на монтажной площадке                      | 56 <b>positioner</b><br>сварочный вращатель   |
| 40 <b>to get a project going</b><br>приступать к проекту; запускать проект             | 57 <b>to let roll as much of the welds as we can</b><br>вести сварку как можно большего количества стыков в поворотном положении  |
| 41 <b>utility compressor station</b><br>компрессорная станция собст-                   | 58 <b>to review a double weld procedure</b>   |



	венных нужд		проверить методику выполнения двусторонней сварки
42	<b>to give a quick overview of a company</b> кратко рассказать о компании	59	<b>to be on the same page</b> быть единого мнения
43	<b>to ship and fabricate</b> осуществлять изготовление и отгрузку	60	<b>subarc welding</b> дуговая сварка под флюсом
44	<b>with over 120,000 square feet of fabrication facilities</b> производственные помещения общей площадью более 120 000 кв. футов; производственные площади более 120 000 кв. футов	61	<b>weld preparation</b> подготовка кромок под сварку
45	<b>overhead cranes ranged from 5 tons to 50 tons</b> мостовые краны грузоподъемностью от 5 до 50 тонн	62	<b>to fit up a forty five</b> подгонять отвод с углом 45 градусов; выполнять сборку отвода 45 градусов
46	<b>fully automated and semi-automated loading equipment</b> полностью механизированное или полуавтоматическое подъемно-транспортное оборудование	63	<b>to get the fitting on the right degree</b> выполнить соединение под нужным углом
47	<b>to fabricate in the field</b> изготавливать на месте / на монтажной площадке	64	<b>to free a joint before welding</b> выполнять предварительный подогрев стыков труб перед сваркой
48	<b>to have downsides</b> иметь недостатки	65	<b>to cut down on the freeing time</b> сокращать время предварительного подогрева
49	<b>to deal with weather conditions</b> учитывать погодные условия	66	<b>to finish up the root pass of a joint</b> завершать сварку корневого слоя шва стыка
50	<b>to lower the time and cost of a project</b> сокращать сроки выполнения и стоимость проекта	67	<b>controlled environment</b> контролируемые условия окружающей среды

<p>51 <b>API 1104 piping project</b> проект изготовления технологического трубопровода по стандарту API 1104</p>	<p>68 <b>high production rate</b> высокая производительность труда</p>
<p>52 <b>to develop and qualify new weld procedures</b> разрабатывать и аттестовывать новые технологии сварки</p>	<p>69 <b>24/7 production tracking</b> система непрерывного производственного контроля</p>
<p>53 <b>welder; welding operator</b> сварщик</p>	<p>70 <b>welding inspector</b> мастер по сварке; контролер сварочных работ</p>

Ex. 13. Learn the vocabulary and retell the video.

Ex. 14. Use the vocabulary to translate the sentences:

1. Автоматическая или **полуавтоматическая сварка под флюсом** применяется для сварки труб с внутренним диаметром не менее 150 мм на переменном или постоянном токе. Автоматическая сварка должна производиться не менее чем в два **слоя** (6:123).

2. Универсальный **вращатель** применяют для **поворота** труб и элементов с  $Dy = 50...500$  мм, при этом он может изменять положение оси трубы или элемента в пространстве, что обеспечивает удобное положение **стыка** при сварке (6:123).

3. При **централизованном изготовлении** трубопроводов обеспечивается возможность перенести до 60% всех трудозатрат с **монтажной площадки** в заводские условия: механизировать **подъемно-транспортные операции**, широко применять механизированную газоплазменную резку и высокопроизводительные **методы сварки** (6:80).

4. **Централизованное изготовление** трубопроводах в цехах по сравнению с их изготовлением на **монтажных площадках** повышает **производительность труда** на 60...70% (6:127).

5. При производстве сварочных работ, особенно при отрицательных температурах окружающего воздуха, применяется такой вид обработки, как **местный подогрев** конструкций. **Подогрев** производят для компенсации усиленного теплоотвода из зоны шва и тем самым предотвращают образование трещин (6:131).

6. **Трубы** являются основным элементом **трубопровода**. Диаметр трубы зависит от количества протекаемой среды и скорости ее протекания в трубопроводе, а толщина стенки - от механической прочности материала при заданных температуре и давлении среды в трубопроводе и **диаметра трубопровода**. Следовательно, труба при одном и том же наружном диаметре может иметь различные внутренние диаметры. Для унификации диаметров труб введено понятие "условный проход". Под условным проходом труб следует понимать номинальный внутренний диаметр, выраженный целым числом (7:28).

7. Качество **подготовки кромок** и **сборки стыков** труб, предназначенных для работы под давлением до 2,2 МПа, должно проверяться **сварщиком**, которому поручена сварка стыков этих труб с периодической проверкой качества сборки стыков **мастером по сварке** (7:158).

8. Наземную укладку трубопроводов (surface laid pipelines) стали применять (to introduce) на участках с пылеватými мелкодисперсными грунтами при высоком стоянии грунтовых вод. **Недостатком** ее является плохая устойчивость грунта насыпи, который иногда ползает (to creep), а труба оголяется (to expose) (8:11).

10. **Остановимся кратко** на характеристике условий, определяющих сложность сооружения трубопровода. Очевидно, условия строительства (site conditions) могут изменяться от нормальных, т.е. таких, при которых возможна организация **непрерывного** строительного потока, до крайне сложных, при которых темп монтажно-строительных работ значительно **снижается** (8:13).

