

A MACHINE SHOP PERSONNEL GROUPING AND NEED (CASE STUDY AT PT PUPUK SRIWIDJAJA PALEMBANG)

Andrian Sagisky Januartha¹, Anis Saggaf² dan Rosidawani²

¹ Bagian Pengadaan M&J JPP, Div. SBU JPP PT. Pupuk Sriwidjaja Palembang

² Program Insinyur Indonesia, Universitas Sriwijaya, Palembang

Corresponding author : andrian.sjanuartha@pusri.co.id

ABSTRAK: Kualitas kerja dimulai dengan meningkatkan kualitas manusia. Keberhasilan meningkatkan kualitas kerja dapat diukur dengan meningkatkan kepuasan pelanggan. Berbagai metode pengambilan sampel dapat digunakan untuk mengukur kepuasan pelanggan. Namun, sebagai fabrikator suku cadang untuk mendukung produktivitas pabrik PT Pupuk Sriwidjaja Palembang, bengkel mesin dapat mengukur tingkat keberhasilan kualitas kerja dengan tingkat penyelesaian permintaan pekerjaan. Selain itu, hasil dari kualitas pekerjaan adalah berkurangnya rework, lamanya waktu penyelesaian pekerjaan, dan utilisasi mesin yang maksimal dan optimal. Hasil-hasil tersebut dijamin dengan adanya quality control (QC) pekerjaan. Penelitian ini memfokuskan pada pembahasan kualitas personil di sebuah bengkel mesin, PT Pupuk Sriwidjaja Palembang.

Kata Kunci: PT. Pupuk Sriwidjaja Palembang, Machine Shop, Personnel Quality dan Quality Control.

ABSTRACT: The quality of work starts by improving the quality of people. The success of improving work quality can be measured by increasing customer satisfaction. Various sampling methods can be used to measure customer satisfaction. However, as a parts fabricator to support the productivity of the PT Pupuk Sriwidjaja Palembang factory, a machine shop can measure the success rate of work quality by the completion rate of work requests. In addition, the results for the quality of work are the reduction of rework, the length of time to complete the work, and the maximum and optimal utilization of a machine. These results are guaranteed by quality control (QC) work. This study focuses on the discussion of personnel quality in a machine shop, PT Pupuk Sriwidjaja Palembang.

Keywords: PT. Pupuk Sriwidjaja Palembang, Machine Shop, Personnel Quality and Quality Control.

INTRODUCTION

A machine shop is a work unit under The Workshop & Heavy Equipment Department of PT Pupuk Sriwidjaja Palembang, a state-owned company established in 1959. A machine shop is obliged to make and repair parts of production and to support operational equipment. With a total company production of 2.33 million tons/year of urea, 1.47 million tons/year of ammonia, and 300 thousand tons/year of NPK, it is hoped that a machine shop will be able to help maintain the reliability of the factory for national food security.

However, with 56.2% (bensin.pusri.co.id) of emergency work requests, the main priority is the speed of work completion so quality is prioritized next. In essence, the quality of work cannot be ruled out because it can affect the life of parts of equipment and reduce

rework so that the cost and time of work can be optimized. To improve the quality of work there are 3 factors that can be improved, namely:

- (1) personnel quality,
- (2) machine quality, and
- (3) production process system quality.

Since its first introduction in Germany in 2011, the new concept of Industry 4.0 has become globally recognized. Industry 4.0 is expected to be an industry that emphasizes information exchange, controlled machines, and every element of production that is automated and has intelligence (Qin, et al., 2016). The quality of machines and production process systems in a machine shop can be improved by proper and efficient utilization of Industry 4.0.

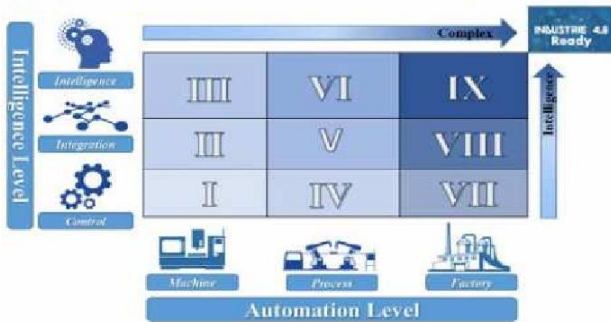


Figure 1. A categorical framework of manufacturing for industry 4.0 and beyond (Qin, et al., 2016).

