



Steinbeis-Hochschule Berlin
Institute of Business Excellence

Lean Manufacturing 5

certified by Steinbeis University[®]
Operational Excellence,
Principles and Selected Methods
of Lean Production

Six practice questionnaires

to prepare for the certification exam
Manager for Lean Manufacturing
(Black Belt of LM)

... certified by Steinbeis University

Steinbeis University Berlin (Steinbeis University) is a state-recognized private educational institution. With more than 5,000 students in Bachelor's, Master's, doctoral and certificate programs, and through intensive cooperation with international universities and institutes, it offers the best conditions for recognized and highly qualified educational qualifications.

Personal university certificates „... certified by Steinbeis University®“ are visible proof that the certificate holder has special qualifications. They have proven that they have special skills in the certified field. Certificates from Steinbeis University, issued by the Institute for Business Excellence, can advance careers! This is how knowledge is turned into new opportunities!

These practice questionnaires are intended to help interested individuals to effectively and efficiently prepare for a written examination for a university certificate. Each questionnaire covers the full extent of knowledge necessary for the specified level. A certificate exam is generated from the pool of questions from all questionnaires. The given answers should be understood as suggestions for finding a solution. It is expected that the participant of an exam will deal intensively with the content, for example in appropriate seminars, trainings or self-study. The exam will require in-depth answers to the questions.

A written certificate exam usually takes 90 minutes. No documents are allowed. The exam has been passed when at least 60 percent of the points have been achieved. The university's examination and certification regulations provide the basis. The examinations and certifications are conducted by the University Institute for Business Excellence.

You can find information on the topics covered in this questionnaire in:

Jeffrey K. Liker: The Toyota Way. FinanzBuch Verlag Munich

The Lean Enterprise Memory Jogger GOAL/QPC USA

The Six Sigma Memory Jogger GOAL/QPC USA

Gerd F. Kamiske, Jörg-Peter Brauer: Qualitätsmanagement von A bis Z. Hanser Verlag Munich Vienna

DIN 31051: Grundlagen der Instandhaltung. Beuth Verlag

Free downloads for further reference at https://www.tqu-group.com/de/zertifizieren/downloads_pruefungen.php

The following exercise questionnaires and university certificates for Lean Management Specialists are available:

LM1: Agent for Lean Manufacturing (Green Belt of LM)

LM2: Manager for Lean Manufacturing (Black Belt of LM)

LM3: Agent for Engineering Excellence (Green Belt of EE)

LM4: Manager for Engineering Excellence (Black Belt of EE)

LM5: Manager for Lean Manufacturing (Black Belt of LM) englisch

Transformation: Master Black Belt

Transformation + LM2: Consultant for Lean Management (Master Belt of LM)

Lean Manufacturing Manager for Lean Manufacturing (Black Belt of LM)

Practice questionnaire LM5 for the certificate exam

LM5-1

Questions

- 1 Operational Excellence: What is meant by operational excellence (OE)? The Shingo Prize rates OE using four criteria. What are these criteria?
- 2 Operational Excellence: You read in a report for the Shingo Prize: Kaizen is used for selected sub-processes. What is the level of Operational Excellence?
- 3 LM basics: Which four important changes in work organization can be traced back to Frederick Winslow Taylor (1856 - 1915)?
- 4 LM basics: What is an innovation? In which two alternative ways are innovations implemented?
- 5 LM basics: What does the abbreviation TOC stand for? What could a German translation be? Who developed TOC?
- 6 LM basics: How can a bottleneck (constraint) be relieved in a production process? Name five options.
- 7 LM implementation: The implementation of slim production (lean production) can happen inductively, process-driven. On which six factors does the decision for the selection of the procedure depend?
- 8 LM value stream: What does the bullwhip-effect (whip stroke effect) mean?

LM5-1

Questions

- 9 LM value stream: Which relationship determines the logistics strategy?

- 10 LM value stream: Explain the value stream concept SET.

- 11 LM value stream: What does it mean if the internal transport runs in the so-called milk run? How is the milk run organised?

- 12 LM value stream: What are the three important criteria in the selection of the small load carrier SLC, in logistics?
What are the three internal effects of logistics when switching to smaller load carriers?

- 13 LM value stream: What effects can large carriers in logistics have on the entire delivery process?

- 14 LM shop-floor: What is shop-floor management? What is the objective? How should shop-floor management be done, in the sense of lean management?

- 15 LM shop-floor: What is a Hancho? What tasks does he perform in shop-floor management?

