

**COMPETENCY MODEL FOR
MACHINIST (2016)
CLASS CODE 3763**

The following competencies have been identified as those that best separate superior from satisfactory job performance in the class of **MACHINIST**. (Numbers refers to the order of competencies in the Competency Bank.)

- 2. Mathematics
- 5. Learning Ability
- 8. Safety Focus
- 12. Conscientiousness
- 20. Job Knowledge
- 23. Equipment Operation
- 24. Mechanical Aptitude
- 35. Teamwork
- 43. Follow Oral Directions

On the following pages are descriptions of each competency, including a definition, the level of the competency required for the class (*italicized*, **bolded**, and underlined), examples of behavioral indicators, and satisfactory and superior performance levels.

2. MATHEMATICS – Performs arithmetic or higher-level mathematical computations accurately.

Level of Competency Required by Job:

- Level 1: Perform arithmetic computations (add, subtract, multiply, divide, ratios, percentages).
- Level 2: **Use algebra (substitute numbers for letters in a formula), geometry (angles, distances, area), and/or descriptive statistics (mean/median/mode, standard deviation, range).**
- Level 3: Apply and interpret calculus, inferential statistics (t-tests, correlations, ANOVA, multiple regression) or other very high level mathematics.

Examples of Behavioral Indicators:

- Quickly and accurately performs arithmetic computations.
- Appropriately selects and applies formulas for stated purpose.
- Correctly identifies an appropriate analysis for a specific purpose and selects the appropriate computer program for computation.
- Accurately interprets and presents results of mathematical/statistical computations.

Performance Levels:

Satisfactory

Knows mathematical requirements of the job and performs them correctly. Verifies work to ensure accuracy.

Superior

Identifies additional opportunities for the application of mathematics in work. Answers questions/trains others to assist them in their use of mathematics.

5. LEARNING ABILITY – Readily acquires and applies new information.

Level of Competency Required by Job:

Level 1: Learn job-related information, rules, and procedures, and apply them correctly.

Level 2: Learn and apply extensive job-related information correctly. Make reasonable inferences when specific information needed in a given instance was not presented.

Level 3: Access new job-related information via print or electronic media, in educational/training programs, and/or by speaking with others, and apply it correctly to the job.

Examples of Behavioral Indicators:

- Recalls information presented in educational/training programs.
- Recognizes how to apply newly acquired information to the job.
- Applies new information to the job in a way that increases productivity.
- Applies “lessons learned” from prior work experiences to current work.
- Answers questions/coaches others who received the same instruction.

Performance Levels:

Satisfactory

Learns new information and applies it appropriately to situations/issues.

Superior

Readily acquires new information, makes appropriate inferences based on it, and integrates it with prior learning and experience to maximize its use in a variety of situations or with respect to a variety of issues.

8. SAFETY FOCUS – Performs work in a way that minimizes risk of injury to self or others.

Level of Competency Required by Job:

- Level 1: Maintain awareness of unsafe conditions and actions to avoid injury.
- Level 2: Follow safety rules/procedures; avoid known hazards in the work environment.
- Level 3: Carefully follow safety rules and procedures and consistently use all necessary safety equipment.**

Examples of Behavioral Indicators:

- Wears seat belt.
- Ensures safe physical work environment by taking actions such as eliminating unstable stacks of materials, closing drawers so filing cabinets will not tip over, and keeping pathways clear of tripping hazards.
- Reviews safety procedures before beginning each job with known hazards.
- Follows safety procedures while performing work even when it takes more time.
- Uses safety equipment such as goggles, gloves, and earplugs as required or warranted.
- Frequently checks safety equipment for proper condition and operation.

Performance Levels:

Satisfactory

Maintains awareness of personal safety to avoid injury or property damage during all work activities.

Superior

“Safety first.” Places avoidance of injury or property damage above all other job requirements. Mentions the need to follow safe work practices to co-workers. Actively seeks ways to avoid injury.

12. CONSCIENTIOUSNESS – Dependable, reliable, diligent, and attends to all aspects of assignments (the “details”).

Level of Competency Required by Job:

Level 1: Remain on-task and make every reasonable effort to complete work in time allotted. Note discrepancies and takes action or informs appropriate person when “things don’t seem right” in information or data.

Level 2: Note when own work logically relates to the work of others and coordinate with them and when additional tasks must be performed to complete an assignment and perform/assign them. Recognize when, despite best efforts, work will not be done and notifies supervision.

Level 3: Attend to each area of responsibility, and if all are not being addressed, arrange for transfer or elimination of some of them. Ensure that all aspects of programs/projects are properly addressed to ensure success.

Examples of Behavioral Indicators:

- Seeks all necessary information to do the job well.
- Learns from experience so can recognize when things are not right.
- Maintains a high level of task-related behavior.
- Continues to work diligently in the absence of supervision.
- Fully attends to seemingly minor as well as major aspects of each work assignment.