11. При выборе трассы газопровода следует **учитывать** условия строительства с тем, чтобы обеспечить применение наиболее экономичных и высокопроизводительных методов строительномонтажных работ (9).

## Part B – Speaking

Ex.15. Managing cultural differences

**Overview:** You are Marco. The general contractor (your customer) decides to run with the idea of connecting a defective NPS 18 ring-joint flange (фланец под круглую стальную прокладку) to the compressor and do a pressure test of the process piping (see Fig.3).

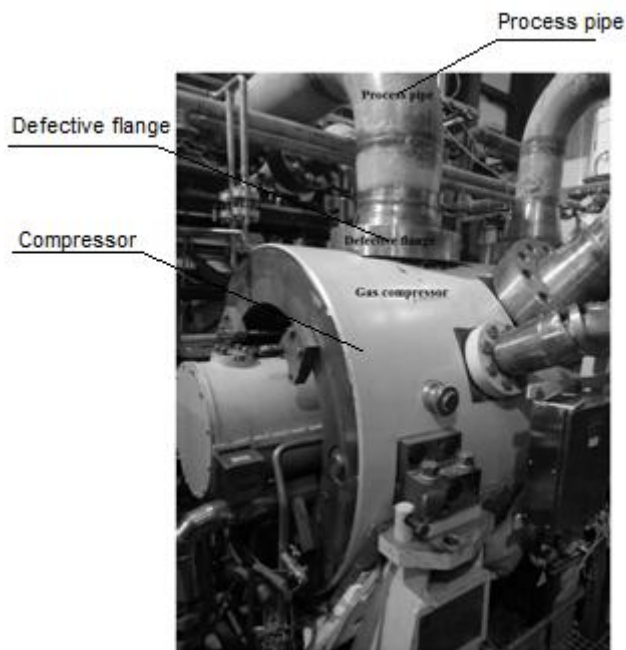


Fig.3. Centrifugal gas compressor with connected process pipes

The customer claims that the scratch on the flange face is not critical and can be removed by grinding (шлифовка). However, your company standards prohibit the use of flanges with such imperfections and require them to be replaced with new ones. Since there is no spare flange available on site, the customer will have to order it from abroad. Its fabrication and shipping will take at least one month and will lead to the plant downtime.

**Task:** Prepare a dialog with the customer to deal with this conflict using one of the following methods:

– *Competing* - конфронтация (defending a position you believe is correct);

- *Collaborating* – сотрудничество (digging into an issue to identify the underlying concerns of both parties and to find an alternative that meets both sets of concerns);
- *Compromising* – компромисс (seeking a quick middle ground solution);
- *Avoiding* – уклонение (sidestepping and postponing an issue until a better time).
- *Accommodating* – приспособление (neglecting your own concerns to satisfy the concerns of the other party) (1:6-11).

**Tips:**

1. Read ASME B16.5-2009, page 63, Table 3 “Permissible Imperfections in Flange Facing Finish for Raised Face and Large Male and Female Flanges“ to learn more about acceptance criteria.
2. Read the following information about Russian negotiating style. This is a general guideline to help you choose one/some of the strategies above.
3. Read the description of the five methods of dealing with a conflict situation according to Thomas-Kilmann conflict mode instrument. Study the circumstances which are best suited for each of the methods to be applied.

**Negotiating style and protocol**

It is important to let the Russians know exactly where your firm stands on all issues. The Russians do not respect negotiators who make large concessions because they then believe that initial proposals were inflated or deceptive. The firm should be prepared to stand by its position, and to drop negotiations and cut its losses if necessary. This will impress the Russians far more than slowly acquiescing to their demands. Although the “old” Soviet system may no longer exist, attitudes and cultural perceptions are much more resilient. Russians are very protocol conscious (2:586).

**References**

1. ASME B16.5-2009
2. ГОСТ Р 54432-2011, пункт 8.2
3. ГОСТ Р 55430-2013, пункт 5.3.1.2
4. ГОСТ Р 55724-2013

5. Рекомендации по устройству и безопасной эксплуатации технологических трубопроводов, утвержденные приказом Ростехнадзора от 27 декабря 2012г. № 784
6. РД 03-606-03
7. СТО Газпром 2-2.1-607-2011
8. Thomas-Kilmann conflict mode instrument. Profile and interpretive report. Report prepared for Jane Sample.-CPP Inc., 2008, 11 p.

## Scene 4 - Stray Welding Current

### Part A – Listening

Ex.16. Watch an educational video “The Problem of Stray Welding Current”. Identify a common welder’s error that can seriously damage production equipment (<https://www.youtube.com/watch?v=80ehl2nDXUk>).