LM5-6

Answers		Points
19	# (g) standardising the new status (c) localising the cause of the problem (POL) (a) detecting the problem (b) naming the problem (f) evaluating and selecting (d) researching the cause using the 5 W method (e) developing solution measures	7
20	# all the information needed to solve the problem, such as the process, the problem description, the solution measures or the cost-benefit analysis, are summarised on a DIN A3 paper, for better communication	2
21	# the normal distribution model, Gaussian bell curve # a center of gravity (mean), symmetry, nonlinear	4
22	# the Six Sigma approach to problem-solving works in five phases: Define, Measure, Analyse, Improve and Control; each project must go through these phases completely, and in chronological order	2
23	# measurement results demonstrating the success of the improvements realised # short-, medium- and long-term observational data # new standards	3
24	# before $cp = (OT - UT)/6\ xs = 0.87$; from this $OT - UT = 5.2\ xs$; from table at $z = 2.61 = 4.53E-03$ corresponds to 0.4527 percent one-sided; both sides = 0.9054 percent; output = $100 - 0.0040 = 99.9960$ percent after $cp = (OT - UT)/6\ xs = 1.37$; from this $OT - UT = 8.220\ xs$; from table at $z = 4.11 = 1.98E-05$ corresponds to 0.002 percent one-sided; on both sides = 0.0040 percent; output = $100 - 0.0040 = 99.9960$ percent; difference = 0.90 percent increase	4
25	# quick response to changing market demands # flexible use of human resources # productivity- and spatial benefits	3
26	# improving the performance of the entire work-system, consisting of man, machine, environment and information	2
27	# theory Z: it is the synthesis of theory X and Y; man is either willing or unwilling; strong employee participation leads to higher productivity; the assumptions of theory Z essentially correspond to the iapanese management style	2
28	five percent of all men are less than 1,629 mm, 95 percent are taller	2
29	# he has to make sure that they have received adequate instructions regarding the hazards to their safety and health while working there	2
30	# so that downtime can be bridged by mechanisations	2
31	# lean metrics are metrics and key figures that help people demonstrate and understand the status and development of lean management versus goals # financial metrics # behavioral metrics # process-related metrics	5
32	# FTT (FTY) = $(728 - (0 + 3))/100 = 99.59$ percent # defect rate = $(100 - 99.59) \times 10,000 = 4,121$ ppm	4
33	# ODT for deliveries = $(50 - 6)/50 = 88.0$ percent # ODT for products = $(876 - 55)/876 = 93.7$ percent	4
34	# ITO = $572,800/40,800 = 14.0$ times a year # time = $(1/ITO) \times 365 = 26.0$ calendar days	3
35	# availability = NOT/NAT; net operating time/available time NOT is the production time (term) minus all (unplanned) downtime; NAT is the available time (operating time), i.e. the possible working time minus all contractual idle-times (e.g. breaks, holidays, etc.)	2
36	# VA/NVA = $(469/60)/(14 \times 8) = 0.070$ or 7.0 percent	3