Performance Levels:

Satisfactory

Fully attends to work at hand; notes details, errors, and discrepancies and follows-up as necessary. Reliably performs and completes work. Punctual; respectful of others’ time.

Superior

Notes relationship of own work to work of others to ensure all aspects are coordinated. Performs additional tasks and otherwise follows-up to ensure thoroughness.

20. JOB KNOWLEDGE – Knows information required to perform a specific job. Includes both widely available courses of study (for example, chemistry, human resources management, graphic arts) and City-specific information (parking regulation and ticketing practices; purchasing procedures; provisions of the City Charter).

Level of Competency Required by Job:

Level 1: Knowledge is concrete, factual, and/or procedural and may be defined by the organization. Situations in which it is applied are quite consistent.

Level 2: Knowledge is substantive and may be defined by an external trade, field, or profession. Situations in which it is applied vary and, as such, require breadth and depth of understanding.

Level 3: Knowledge is abstract, conceptual, and/or complex and may be supported by a well-defined academic discipline or authoritative sources (e.g., laws, ordinances, government guidelines/regulations/codes). Situations in which it is applied may vary greatly or be novel.

Examples of Behavioral Indicators:

- Performs work correctly/avoids technical (job content related) errors.
- Answers technical questions about work accurately.
- Asks few technical questions about the performance of routine work activities.
- Offers advice (“coaching”) to new employees regarding their work.
- Develops training programs for other employees.

Performance Levels:

Satisfactory

Sufficient job knowledge to perform work correctly independently. Answers technical questions about work correctly.

Superior

Expertise in technical job information sufficient to serve as a resource to others. May develop training manuals/ programs and/or give internal and/or external presentations related to work.

Job Knowledge Areas

1. Knowledge of terminology used in cutting and shaping metal and other materials such as turn, mill, broach, grind, and fit for the fabrication and repair of various types of machinery and equipment.
2. Knowledge of the physical properties (e.g. tensile and yield strength) and uses of cast iron, steel, brass, aluminum, copper, bronze, plastic and other materials for parts fabrication in order to use the proper materials under appropriate conditions such as high temperature or corrosion resistance.
3. Knowledge of the methods used to disassemble, repair, and assemble gas, diesel, and marine engines, steam and hydraulic turbines, fire apparatus and pumps, vehicular and construction equipment, water distribution and power generating equipment, asphalt and sewage treatment plant equipment, and a variety of other mechanical, hydraulic, pneumatic, and electrical assemblies in order to correctly disassemble assemblies without causing damage, effectively eliminating defects by performing repairs, and correctly reassembling assemblies for future use.
4. Knowledge of non-destructive testing methods such as dye penetration for determining the acceptability of various materials and parts for use in assemblies.
5. Knowledge of manual inspection procedures including but not limited to indicator run out and precision measuring tools such as micrometers and calipers sufficient to conduct inspections on equipment parts to detect a defect and/or determine if a part is worn out, the extent of repairs needed, and if a new equipment is being fabricated according to blueprints and specifications if repairs are needed.
6. Knowledge of the methods used for repairs on engines, turbines, pumps, compressors, valves, pneumatic tools, and other special equipment and their component parts such as parts fabrication or modification in order to restore the equipment back to normal operating conditions.
7. Knowledge of drafting practices including but not limited to technical drawing and computer aided drawing (CAD) sufficient to create and interpret blueprints, drawings, sketches, and specifications related to the machinist trade.
8. Knowledge of computer numerical control (CNC) machinery such as milling machines and lathes sufficient to manually set up said CNC machinery using dial indicators and hand tools (e.g. wrenches) as well as program CNC machinery by writing and editing programs and subroutines using G-Code such as G99 or computer-aided design and computer-aided manufacturing (CAD/CAM) software including but not limited to MasterCAM to ensure that CNC machinery and equipment will operate safely and efficiently.
9. Knowledge of rotating and reciprocating shafts such as pumps, transmissions, and turbines sufficient to align them to reduced tolerances using manual methods

for face and rim such as the use of dial test indicators, or by using laser alignment tools such as Optalign to ensure smooth operation.

10. Knowledge of precision machine tools and shop equipment including but not limited to: engine lathes, mills, vertical turret lathes, grinders, and drill presses sufficient to operate them manually using dial indicators and hand tools such as wrenches and by selecting cutting tools, speed of feed rates, methods of holding, and order of operations to cut, turn, grind, lap, shape, mill, bore, drill, thread, groove, test, broach, and slot materials such as: cast iron, steel, nickel alloys, brass, aluminum, copper, bronze, plastic, and other materials and to fabricate and repair equipment parts from sample parts safely and efficiently using, sketches and blueprints.
11. Knowledge of the steps and controls necessary to operate heavy shop equipment including but not limited to overhead cranes and forklifts in order to properly complete machinist duties such as lifting and moving heavy equipment, machines, and materials.
12. Knowledge of how to operate jigs, fixtures, tools, dies, and machine shop tools including but not limited to mills, lathes, vertical turret lathes, drill presses, band saws, and surface grinders sufficient to repair and fabricate machines, machine parts and equipment.