### Vocabulary

71 <b>stray welding current</b> блуждающий сварочный ток	81 <b>correct welding setup</b> правильная схема подключения сварочного аппарата
72 <b>secondary welding current</b> ток вторичной обмотки сварочного трансформатора	82 <b>return current clamp</b> «масса», зажим «массы», зажим обратного кабеля
73 <b>unintended conductor</b> естественный проводник	83 <b>down-draft table</b> сварочный стол с вытяжкой
74 <b>grounding conductor</b> заземляющий проводник	84 <b>welding work cable</b> кабель «массы», обратный кабель
75 <b>to happen inadvertently</b> случаться по недосмотру	85 <b>electrode cable</b> сварочный кабель
76 <b>SMAW (shielded metal arc welding)</b> дуговая сварка металлическим электродом	86 <b>to idle</b> работать на холостом ходу; без нагрузки; при отсутствии дуги
77 <b>to plug into a 3-phase 600V AC outlet</b> включать в 3-фазную розетку ~ 600В	87 <b>to strike an arc</b> поджигать дугу
78 <b>AWG #4 power cord</b> силовой кабель калибра AWG 4	88 <b>cart</b> тележка
79 <b>ampacity of 70 amps</b> наибольший допустимый ток 70 А	89 <b>carbon arc gouging</b> строжка угольной дугой
80 <b>to conduct a test</b> проводить испытание	90 <b>to be implicated as the root cause</b> считаться основной причиной

Ex.17. Now identify which material the current return clamp is made of and say why this particular material was selected.

Ex.18. Use the vocabulary to translate the sentences.

1. **Сварка плавящимся металлическим электродом** изобретена учёным Н.Г. Славяновым в 1888 году (Wikipedia).

2. Не допускается использование контура заземления в качестве **обратного провода** (10:31)

3. Одна из серьезных причин порчи изоляции - чрезмерная перегрузка питающих проводов; поэтому сечение питающих проводов должно строго соответствовать **силе тока** в сварочной цепи (10:27).

4. Выполнение сетей заземления можно облегчить при использовании в качестве **заземляющих проводников** стальных конструкций различного назначения. Будем условно их называть **естественными проводниками** (11:29).

5. **Заземляющие проводники** по условиям механической прочности и стойкости против коррозии должны иметь минимальные размеры, приведенные в табл. 5 и 6 (11:29).

6. Для сварщиков важно, чтобы **дугу** было легко **возбудить**, чтобы она была устойчивой и более управляемой (12:21).

7. Передвижные сварочные установки обязательно заземляют перед началом работ, заземление снимается только после окончания работ, причем его необходимо производить до **включения установки в сеть**. Сначала **заземляющий провод** подсоединяют к магистрали заземления, а затем к сварочному оборудованию. При снятии заземления поступают наоборот: сначала конец заземляющего провода отсоединяют от корпуса агрегата или изделия, а затем от магистрали заземления (или от заземлителя) (10:27).

8. Для возбуждения дугового разряда два электрода сводят до соприкосновения и сразу же разводят на небольшое расстояние. В этот момент между ними и **вспыхивает** дуга (12:23).

9. Способы сварки в защитных газах (shielded welding methods) были лишены недостатков способа сварки под флюсом, но имели существенные собственные недостатки, например разбрызгивание капель



металла (weld spatter). Это вызвало необходимость **проводить** многочисленные научные **исследования** особенностей плавления электрода (12:88).

## Part B –Speaking

Ex.19. Managing cultural differences

**Overview:** You are Santino. The compressor control panel is powered up (подавать питание). You check communication of your compressor control system with the distributed control system (система управления верхнего уровня) of your customer. Your work-mate Marco comes to the control room and tells you that the Russian installation crew is welding walkways (площадки обслуживания) on the compressor baseplate (рама компрессора).

**Task 1:** Prepare a dialog between you, the Russian installation manager (прораб монтажной организации) and Russian customer to cover this unsafe situation. In this dialog all the parties tend to handle the problem as if they communicate with individuals of their own culture: The Russian installation manager and customer will deal with the Italian as if he is a typical Russian.

**Task 2:** Prepare another dialog where all the parties will act with cross-cultural understanding, making sure that their ideas and words are understood and internalized.

**Tips:** Read the following information about “Attribution”, a theory of how people explain things that happen. Use it to do Task 2.

### Attribution

Triandis cites the following interesting cross-cultural situation. In many cultures domestic help does most of the tasks around a home, including the cleaning of shoes. In the United States, such employees usually do not clean shoes as part of their responsibilities. If Mr. Kato, a Japanese businessman, were a house guest of Mr. Smith, an American businessman, and asked the “cleaning person” to shine his shoes, there could be a problem. It is, or at least could be, an inappropriate request. However, the crucial question is, what *attributions* does the cleaning per-

son make concerning Mr. Kato's request? There are probably two possibilities. One is that he or she could say Mr. Kato is ignorant of American customs, and in this case the person would not be too disturbed. The cleaning person could respond in a variety of ways, including telling the Japanese guest of the American custom, ignoring the request, and speaking to his or her employer. However, if the cleaning person attributes Mr. Kato's request to a personal characteristic (he is arrogant), then there will be a serious problem in their interpersonal relationship. If a person from one culture is offended by a person from another culture and believes the offense is caused by culture ignorance, this is usually forgiven. If one "attributes" the offense or "error" to arrogance, there will be serious problems. Attribution theory is concerned with how people explain things that happen. We interpret behavior in terms of what is appropriate for a role. Mr. Kato expected that it would be acceptable to ask the cleaning person to shine his shoes. From the perspective of the cleaning person, this is not acceptable. When each one's expectations were not realized they attributed motives to the "offender" based on their cultural construct. There are many ways of perceiving the world. Given the almost limitless possibilities, we must subconsciously and habitually "screen" and organize the stimuli. Attribution theory helps explain what happens and is applicable to cross-cultural management situations for the following reasons:

1. *All behavior is rational and logical from the perspective of the behaver.* At a seminar involving Japanese and American business people, an American asked a Japanese what was most difficult for him in the United States. The Japanese replied that "the most difficult part of my life here is to understand Americans. They are so irrational and illogical." The Americans listened with amusement and surprise.
2. *Persons from different cultures perceive and organize their environment in different ways, so that it becomes meaningful to them.* To be effective in working with people from different cultures requires that we make *isomorphic attributions* of the situation, i.e., we put ourselves "in the other person's shoes." Isomorphic attributions result in a positive evaluation of the other person because they help us to better understand his or her verbal and nonverbal behavior.