z-table

z	0	0,01	0,02	0,03	0,04	0,05	0,06	0,07	0,08	0,09
0,0	5,00E-01	4,96E-01	4,92E-01	4,88E-01	4,84E-01	4,80E-01	4,76E-01	4,72E-01	4,68E-01	4,64E-01
0,1	4,60E-01	4,56E-01	4,52E-01	4,48E-01	4,44E-01	4,40E-01	4,36E-01	4,33E-01	4,29E-01	4,25E-01
0,2	4,21E-01	4,17E-01	4,13E-01	4,09E-01	4,05E-01	4,01E-01	3,97E-01	3,94E-01	3,90E-01	3,86E-01
0,3	3,82E-01	3,78E-01	3,74E-01	3,71E-01	3,67E-01	3,63E-01	3,59E-01	3,56E-01	3,52E-01	3,48E-01
0,4	3,45E-01	3,41E-01	3,37E-01	3,34E-01	3,30E-01	3,26E-01	3,23E-01	3,19E-01	3,16E-01	3,12E-01
0,5	3,09E-01	3,05E-01	3,02E-01	2,98E-01	2,95E-01	2,91E-01	2,88E-01	2,84E-01	2,81E-01	2,78E-01
0,6	2,74E-01	2,71E-01	2,68E-01	2,64E-01	2,61E-01	2,58E-01	2,55E-01	2,51E-01	2,48E-01	2,45E-01
0,7	2,42E-01	2,39E-01	2,36E-01	2,33E-01	2,30E-01	2,27E-01	2,24E-01	2,21E-01	2,18E-01	2,15E-01
0,8	2,12E-01	2,09E-01	2,06E-01	2,03E-01	2,00E-01	1,98E-01	1,95E-01	1,92E-01	1,89E-01	1,87E-01
0,9	1,84E-01	1,81E-01	1,79E-01	1,76E-01	1,74E-01	1,71E-01	1,69E-01	1,66E-01	1,64E-01	1,61E-01
1,0	1,59E-01	1,56E-01	1,54E-01	1,52E-01	1,49E-01	1,47E-01	1,45E-01	1,42E-01	1,40E-01	1,38E-01
1,1	1,36E-01	1,33E-01	1,31E-01	1,29E-01	1,27E-01	1,25E-01	1,23E-01	1,21E-01	1,19E-01	1,17E-01
1,2	1,15E-01	1,13E-01	1,11E-01	1,09E-01	1,07E-01	1,06E-01	1,04E-01	1,02E-01	1,00E-01	9,85E-02
1,3	9,68E-02	9,51E-02	9,34E-02	9,18E-02	9,01E-02	8,85E-02	8,69E-02	8,53E-02	8,38E-02	8,23E-02
1,4	8,08E-02	7,93E-02	7,78E-02	7,64E-02	7,49E-02	7,35E-02	7,21E-02	7,08E-02	6,94E-02	6,81E-02
1,5	6,68E-02	6,55E-02	6,43E-02	6,30E-02	6,18E-02	6,06E-02	5,94E-02	5,82E-02	5,71E-02	5,59E-02
1,6	5,48E-02	5,37E-02	5,26E-02	5,16E-02	5,05E-02	4,95E-02	4,85E-02	4,75E-02	4,65E-02	4,55E-02
1,7	4,46E-02	4,36E-02	4,27E-02	4,18E-02	4,09E-02	4,01E-02	3,92E-02	3,84E-02	3,75E-02	3,67E-02
1,8	3,59E-02	3,51E-02	3,44E-02	3,36E-02	3,29E-02	3,22E-02	3,14E-02	3,07E-02	3,01E-02	2,94E-02
1,9	2,87E-02	2,81E-02	2,74E-02	2,68E-02	2,62E-02	2,56E-02	2,50E-02	2,44E-02	2,39E-02	2,33E-02
2,0	2,28E-02	2,22E-02	2,17E-02	2,12E-02	2,07E-02	2,02E-02	1,97E-02	1,92E-02	1,88E-02	1,83E-02
2,1	1,79E-02	1,74E-02	1,70E-02	1,66E-02	1,62E-02	1,58E-02	1,54E-02	1,50E-02	1,46E-02	1,43E-02
2,2	1,39E-02	1,36E-02	1,32E-02	1,29E-02	1,25E-02	1,22E-02	1,19E-02	1,16E-02	1,13E-02	1,10E-02
2,3	1,07E-02	1,04E-02	1,02E-02	9,90E-03	9,64E-03	9,39E-03	9,14E-03	8,89E-03	8,66E-03	8,42E-03
2,4	8,20E-03	7,98E-03	7,76E-03	7,55E-03	7,34E-03	7,14E-03	6,95E-03	6,76E-03	6,57E-03	6,39E-03
2,5	6,21E-03	6,04E-03	5,87E-03	5,70E-03	5,54E-03	5,39E-03	5,23E-03	5,08E-03	4,94E-03	4,80E-03
2,6	4,66E-03	4,53E-03	4,40E-03	4,27E-03	4,15E-03	4,02E-03	3,91E-03	3,79E-03	3,68E-03	3,57E-03