23. EQUIPMENT OPERATION – Operates specialized equipment in performance of job duties.

Level of Competency Required by Job:

- Level 1: Operate equipment based on on-the-job training.
- Level 2: Operate equipment based on attendance at a training program and practice.
- Level 3: Operate equipment for which in-depth, complex training was required and which may require certification.**

Examples of Behavioral Indicators:

- Operates equipment proficiently.
- Operates equipment with strict adherence to safety procedures.
- Understands the operation of equipment used on the job and correctly answers questions about it.
- Willingly participates in any training necessary to maintain up-to-date knowledge of equipment operation.

Performance Levels:

Satisfactory

Operates equipment safely and with a high degree of proficiency.

Superior

Operates equipment with extreme proficiency and correctly answers questions about its operation. Trains and/or coaches others in the operation of equipment.

24. MECHANICAL APTITUDE – Accurately predicts the impact of forces on objects and assesses the behavior of other physical phenomena (e.g., volume, weight, velocity). Readily learns work involving the application of mechanical principles.

Level of Competency Required by Job:

Level 1: Maintain a safe work environment by ensuring objects in it are stable, tools and equipment are properly used.

Level 2: Know the physical properties of objects in the work environment and correctly anticipate the action of forces upon them; performs work accordingly (correctly and safely).

Level 3: In-depth understanding of mechanical and physical phenomena sufficient to design and/or oversee the construction of systems.

Examples of Behavioral Indicators:

- Recognizes the impact of an earthquake on objects in the work environment and re-arranges them as possible to avoid possible damage or destruction and potential to cause injury.
- Uses tools properly to accomplish work correctly and safely.
- Recognizes the effects of various actions on objects and performs only those actions that will accomplish intended result and will not cause property damage or injury.
- Systems designed and/or for which construction is overseen operate as intended upon completion.

Performance Levels:

Satisfactory

Recognizes the operation of mechanical/physical phenomena sufficient to readily learn and perform work of a mechanical nature.

Superior

Displays exceptional insight into the operation of mechanical phenomena, and makes correct inferences regarding it. Promptly and accurately troubleshoots problems..

35. TEAMWORK – Interacts effectively with others to achieve mutual objectives;
Readily offers assistance to others to facilitate their goal accomplishment.

Level of Competency Required by Job:

Level 1: Work effectively as a member of a work unit or project team. Readily offer assistance to others when they have too much work or have too little.

Level 2: *Work effectively as a team member in which different people have different roles/responsibilities and perspectives. Identify points for collaboration with co-workers; readily offer and request assistance.*

Level 3: Work effectively as a part of an interdependent team (your work gets done only if the work of the whole team is done; evaluation of team performance is more relevant than individual performance).

Examples of Behavioral Indicators:

- Discusses work-related matters with co-workers.
- Offers and requests assistance readily.
- Offers and is receptive to suggestions.
- Identifies problems with workflow that will prevent team from accomplishing its goals.
- Provides constructive criticism and feedback to team members to improve overall functioning of team.
- Assigns credit to team for accomplishments.

Performance Levels:

Satisfactory

Cooperates with co-workers and fulfills responsibilities as a member of a project team. Maintains a focus on common objectives and offers and requests assistance readily.

Superior

Sees the team as a whole; acknowledges that performance of the team is what in reality is evaluated by others. If anyone fails, everyone on the team fails.

43. FOLLOW ORAL DIRECTIONS – Performs work accurately as directed orally.

Level of Competency Required by Job:

- Level 1: Receive specific, complete oral directions daily or by individual task assignment throughout the day.
- Level 2: Receive general instructions orally that span across days or for entire assignments.**
- Level 3: Receive general instructions/assignments orally regarding longterm objectives/responsibilities.

Examples of Behavioral Indicators:

- Does work assigned orally properly and on time.
- Asks pertinent questions for clarification of assignments.
- Performs work correctly when instructions were given orally.
- Explains assignments to others who received the same instructions.
- Performs work in accordance with general outline provided orally.
- Correctly infers details of assignments given only in general terms.

Performance Levels:

Satisfactory

Behaves in a courteous, respectful, cooperative manner toward co-workers, other City employees, and members of the public.

Superior

Facilitates positive interpersonal relations within/among workgroups and toward members of the public. Adept at finding similarities and grounds for cooperation/mutual benefit.