Triandis provides another attribution in Exhibit 2.6. As background Greeks perceive supervisory roles as more authoritarian than Americans, who prefer participatory decision making. Read the verbal conversation first, then the attributions being made by the American and the Greek. These examples illustrate that each statement in cross-cultural communication leads to an intimation that does not match the attribution of the other. These are extreme examples of nonisomorphic attributions, and accordingly work to the detriment of the relationship. The intercultural skill of making isomorphic attributions is vital to appropriate protocol and effective technology transfer (2:56).

EXHIBIT 2.6  
ATTRIBUTION IN GLOBAL MANAGEMENT

<u>Verbal Conversation</u>	<u>Attribution</u>
<i>American:</i> How long will it take you to finish this report?	<i>American:</i> I asked him to participate. <i>Greek:</i> His behavior makes no sense. He is the boss. Why doesn't he <i>tell</i> me
<i>Greek:</i> I do not know. How long should it take?	<i>American:</i> He refuses to take responsibility. <i>Greek:</i> I asked him for an order (попросить дать поручение).
<i>American:</i> You are in the best position to analyze time requirements.	<i>American:</i> I <i>press</i> him (настаивать) to take responsibility for his own actions. <i>Greek:</i> What nonsense! I better give him an answer.
<i>Greek:</i> 10 days.	<i>American:</i> He lacks the ability to estimate time; this time estimate is totally inadequate.
<i>American:</i> Take 15. Is it agreed you will do it in 15 days?	<i>American:</i> I offer a contract. <i>Greek:</i> These are my orders: 15 days.

In fact the report needed 30 days of regular work. So the Greek worked day and night, but at the end of the 15th day, he still needed one more day's work.

**Verbal Conversation**

**Attribution**

*American:* Where is the report?

*American:* I am making sure he fulfils his contract.

*Greek:* He is asking for the report.

*Greek:* It will be ready tomorrow.

Both attribute that it is not ready.

*American:* But we had agreed it would be ready today.

*American:* I must teach him to fulfil a contract.

*Greek:* The stupid, incompetent boss! Not only did he give me wrong orders, but he does not even appreciate that I did a 30-day job in 16 days.

The Greek hands in his resignation.

The American is surprised.

*Greek:* I can't work for such a man (2:58).

**Task 3:** Now revise your dialog 1. Add the Attribution comments next to each phrase as in Exhibit 2.6. Report back to the class what you have learnt.

**References**

1. Moran R., Harris P., Moran S. Managing cultural differences. – Elsevier, 2007, pp. 49-57
2. Triandis, H. C. (ed.) Variations in Black and White - Perceptions of the Social Environment. - Urbana, IL: University of Illinois Press, 1976

## Scene 5 - Machine Trip

### Part A – Listening

Ex. 20. Before watching a video identify the most common way of communication in oil&gas industry. What are the basic principles of efficient radio communication? (e.g. Do not ramble). Watch a video “Radio operating techniques: best practice for radio users” and check your guesses (<https://www.youtube.com/watch?v=Ib6Aw-Jh-Wc>).

### Vocabulary

91 <b>machine trip</b> аварийный оборудования	останов	96 <b>push to talk button</b> переключатель передачи; тангента
92 <b>radio operating techniques</b> правила радиообмена		97 <b>to keep a conversation as brief as possible</b> осуществлять переговоры с максимальной краткостью; говорить кратко
93 <b>to get a message through</b> передавать сообщение		98 <b>to reply promptly</b> отвечать на вызов немедленно
94 <b>to occupy frequency</b> занимать эфир		99 <b>transmitting radio</b> передающая радиостанция
95 <b>to garble a transmission</b> мешать переговорам; создавать помехи передаче		

Ex.21. Use the vocabulary to translate the sentences.

1. Перед вызовом (to call) необходимо **прослушать эфир** (to listen) и убедиться, что он **свободен** и вызов не **помешает** ведущимся в эфире **переговорам** (15:37)
2. Перед передачей **прослушайте**. Вы **работаете** одновременно с радиостанцией РНБ91 (15:61).
3. До начала **передачи сообщения** нажать переключатель (**тангенту**) передачи и не отпускать его до окончания **передачи сообщения** (14).

4. **Ответ на вызов** дается **немедленно** после того, как вызов услышан (13).

5. Переговоры по сетям радиотелефонной связи должны быть заранее подготовлены и осуществляться с максимальной **четкостью** и **краткостью** (15:85).

Ex.22. Have you ever used a two way radio for workplace communication? What makes a good radio user?

Ex. 23. Watch a video “Procedure words in radio communications” (<https://www.youtube.com/watch?v=Alro8SfO-tQ>). *Procedure words* (служебные слова) or *prowords* are words or phrases limited to radio talks. They are used to make radio communication easier by conveying information in a condensed form.