2,7	3,47E-03	3,36E-03	3,26E-03	3,17E-03	3,07E-03	2,98E-03	2,89E-03	2,80E-03	2,72E-03	2,64E-03
2,8	2,56E-03	2,48E-03	2,40E-03	2,33E-03	2,26E-03	2,19E-03	2,12E-03	2,05E-03	1,99E-03	1,93E-03
2,9	1,87E-03	1,81E-03	1,75E-03	1,69E-03	1,64E-03	1,59E-03	1,54E-03	1,49E-03	1,44E-03	1,39E-03
3,0	1,35E-03	1,31E-03	1,26E-03	1,22E-03	1,18E-03	1,14E-03	1,11E-03	1,07E-03	1,04E-03	1,00E-03
3,1	9,68E-04	9,35E-04	9,04E-04	8,74E-04	8,45E-04	8,16E-04	7,87E-04	7,62E-04	7,36E-04	7,11E-04
3,2	6,87E-04	6,64E-04	6,41E-04	6,19E-04	5,98E-04	5,77E-04	5,57E-04	5,38E-04	5,19E-04	5,01E-04
3,3	4,83E-04	4,66E-04	4,50E-04	4,34E-04	4,19E-04	4,04E-04	3,90E-04	3,76E-04	3,62E-04	3,49E-04
3,4	3,37E-04	3,25E-04	3,13E-04	3,02E-04	2,91E-04	2,80E-04	2,70E-04	2,60E-04	2,51E-04	2,42E-04
3,5	2,33E-04	2,24E-04	2,16E-04	2,08E-04	2,00E-04	1,93E-04	1,85E-04	1,78E-04	1,72E-04	1,65E-04
3,6	1,59E-04	1,53E-04	1,47E-04	1,42E-04	1,36E-04	1,31E-04	1,26E-04	1,21E-04	1,17E-04	1,12E-04
3,7	1,08E-04	1,04E-04	9,96E-05	9,57E-05	9,20E-05	8,84E-05	8,50E-05	8,16E-05	7,84E-05	7,53E-05
3,8	7,23E-05	6,95E-05	6,67E-05	6,41E-05	6,15E-05	5,91E-05	5,67E-05	5,44E-05	5,22E-05	5,01E-05
3,9	4,81E-05	4,61E-05	4,43E-05	4,25E-05	4,07E-05	3,91E-05	3,75E-05	3,59E-05	3,45E-05	3,30E-05
4,0	3,17E-05	3,04E-05	2,91E-05	2,79E-05	2,67E-05	2,56E-05	2,45E-05	2,35E-05	2,25E-05	2,16E-05
4,1	2,07E-05	1,98E-05	1,89E-05	1,81E-05	1,74E-05	1,66E-05	1,59E-05	1,52E-05	1,46E-05	1,39E-05
4,2	1,33E-05	1,28E-05	1,22E-05	1,17E-05	1,12E-05	1,07E-05	1,02E-05	9,77E-06	9,34E-06	8,93E-06
4,3	8,54E-06	8,16E-06	7,80E-06	7,46E-06	7,12E-06	6,81E-06	6,50E-06	6,21E-06	5,93E-06	5,67E-06
4,4	5,41E-06	5,17E-06	4,94E-06	4,71E-06	4,50E-06	4,29E-06	4,10E-06	3,91E-06	3,73E-06	3,56E-06
4,5	3,40E-06	3,24E-06	3,09E-06	2,95E-06	2,81E-06	2,68E-06	2,56E-06	2,44E-06	2,32E-06	2,22E-06
4,6	2,11E-06	2,01E-06	1,92E-06	1,83E-06	1,74E-06	1,66E-06	1,58E-06	1,51E-06	1,43E-06	1,37E-06
4,7	1,30E-06	1,24E-06	1,18E-06	1,12E-06	1,07E-06	1,02E-06	9,68E-07	9,21E-07	8,76E-07	8,34E-07
4,8	7,93E-07	7,55E-07	7,18E-07	6,83E-07	6,49E-07	6,17E-07	5,87E-07	5,58E-07	5,30E-07	5,04E-07
4,9	4,79E-07	4,55E-07	4,33E-07	4,11E-07	3,91E-07	3,71E-07	3,52E-07	3,35E-07	3,18E-07	3,02E-07
5,0	2,87E-07	2,72E-07	2,58E-07	2,45E-07	2,33E-07	2,21E-07	2,10E-07	1,99E-07	1,89E-07	1,79E-07
5,1	1,70E-07	1,61E-07	1,53E-07	1,45E-07	1,37E-07	1,30E-07	1,23E-07	1,17E-07	1,11E-07	1,05E-07
5,2	9,96E-08	9,44E-08	8,95E-08	8,48E-08	8,03E-08	7,60E-08	7,20E-08	6,82E-08	6,46E-08	6,12E-08
5,3	5,79E-08	5,48E-08	5,19E-08	4,91E-08	4,65E-08	4,40E-08	4,16E-08	3,94E-08	3,72E-08	3,52E-08
5,4	3,33E-08	3,15E-08	2,98E-08	2,82E-08	2,66E-08	2,52E-08	2,38E-08	2,25E-08	2,13E-08	2,01E-08
5,5	1,90E-08	1,79E-08	1,69E-08	1,60E-08	1,51E-08	1,43E-08	1,35E-08	1,27E-08	1,20E-08	1,14E-08
