Competence framework

for chemical engineering

(Certified Master (industrial) in the field of chemistry)

Final Version

SBG Dresden

March 2017

ComProCom (Communicating Professional Competence)
Project Number: 2015-1-EL01-KA202-013960

Project	**Communicating Professional Competence** (ComProCom)
Project number	2015-1-EL01-KA202-013960
Title of Document	Competence framework on chemical engineering / Certified Master (industrial) in the field of chemistry
Intellectual Output no.	Intellectual Output 5
File name (with extension)	IO Report
Document Version	1.2
Dissemination Level	Internal
Authors	Jens Hofmann
Date	31.03.20017

1. Business assessment

1.1 Assess the economic situation of the company

This includes:

- identifying and evaluating production and accounting data to determine how the company or business unit is performing in relation to its targets and objectives

- identifying the economic significance of any deviations or shortfalls, and the reasons for them

- using a range of accounting tools, including choice and use of relevant costing methods; assessment of deviation; calculation of directly and indirectly costs, operating income and contribution margins; and assessment of trends over time

- identifying any changes that may be necessary or possible to improve performance

1.2 Identify customer demands and how they impact on products and production resources

This includes:

- identifying customers' quantitative and qualitative requirements, including any changes that can be identified or anticipated

- identifying any current or upcoming changes to legal and operating requirements, quality and compliance standards in own area of responsibility

- making an assessment of the implications of these requirements for production output and processes

2. Production assessment

2.1 Assess production quality and resourcing

This includes assessing compliance with quality objectives and quality management standards, as well as the use of production resources; and identifying any improvements that are needed.

2.2 Monitor chemical processes

This includes:

- classifying chemical reactions and taking into account reaction types
- monitoring and analyzing relevant technical data including as relevant pressure, temperature, pH- value, solvent, fuel distribution and residence time, and identifying the influence of rate of reaction, chemical equilibrium, solubility, catalysis, ions and concentration
- using process controls such as sampling, classical methods of analysis, instrumental analysis and online procedures

2.3 Assess the production processes

This includes:

- assessing the production conditions for chemical processes in accordance with the types of reaction
- distinguishing between mass and energy interconnection and transport group, and detecting and calculating of material and energy balances
- evaluating the hazard potential and the effect of human factors, facilities, operating equipment and environment

3. Planning and decision-making

3.1 Plan the application of operating and production resources

This includes:

- taking account of quality and quantity specifications
- selecting machines and system components, including any interactions between raw materials, consumables, operating materials and materials
- organizing of raw materials, consumables and operating materials
- participating in the selection and procurement of equipment, systems and facilities

3.2 Plan technological and production processes

This includes:

- incorporating the relevant quality and quantity standards

- planning the rational use of energy and resources and of energy and material flows

- selecting control, regulation and process control systems according to the relevant criteria

- selecting production technology equipment and procedures in accordance with the reactions and processes involved

3.3 Optimize the cost and performance ratio

This includes creating cost plans and cost controls, and applying measures to keep costs under control.

4. Managing production

4.1 Manage product-technical and related business processes

This includes:

- creating flow rates and energy balances

- controlling the rational use of energy and resources

- employing the relevant apparatus, equipment, and technical support facilities and ensuring their proper use

- coordinating and optimizing the start-up, running and shut-down of processes

4.2 Lead and supervise the production cycle

This includes:

- starting up and shutting down systems and processes

- arranging the optimum operation of plant to ensure that the required reactions take place

- carrying out process and quality control

4.3 Ensure compliance with qualitative and quantitative specifications

This includes:

- using relevant tools and methods, including statistical methods, for quality management

- description of operational processes and preparing audits and certifications

- ensuring appropriate training and qualification of personnel

4.4 Take measures to eliminate undesired deviations and confounding factors

This includes:

- detecting deviations and causes of faults, and assessing their impact
- securing the necessary energy supply
- using information systems to assess deviations
- performing risk assessments