### Vocabulary

100	<b>Acknowledge!</b> Подтвердите прием!	113	<b>Break, break, break! I have an emergency message. Call in!</b> Всех, кто меня слышит, прошу на связь! Срочное сообщение!
101	<b>Radio check</b> Проверка связи ; Проверяю связь	114	<b>Say again ALL AFTER / ALL BEFORE“Position”</b> Вас не понял. Повтори все со слова / до слова “Position”
102	<b>Do you read / copy me?</b> Как слышите меня?	115	<b>I say again</b> Повторяю
103	<b>Read you loud &amp; clear</b> Вас слышу отлично	116	<b>Over</b> Прием
104	<b>Come in</b> Вызываю / Прошу на связь / На связь	117	<b>Out</b> Конец связи
105	<b>Go ahead</b> На связи	118	<b>Affirmative</b> Да / Разрешаю / Так точно / Подтверждаю
106	<b>Roger</b> Вас понял	119	<b>Negative</b> Нет / Не разрешаю / Никак нет /

107 <b>Say again</b> Вас не понял	Не могу выполнить
108 <b>Correction</b> Поправка	120 <b>Wilco</b> Выполняю
109 <b>Relay to</b> Передайте сообщение	121 <b>Sécurité</b> Сигнал безопасности, «БЕЗОПАСНОСТЬ»
110 <b>Mayday</b> Сигнал «ТЕРПЛЮ БЕДСТВИЕ», «МЕЙДЕЙ»	122 <b>Pan-Pan</b> Сигнал срочности, «СРОЧНОЕ»
111 <b>to keep a channel clear</b> прекращать радиообмен	123 <b>emergency distress call</b> вызов при бедствии
112 <b>I spell</b> По буквам	124 <b>to clear an event</b> устранять причину бедствия, возобновлять обычную работу, устранять обстановку срочности
	125 <b>to override all other communica- tions</b> иметь приоритет перед всеми другими передачами

Ex.24. Use the vocabulary to translate the sentences.

1. При ведении радиотелефонного обмена используются специальные служебные слова и фразы: «**Как слышно**», «**Прием**», «**Слышу хорошо**» (удовлетворительно – fair but readable, плохо – weak and unreadable), «**Передайте сообщение**» и т.д. (13:13).

2. **Сигнал безопасности** указывает, что данная радиостанция намерена передавать сообщение, касающиеся обеспечения безопасности плавания: важные гидрометеорологические предупреждения, извещения об изменении навигационной и путевой обстановки и т.д. (13:9).

3. **Сигнал безопасности** в радиотелефонии состоит из трехкратного повторения слова «**БЕЗОПАСНОСТЬ**». Сигнал безопасности передается перед вызовом, адресуемым, как правило, всем радиостанциям с передачей слова «**ВСЕМ**» (13:9).

4. Все радиостанции, принявшие **сигнал безопасности**, должны продолжать прием сообщения о безопасности до тех пор, пока его **передача не будет закончена** (13:9).

5. Вахтенный радиооператор обязан в случае приема **сигналов бедствия, срочности и безопасности** прекратить радиообмен, сообщить о полученных сигналах капитану и действовать соответствии с его указаниями (13:6).
6. **Вызов при бедствии** применяется судном для извещения о том, что оно находится под угрозой серьезной и неминуемой опасности и просит оказать немедленную помощь (13:8).
7. Если на воздушном судне **устранена причина бедствия**, экипаж обязан передать сообщение, аннулирующее состояние бедствия фразой «Обмен о бедствии окончен» (15:33).
8. Всем станциям запрещается **работать на частотах**, на которых происходит обмен в случае бедствия, до получения сообщения, указывающего о **возобновлении обычной работы** (15:32).
9. **Передача слов по буквам** при радиосвязи, в тех случаях, когда передаются труднопроизносимые слова или правильный прием каких-либо слов и знаков затруднен, они должны передаваться **раздельно по буквам** согласно фонетическому алфавиту (15:38).
10. Вызов в случае бедствия имеет абсолютный **приоритет перед всеми другими передачами** (15:32).
11. Альфа Майк один, это Альфа Майк шесть, **как слышно, приём?** Альфа Майк шесть, это Альфа Майк один, **слушаю тебя, приём!**
12. Альфа Майк один, это Альфа Майк шесть, **проверка связи, приём?** Альфа Майк шесть, это Альфа Майк один, **на связи, приём!**

Ex. 25. Watch a video “Phonetic Alphabet - Best Practice for Radio Users” about an international phonetic alphabet (<https://www.youtube.com/watch?v=2774vY7p4-w>). What is it used for?

Ex.26. Retell the video.

Ex.27. Read and learn the phonetic alphabet below.



A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

Fig.4. English phonetic alphabet

Ex.28. Now practise spelling the following tag numbers of field instruments using the phonetic alphabet: TE378B, SD246C, FCV744D, PDT278X, PD613Y, TD623Z, VP321T, SP509G, Z145A, X245B, MV723C, JB089D.