5,6	1,07E-08	1,01E-08	9,55E-09	9,01E-09	8,50E-09	8,02E-09	7,57E-09	7,14E-09	6,73E-09	6,35E-09
5,7	5,99E-09	5,65E-09	5,33E-09	5,02E-09	4,73E-09	4,46E-09	4,21E-09	3,96E-09	3,74E-09	3,52E-09
5,8	3,32E-09	3,12E-09	2,94E-09	2,77E-09	2,61E-09	2,46E-09	2,31E-09	2,18E-09	2,05E-09	1,93E-09
5,9	1,82E-09	1,71E-09	1,61E-09	1,51E-09	1,43E-09	1,34E-09	1,26E-09	1,19E-09	1,12E-09	1,05E-09
6,0	9,87E-10	9,28E-10	8,72E-10	8,20E-10	7,71E-10	7,24E-10	6,81E-10	6,40E-10	6,01E-10	5,65E-10
6,1	5,30E-10	4,98E-10	4,68E-10	4,39E-10	4,13E-10	3,87E-10	3,64E-10	3,41E-10	3,21E-10	3,01E-10
6,2	2,82E-10	2,65E-10	2,49E-10	2,33E-10	2,19E-10	2,05E-10	1,92E-10	1,81E-10	1,69E-10	1,59E-10
6,3	1,49E-10	1,40E-10	1,31E-10	1,23E-10	1,15E-10	1,08E-10	1,01E-10	9,45E-11	8,85E-11	8,29E-11
6,4	7,77E-11	7,28E-11	6,81E-11	6,38E-11	5,97E-11	5,59E-11	5,24E-11	4,90E-11	4,59E-11	4,29E-11
6,5	4,02E-11	3,76E-11	3,52E-11	3,29E-11	3,08E-11	2,88E-11	2,69E-11	2,52E-11	2,35E-11	2,20E-11
6,6	2,06E-11	1,92E-11	1,80E-11	1,68E-11	1,57E-11	1,47E-11	1,37E-11	1,28E-11	1,19E-11	1,12E-11
6,7	1,04E-11	9,73E-12	9,09E-12	8,48E-12	7,92E-12	7,39E-12	6,90E-12	6,44E-12	6,01E-12	5,61E-12
6,8	5,23E-12	4,88E-12	4,55E-12	4,25E-12	3,96E-12	3,69E-12	3,44E-12	3,21E-12	2,99E-12	2,79E-12
6,9	2,60E-12	2,42E-12	2,26E-12	2,10E-12	1,96E-12	1,83E-12	1,70E-12	1,58E-12	1,48E-12	1,37E-12
7,0	1,28E-12	1,19E-12	1,11E-12	1,03E-12	9,61E-13	8,95E-13	8,33E-13	7,75E-13	7,21E-13	6,71E-13
7,1	6,24E-13	5,80E-13	5,40E-13	5,02E-13	4,67E-13	4,34E-13	4,03E-13	3,75E-13	3,49E-13	3,24E-13
7,2	3,01E-13	2,80E-13	2,60E-13	2,41E-13	2,24E-13	2,08E-13	1,94E-13	1,80E-13	1,67E-13	1,55E-13
7,3	1,44E-13	1,34E-13	1,24E-13	1,15E-13	1,07E-13	9,91E-14	9,19E-14	8,53E-14	7,92E-14	7,34E-14
7,4	6,81E-14	6,32E-14	5,85E-14	5,43E-14	5,03E-14	4,66E-14	4,33E-14	4,01E-14	3,72E-14	3,44E-14
7,5	3,19E-14	2,95E-14	2,74E-14	2,54E-14	2,35E-14	2,18E-14	2,02E-14	1,87E-14	1,73E-14	1,60E-14
7,6	1,48E-14	1,37E-14	1,27E-14	1,18E-14	1,09E-14	1,01E-14	9,33E-15	8,55E-15	7,99E-15	7,33E-15
7,7	6,77E-15	6,33E-15	5,77E-15	5,33E-15	5,00E-15	4,55E-15	4,22E-15	3,89E-15	3,66E-15	3,33E-15
7,8	3,11E-15	2,89E-15	2,66E-15	2,44E-15	2,22E-15	2,11E-15	1,89E-15	1,78E-15	0,00E+00	0,00E+00
7,9	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
8,0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

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Practice questionnaire for certification exams from TQU VERLAG on the following topics:

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TQU VERLAG
Magirus-Deutz-Straße 18
89077 Ulm
Germany

phone 0731/14 66 02 00
fax 0731/14 66 02 02
e-mail verlag@tqu-group.com