However, before the quality of machines and production process systems is improved, the quality of people must first be improved to support the optimization of improving the quality of machines and production process systems. This study focuses on improving the quality of people in a machine shop by prioritizing according to the main needs at PT Pupuk Sriwidjaja Palembang. At the time of this paper writing, PT. Pupuk Sriwidjaja Palembang has 4 Ammonia Plants, 4 Urea Plants and 3 NPK Plants.

STRATEGIC PLANNING

PT. Pupuk Sriwidjaja Palembang divides its business products into 3 (three) categories, namely fertilizer product, non-fertilizer product and side product. Fertilizer products consist of Urea fertilizer and NPK fertilizer. Non-fertilizer product in the form of ammonia. These three types of product are produced by four main factories, namely Pusri-1B, 2B, 3 and 4. As well as side products which are extra products of production activities. Meanwhile, those includes in side products are liquid CO₂, solid CO₂ or dry ice, as well as nitrogen and oxygen. Apart from that, pusri also produces and sell innovative products, including biological fertilizer and mikro fertilizer.

The main units in production line PT. Pupuk Sriwidjaja Palembang include :

- Non Rotating : absorber, column, boiler, heat exchanger, vessel (pressure, storage and reactor), compressor, reformer, prilling tower, cooling tower.
- Rotating : pompa, refrigeration, gearbox, ide/fd fan, conveyor, motor, compressor, turbine,
- Electricity
- Instrumentation
- Piping
- Valves

From the items of equipment owned by the company, some of the work that goes to a machine shop includes :

- Fabrication parts
- Cleaning Material
- Heat treatment
- Rotating parts treatment
- Coating material
- Equipment repair such as valves, turbine governor and main burner.

The steps that a machine shop has taken so far to cope with the high number of work requests and maintain the quality of work results include:

Work types grouping

In a machine shop there are several types of related work, which can be grouped as follows :

- (a) Machining, including : turning, milling, hobbing, scraping, slotting dan grinding.
- (b) Equipment, including : Valves, turbine governor and main burner.
- (c) Specialized work, including : balancing, blasting, thermal spray and electroplating.
- (d) Supporting work, including : mechanical drawing, fabrication planning and control, and lift and transport.

Personnel grouping

Diverse types of work and urgent demand conditions require most personnel to have diverse abilities to maximize the time available for immediate completion of work. However, in supporting the quality of work that is consumer-oriented and in accordance with standards, competent and standardized individuals are needed in each type of work.

The selection of the right personnel, according to the type of work is not only based on the time / length of time of their working experience, but also based on their interest in the type of work.

The division of personnel in a machine shop is grouped into several squads. The teams include:

1. Lathe.
2. Milling.
3. General Repairs.
4. Valve Repairs.
5. Special Repairs.

There is no special team to handle supporting work. Support work is distributed to personnel in various squads.

Knowledge Standarization

From the various types of work that have been grouped in a machine shop (bensin.pusri.co.id) it is necessary to standardize knowledge and select the required work that should be labeled standardized.

Standardized work requires basic knowledge to be possessed. These are:

- (a) Machining :
 1. Conventional lathe.
 2. Conventional milling.
 3. CNC lathe.
 4. CNC milling.
- (b) Equipment :
 1. Valve types and repair.
 2. Valve inspection and testing.
 3. Turbine governor inspection and testing.
- (c) Specialized work :
 1. Blasting Coating Operator.
 2. Metal Coating.
 3. Hazardous waste handling.
- (d) Supporting work:
 1. 2D and 3D Modeling.
 2. Lift and transport operator.

Quality Control (QC)

Quality control is essentially all efforts to satisfy consumers. The quality that must be maintained by the products produced can be as diverse as the variety of consumer desires, including: transcendent, having certain characteristics, in accordance with the consumer's perspective, meeting certain requirements and procedures, as well as appropriate in terms of value and price (Deming, 1982). A machine shop prioritizes fulfilling consumer desires in accordance with certain requirements and procedures.

The standards applied in a machine shop include:

- (a) Machining :
 1. ISO 2768-1 : Tolerances for Linear and Angular Dimensions without Individual Tolerance Indications.
 2. ISO 2768-2 : Geometrical Tolerances for Features without Individual Tolerance Indications.
 3. ISO 286-1 : Basis of Tolerances, Deviations and Fits.
 4. ISO 286-2 : Tables of Standards Tolerance Classes and Limit Deviations for Holes and Shafts.
- (b) Equipment :
 1. API 598 : Valve Inspection and Testing.
 2. ASME B16.34 : Valves - Flanges, Threaded, and Welding End.
 3. API 617 : Centrifugal Compressors.
- (c) Specialized Work:
 1. ISO 1940-1 : Specifications and Verification of

Balance Tolerances.