### Part B – Speaking

Ex.29. Managing cultural differences

**Overview:** You are Santino. You are in your man camp. A phone call wakes you up in the middle of the night. It is from your customer who says that one of the machines has tripped (падать в аварию, аварийно останавливаться) and you need to identify the problem with the machine to get it up and running again. First, you have a meeting with the customer in the main control room (пультовая) where the control room operator (сменный инженер) shows you the trends on the HMI (автоматизированное рабочее место, АРМ) to analyze the behavior of the machine before it tripped. These trends can help you locate the source of the problem. Second, you go to the machine, do its visual inspection and investigate into the case with the machine. Use a radio to talk to the control room about current instrument readings on the HMI. Finally, after

a while you identify the problem: one of the impulse lines at the compressor inlet got frozen during the cold winter night. The inlet pressure reading was inaccurate and caused the trip of the machine.

**Task:** Prepare a detailed dialog with the customer and the control room operator to demonstrate the entire process of troubleshooting the machine. Suggest actions to prevent icing (обледенение) of the impulse lines in the future. Use the prowords, phonetic alphabet and pictures above to help you.

**Tips:**

1. Watch a video “How to connect. Best practice for radio users. Tait Radio Academy“ (<https://www.youtube.com/watch?v=JFZvpKRVHY>). Use it as an example of how to get your message through with complete accuracy and minimum delay.

2. Martin J.Gannon claims that you can understand a whole nation through its central cultural metaphor. A cultural metaphor can be any major phenomenon, activity, or institution with which its members closely identify both cognitively and emotionally (xiii:66). Russia can be understood through ballet, Italy through opera, the USA through American football and France through wine. Read about the Italian Opera in the Gannon’s book and find the ways how its distinctive features can manifest themselves in the episode with the machine trip.

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## **Annex A - Transcripts**

### **Scene 1**

#### **TRUMPF Career: Field Service Engineer**

As a field service engineer my job is to travel to the customer's place of business, identify the problem with the machine and work to get it running again. The typical day starts with an assignment from my manager or scheduler to make a repair, provide an instruction or a machine installation, then make necessary arrangements and travel to the customer. Working at TRUMPF has allowed me to develop significant analytical and problem solving skills which lead to customers getting their machines up and running faster. While travelling I am in close contact with the service scheduling and training departments. We keep each other in the loop to ensure customer's satisfaction.

In my 20 years with TRUMPF I have worked on nearly 2,000 missions. I have also learnt to repair ten different machine types. TRUMPF continues advancing in the machine tool industry by remaining a family owned business for which I am proud to be a part of. TRUMPS plays a bit part in making the world go around. What I enjoy most about the job is knowing I have restored a machine to production. You can see the joy in the customer's face when this is achieved. My name is Dan Nietzel and I am a field service engineer for TRUMPF.

## Scene 2

### Williston ND - Inside a Man Camp

Today we're at the Bear Paw Lodge in Williston North Dakota, a target logistics man camp. This unit houses 496 males and females. This unit was built in 87 days from cutting the ground to actual opening this facility. So we'll go in here and show you all the amenities that we have to offer and give you a kind of a good inside tour.

This is called the mudroom and what this is designed for is for other guys to come in and get out of their gear - their overalls, their boots. We have booties so if it's their only boots that they wear in and out to the room they can just put those on so they don't track that mud and dirt into the room. We want to keep it nice and clean.

In this facility we have 496 rooms. We offer quite a few amenities. We're coming up on the convenience store: cigarettes, energy drinks, if they need a little bag of toothpaste or flu medicine, stuff like that. Little basic amenities that you would get at a gas station. Some of them that come in they get picked up at the airport by their company, get dropped here and then they get transported to and from their worksite. So they really don't have that option as far as going out.

One through nine hallways or what are called a VIP room, they have their own individual shower, a queen bed, a microwave and a refrigerator as well. They also have a flat-screen TV and a DVD player. In the convenience store we do rent movies as well. Over to my direct left you'll see pool tables, TVs and stuff like that just for their entertainment.

There's a real shortage of housing for oil workers and site workers. A lot of them were coming out and having problems with their not being able to recruit to help find the actual job market. They had a real struggle as far as where are we gonna put our employees. So that's how the man camps came about.

So what we're gonna do is we're gonna come down here we'll show you the actual salad bars, fruit bars, desserts, goodies, stuff like that. There's water; they're allowed to basically take and eat one meal on-site, take one meal in the field per breakfast lunch and dinner. So in a sense they get six meals a day. In this actual facility we're serving rough-

ly 200 meals a day for dinner. Breakfast is 150 to 200 and lunch is usually hundred tops because most of them actually go out on the site and stay on the site.

The image of the wild wild west is truthfully not there. I mean occasionally we'll get guests that'll be verbally abusive to maybe another guest or something like that. We have zero tolerance for that. We'll get a hold of their housing coordinator and depending on the severity of the actual incident they're gone. We try to create that safe and secure environment for our employees and our guests.

### Scene 3

#### **W.Soule & Co. API Pipe Fabrication**

I'm Ed Hawkins, corporate quality control director for W. Soule & Co. in Kalamazoo, Michigan. Today I want to talk to you about a project we got going in two of our facilities as an API 1104 pipe fabrication for a large utility compressor station in Michigan.

Let me give you a quick overview of our company. We're a 65 year old Kalamazoo based operations who ship and fabricate throughout the United States and throughout the world with over 120,000 square feet of fabrication facilities, overhead cranes ranged 5 tons to 50 tons, fully automated and semi-automated welding equipment.