It also involves being able to respond to contingencies and emergencies, including as necessary:

- shutting down the plant
- applying internal emergency plans and reporting systems
- carrying out troubleshooting and fault analysis, distinguishing between recurrent and random perturbations
- taking measures to limit damage and disruption
- disclosing relevant information to the public
- effectively communicating company information and instructions to staff (internal communication)

5. Managing people

5.1 Secure staff resources to meet production needs

This includes:

- planning staff requirements (quantity and qualification/training level) to meet production needs, and communicating them to those responsible for allocation, resourcing and recruitment
- adapting job descriptions to meet identified personnel needs

5.2 Allocate responsibilities to employees

This involves assigning tasks by taking into account operating criteria in accordance with commercial considerations, as well as consideration of individuals' suitability, competences and interests.

5.3 Assess, guide and support the development of individuals and groups

This involves inducting new staff into their work, arranging appropriate personal development measures (including for the qualification of employees), as well as taking responsibility for training trainees.

5.4 Supervise and communicate with staff

This includes:

- supervising and supporting working groups in order to ensure objectives are met and any problems resolved
- promoting productive cooperation and communication between staff members, with managers and with the workers' council
- effectively communicating company information and instructions to staff

5.5 Promote a culture of responsible conduct and innovation within the company

This includes:

- leading employees to contribute to corporate goals, including through quality improvement and innovative measures
- promoting quality management aims, quality awareness and customer orientation
- carrying out relevant training

6. Evaluation

6.1 Evaluate the application of operational and production resources

This includes:

- evaluating the use of raw materials, consumables and materials
- assessing any losses of materials and products during transport and storage
- assessing the impacts of processes on the environment, including compliance with environmental protection measures

6.2 Evaluate the optimum operation of facilities and possible undesired deviations and confounding factors

This involves evaluating how well facilities have been operated to meet production requirements, including meeting of quality criteria, production and

efficiency targets as well as evaluating of planning and execution scheduled and unscheduled repairs.

It also involves assessing how well contingencies and emergencies were managed in order to minimise impact on production, cost, safety and the environment.

6.3 Evaluate cost developments and economic processes

This includes:

- assessing business processes, based on operating processes and value chains
- developing proposals to further optimize processes
- using key business data to provide information and set controls
- identifying measures to monitor costs and the impact on the business

6.4 Evaluate the work environment and the deployment of staff

This includes:

- evaluating performance against quality and production targets
- assessing the performance and development of individuals, taking into account their previous professional career and personal and social circumstances
- assessing the influence of the organisational culture and workplace on the work environment and the behavior of individuals
- evaluating the influence of group structure on behavior and cooperation

7. Corporate and professional responsibility

7.1 Ensure compliance with health and safety regulations and environmental policies

This includes:

- ensuring that the workplace is ergonomically laid out as far as possible, and compliant with the relevant regulations

- checking, and identifying any weaknesses in, workplace and plant safety, environmental and health protection
- ensuring instructions and information relating to plant safety, environmental and health protection are provided and understood

7.2 Develop and promote responsible care within the company

This includes:

- developing proposals and that support continuous improvement
- supporting and motivating staff towards independent, responsible action, and encouraging them to participate in decision-making processes
- supporting employees' openness to innovation
- promoting responsible care in the company through actions that might include taking relevant action directly, bringing potential improvements to the attention of colleagues, and supporting improvements in discussion with senior managers

8. (Self) development

8.1 Ensure up-to-date best practice, knowledge and competency in your occupational field as well as in interrelated areas

This includes maintaining up-to-date knowledge of technical documentation and methods, relevant regulations, production processes, methods and equipment, and management techniques.

8.2 Reflect on your own practice and continue learning

8.3 Adjust to altering methods and procedures of the company

This involves gaining a thorough operational understanding of changes, passing them on to others as necessary.

8.4 Contribute to the ongoing development of others

This involves, as appropriate, transferring knowledge and skills to colleagues and contributing to training sessions.