2. API 610 : Centrifugal Pumps for Petroleum, Heavy Duty Chemical, and Gas Industry Services.

(d) Supporting Work :

1. ISO 9001 : Quality Management System.
2. ISO 14001 : Environmental Management System.

The quality controls implemented in a machine shop include:

(a) Machining :

1. Drawing scale 1:1 up to A3 size.
2. Dimension check using calibrated measuring instruments.

(b) Equipment :

1. Testing using a calibrated machine.
2. Involving a certified 3rd party.

(c) Specialized Work:

1. Testing using a calibrated machine.
2. Involving a certified 3rd party.

Improved Utilization

With the age of a machines getting older and the addition of the STG (Steam Turbine Generator) and NPK Fertilizer factory, a machine shop is still required to be able to produce equipment parts for the entire factory.

A machine shop answers this challenge by actively innovating that are registered in the annual Innovation Meeting at PT Pupuk Sriwidjaja.

Innovation Meeting at PT Pupuk Sriwidjaja Palembang. The best achievement of a machine shop at the Innovation Meeting is to become a company representative at the 2022 International Quality and Productivity Convention (IQPC) with a platinum predicate result, with the title of the paper : Fabricating of Special Tool to Make Precision Radius Contour on Conventional Lathe Machine. In the process of making these tools, several tools are needed such as: lathe tools, collet tools, bushing tools and freis tools. All of these tools are the invention and work of a machine shop personnel.

RESULT AND DISCUSSIONS

A machine shop as a part that supports fertilizer production at PT Pupuk Sriwidjaja Palembang has carried out its duties and functions well. A strong commitment to always participate when production problems arise is seen with the creation of work groupings and the formation of shift teams that operate for 24 hours. With the achievement of the company's production of 2.33 million tons/year of urea, 1.47 million

tons/year of ammonia and 300 thousand tons/year of NPK (PT. Pupuk Sriwidjaja, 2023) as evidence of this commitment. The diverse types of work, not just revolving around machinery (which is why this section was originally named a machine shop) show that a machine shop continues to develop and grow. Grouping work, adding knowledge and standards and continuing to innovate can complement the quality needs of personnel in a machine shop work unit. As one of the famous quote “Life is like riding a bicycle. To keep your balance you must keep moving” (Albert Einstein).

CONCLUSION

With the ever-increasing desires and expectations of consumers in terms of tastes and choices, as well as the increase in production costs that can only be overcome through process quality improvement and productivity improvement, there are several conclusions that can be drawn, among others:

1. Supporting work must receive more attention, because it has not been utilized optimally and proportionally. It is necessary to form a team that makes supporting work its main task and function.
2. Quality Control must be layered and tiered to ensure that the goods received by consumers are in accordance with the agreed requirements and procedures. Personnel training and calibration of tools and machines are mandatory to support reliable quality control results. Shift team leaders will be equipped with quality control skills so that quality control can take place for 24 hours.
3. Improved personnel skills can be honed with additional knowledge to support the quality of work. Supporting training includes:
 - (a) Machining:
 1. Computer-Aided Manufacturing (CAM).
 2. Measurement and Calibration Techniques.
 - (b) Unit Work:
 1. Non Destructive Test.
 2. Mechanical governors and actuators.
 - (c) Specialized Work:
 1. Coating Inspector.
 2. Balancing rotating machinery.
 - (d) Supporting work:
 1. Production Planning and Control.
 2. Project Management.
 3. Engineering design software.
4. Increased utilization not only includes the constraints and challenges in a machine shop, but also must look at the constraints and challenges outside a machine shop. Some of the things that can be raised as topics are parts fabrication and repair, among others :

ARCV, LV-1004 P1B and Cage Valve GB-101.

ACKNOWLEDGEMENTS

Thank to PT Pupuk Sriwidjaja Palembang for the opportunity to conduct the study and the data provided, and also thank to all family members at home for giving me the time i needed during the writing process. This paper would not have been finished without your support.

REFERENCES

- Deming, W. Edwards, 1982. Quality, productivity, and competitive position, Paper Cavalier, UK.
Information from www.bensin.pusri.co.id (accessed on march 24th, 2020)
PT. Pupuk Sriwidjaja Palembang, 2023. Annual Report.
Qin J., Liua Y., Grosvenor R., 2016. A Categorical Framework of Manufacturing for Industry 4.0 and Beyond, Changeable, Agile, Reconfigurable & Virtual Production Conference, 2016, 173-178