This project was perfect for our fabrication facilities. In the past projects some of this would have been fabricated in the field. However, fabrication in field has downsized. We have weather conditions to deal with, large crews, multiple trades, all these combined along with a safety factor impacted the time and cost of the project. The API 1104 project is being fabricated in our Midlink facility which is our largest fabrication facility. Let's go inside.

For this process right here for this project we developed and qualified 23 new weld procedures for us to meet API 1104. All of our weld procedures are logged in before the welder begins operating. He can only operate within those weld procedures. What you see right now is Boe who is changing over from the RMD process to a pulse process. Everything is computerized. As you see here this is one of our largest positioners for this project. The reason we go to larger positioners is that we'd like to let roll as much of the welds as we can. We roll probably 90 to 95% of all of our work. The reason we do this is it produces a higher quality, higher production rate weld. Before each joint begins the certified welding inspector and our welder operators are going to talk about the joint, review the double weld procedure and make sure everyone is on the same page before we start the joint.

What we're looking at right now is our subarc welding position or station with Scott welding up some three-quarter inch and 24 inch API X 60 piping. As you see the subarc process has the flux and the puddle is

always maintained inside the flux. Using our positioner is kind as well to the weld procedures you can see up in the controller. This is a great process, high quality, extremely fast welding process.

Great care is taken on our weld preparation for our weld joints to make sure that we stay within the 1/16 inch tolerance allowable for the API 1104 code. As you see, one of the welding operators is just double checking the joint to make sure that it is within tolerances before we start welding.

You see right now that we have Norm working with Brian here fitting up a forty-five. He's running two levels - a regular mechanical level and we're also using a digital level in the backside to assure that we're going to get the fitting on the right degree.

Freeing the joint before welding is a critical step to ensuring a high quality weld. Another benefit to using our indoor facility is it's always 55 °F or 60 °F in here. It cuts down on the freeing time. So in this welding process for the standards of our customer all weld joints greater than 12 and 3/4 got a root pass put in using two welders before we flip-flop it back and forth. What you're seeing right now is Kevin finish up the root pass of a joint.

In most fabrication shops they store the majority of carbon steel outside. Ours are stored inside to help it keep it clean and secure for fabrication.

This is an automated plasma table for cutting pipes. Here we have our operator to program the cutting. Once programmed, the cutting head will travel or choose a desired cut location and drop down to the elevation.

This is a great example what our fabrication shop can do for you - by using positioners, fixture jigs for rotating this large piece of fabrication using one employee. An important part of our fabrication facility since we are a production shop as well is the use of our coating system. Even though we have tools in place to check the fabrication before we start and we have monitoring during fabrication we always check the fabrication once it's complete. Here we got our QC department double-checking the measurements of the fabrication.

Controlled environment, automated welding equipment, higher production rates, 24/7 production tracking, higher quality and lower cost

are just a few of the value-added benefits our fabrication shop can bring to your next project. Please, contact us today.



## Scene 4

### The Problem of Stray Welding Current

The following is a demonstration of one example of a common error in welding operations that can result in stray current flowing through a building's electrical system. Stray welding currents are dangerous conditions that can occur when the secondary welding current from the power supply returns to the source through unintended means, such as the building's grounding conductors. We are conducting this demonstration under very carefully controlled conditions so as to not cause any permanent damage to our systems. However, it should be noted that this exact scenario has been observed happening inadvertently several times, and at much higher currents than we will be using today. We will be using the SMAW, or stick welding process, today and this old model Hobart arc welder.

The machine is plugged into a 3-phase 600V AC outlet and has an AWG #4 power cord with an ampacity of 70 amps. The machine's model, current type and process are irrelevant to the stray current events and we have conducted similar tests on dozens of different machines and scenarios. Initially, we will demonstrate a correct welding set-up where the current return clamp is properly located near the point of welding on the steel down-draft table. As you can see on the ammeter, we are measuring a secondary current flow of approximately 70 amps in the welding work and electrode cables as we weld. When using the ammeter on the power cord we read '0' amps with both AC and DC settings while the machine is idling and when the arc is struck. This is normal as the AC current in the phases cancel each other out.

Now we will repeat the welding operation after the welder has made the simple mistake of forgetting to connect the work lead to a point close to the welding area. As you can see here, the bare current return clamp has been left in contact with the machine chassis through the cart that it is sitting on. Many people are surprised by this, but in this scenario the welding operation will work fine, and the welder could keep welding for hours and at a much higher current than we are using here.

The machine that we are using has a maximum output current of well over 450 amps, but we are only using around 70 amps today and for very short periods of time. If you are wondering how the circuit is being satisfied, the welding current is flowing from the welding machine secondary, through the electrode lead, through the work table, up through the duct work which is attached to the building steel, into the building's electrical system, through the machine's power cord ground wire, through the machine's chassis, through the cart, and back to the secondary work terminal through the work lead. When using the ammeter on the power cord in this stray current event, we read '0' amps DC while the machine is idling. But the current jumps to 70 amps when the arc is struck. We are using a DC welding current here, however, we would see the same result with an AC welding current. This is not normal and over time we could cause serious damage to the electrical system. It is important to realize that the overcurrent protection devices in the electrical system do not react in any way to this stray current fault condition.

Remember that the machine that we are using could easily be welding or carbon arc gouging at over 450 amps in the same scenario and for much longer cycles. Stray welding currents have led to very serious and expensive damages to equipment and electrical systems, and have even been implicated as the root cause of serious industrial accidents, even resulting in the death of workers. Electrical arcing in unexpected locations in a building can also start fires or explosions since there is no way to predict where the current will find the path of least resistance through an industrial facility or construction site.

## Scene 5, ex.20

### **Radio Operating Techniques: Best Practice for Radio Users**

The aim of all radio operators should be to get the message through with complete accuracy and minimum delay, so the least possible time is spent occupying frequency. Occupying frequency may prevent other users from communicating when they need it most. Here are a few general operating guidelines.

First, listen before you call. If someone's already talking on the channel you want to use, it's gonna be really inconvenient if you try to talk over them. It will garble the transmission.

Second, don't interrupt. If you hear people talking, wait until their conversation is finished before you begin, unless it's an emergency.

Third, think before you speak. Know what you are going to say before you press the PTT or push to talk button. Long moments of quiet thinking are, um, frustrating for others and occupy frequency unnecessarily.

Fourth, speak clearly. Use your normal voice and do not speak too fast. Divide your message into natural phrases instead of individual words so that they flow smoothly.

Fifth, never transmit sensitive, confidential, financial or military information unless you're certain that your conversations are secured with the proper level of encryption for the level of sensitivity. Otherwise, you should always assume your conversations can be heard by others.

Sixth, spell difficult, ambiguous or unfamiliar words using the phonetic alphabet. For more on this refer to the phonetic alphabet lesson in this series.

Seventh, keep your conversation short. There's no need to ramble. Conversations should be kept as brief as possible so as to allow others the time to use the frequency.

Eighth, reply promptly when someone calls you. When a transmitting radio has said over, reply immediately. If a transmitting radio fails to receive an immediate reply, there will be doubts as to whether the message has actually been received, your radio is working, or if you're even on your radio.

Lastly as a recap, here are the four golden rules of radio operation. One, clarity. For clear communications speak slightly slower than normal and avoid shouting. Two, simplicity. Simplified language will make it easier for everyone to understand you. Three, brevity. Keep your statements short and concise. And four, security. Always assume that someone is listening to your conversation. If your system uses encryption, you still need to be cautious because there is a human element that could cause a security breach. This concludes our lesson on radio operating techniques.

## Scene 5, ex.23

### Procedure Words in Radio Communications

Procedure words are standard, easily pronounced words which have been assigned special meanings to speed up message handling on radio networks. They should be used whenever appropriate.

The following procedure words are acceptable for general use.

First, 'Acknowledge'. Use this when the person you're addressing must acknowledge receipt on the message.

Next, 'Affirmative'. This simply means yes, or that is correct. This simply means yes, or that is correct.

'Break-Break'. You have an urgent message and need to interrupt the current conversation.

'Correction'. This indicates that an error has been made, and that the transmission will repeat from the last word correctly used.

'I Say Again'. I will re-transmit the message or a part of the message.

'I Spell'. The word will be spelled using the phonetic alphabet.

'Negative'. Meaning no, or that's not correct.

'Out'. End of transmission, no reply is expected.

Additionally, 'Over'. Which also means that it's the end of the transmission, but this time a reply is expected.

'Radio Check'. Say this when you want to know that your signal strength and readability is strong.

'Relay To'. Transmit this message to the addressee indicated.

'Roger'. Message received and understood.

'Say again'. Please repeat your last transmission.

'This is'. This indicates the calling unit's identification is next. For instance, if dispatch were making a call and needed to identify themselves, they would say, "this is dispatch".

'Wait'. A pause of a few seconds will follow.

And lastly, 'Wilco'. Which means, I will comply with your message.

There are also three procedural phrases that are specifically for emergencies.

The first is 'Securite'. This is a marine safety alert and is normally repeated three times.

'Pan-Pan'. This is an urgent call requesting help, and it is also repeated three times.

'Mayday'. This is an emergency distress call that overrides all other communications and general etiquette, is to keep the channel clear until the event is cleared.

The use of correct operating procedures, whilst it may appear irksome and over-efficient to some, does save considerable time if every operator is aware of what to expect. Should an operator have an urgent message to clear, he should break in on the channel and say so. But this action should always be used with discretion, clearly bearing in mind the degree of urgency of the message.

## Scene 5, ex.25

### Phonetic Alphabet

This is the phonetic alphabet. Once connected, it's important to keep communications brief and clear. The phonetic alphabet was designed to allow clarity in communications when speaking over a radio or field phone. Due to vexing radio static or the tremendous background noise found in combat, early communicators found it difficult to distinguish between letters which may rhyme or sound similar. So the phonetic alphabet was established to avoid confusion between say a B or an E or a D, when spelling or using letters of the alphabet.

The phonetic alphabet has evolved since its inception but has now been standardized internationally for years. This alphabet has been sanctioned by the world's major aviation and telecommunications organizations.

The letter A is pronounced Alpha.	N is November.
B is Bravo.	O is Oscar.
C is Charlie.	P is Papa.
D is Delta.	Q is Quebec.
E is Echo.	R is Romeo.
F is Foxtrot.	S is Sierra.
G is Golf.	T is Tango.
H is Hotel.	U is Uniform.
I is India.	V is Victor.
J is Juliett.	W is Whiskey.
K is Kilo.	X is Xray.
L is Lima.	Y is Yankee.
M is Mike.	Z is Zulu.

That is the phonetic alphabet.

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