
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2012/2013

January 2013

EBP 310/3 – Plastics Processing **[Pemprosesan Plastik]**

Duration: 3 hours
[Masa: 3 jam]

Please ensure that this examination paper contains SEVEN printed pages before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi TUJUH muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

This paper consists of SEVEN questions. THREE questions from PART A and FOUR questions from PART B.

[Kertas soalan ini mengandungi TUJUH soalan. TIGA soalan dari BAHAGIAN A dan EMPAT soalan dari BAHAGIAN B]

Instruction: Answer FIVE questions. Answer **ALL** questions from PART A and **TWO** questions from PART B. If candidate answers more than five questions only the first five questions answered in the answer script would be examined.

[Arahan: Jawab LIMA soalan. Jawab **SEMUA** soalan dari BAHAGIAN A dan **DUA** soalan dari BAHAGIAN B. *Jika calon menjawab lebih daripada lima soalan hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]*

The answers to all questions must start on a new page.

[Mulakan jawapan anda untuk semua soalan pada muka surat yang baru.]

You may answer a question either in Bahasa Malaysia or in English.

[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

PART A / BAHAGIAN A

1. [a] Figure 1 shows the cross section of a basic hot runner system. Explain the function of sprue bushing, runner, manifold, cavity and gate drop.

Rajah 1 menunjukkan keratan rentas bagi sistem asas "hot runner". Jelaskan fungsi-fungsi "sprue bushing, runner, manifold, cavity dan gate drop".

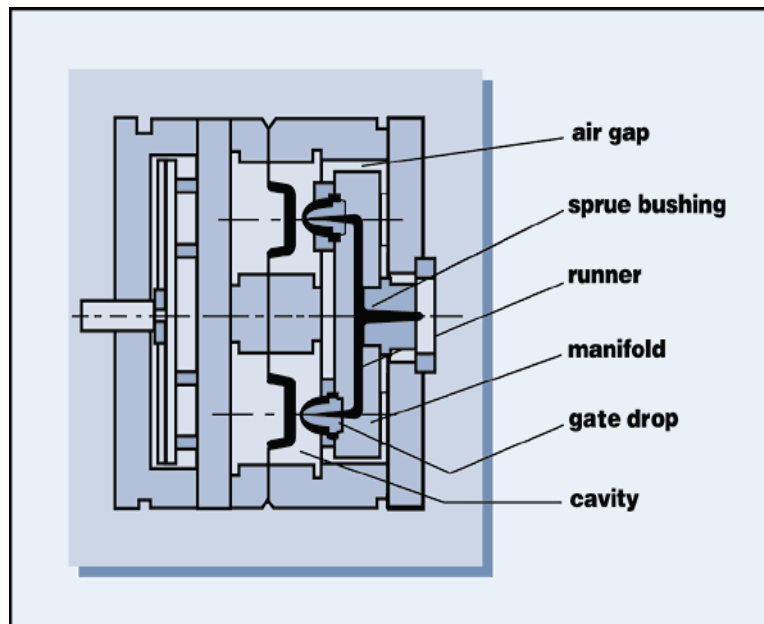


Figure 1: Cross section of basic hot runner system

Rajah 1: Keratan rentas bagi sistem asas "hot runner"

(25 marks/markah)

- [b] Write a short essay about injection moulding of thermoset.

Tuliskan sebuah karangan pendek berkenaan dengan pengacuanan suntikan bagi termoset.

(75 marks/markah)

...3/-

2. [a] (i) Instead of using single layer for packaging of food product, we need to use multilayer plastic films. Elaborate the reason why we need to use more than one layer of plastic film?
- (ii) Why do you think that plastic film is a better material than paper for packaging? Suggest five (5) reasons.
- (iii) On the other hand, the used of paper will reduce contamination by plastic material in the environment. Will this affect the plastic industry? Give your opinion.

(i) *Di sebalik menggunakan satu lapisan untuk pembungkusan produk makanan, kita memerlukan pelbagai lapisan filem plastik. Jelaskan mengapa kita memerlukan lebih dari satu lapisan filem plastik?*

(ii) *Mengapa anda fikir filem plastik adalah bahan yang lebih baik dari kertas untuk pembungkusan? Cadangkan lima (5) sebab.*

(iii) *Sebaliknya penggunaan kertas dapat mengurangkan pencemaran bahan plastik di persekitaran. Adakah ini akan memberi kesan terhadap industri plastik? Berikan pendapat anda.*

(70 marks/markah)

- [b] Why do we need to use spider die (spider leg) in the production of pipe and tube? Explain.

Mengapa kita perlu menggunakan "spider die (spider leg)" dalam penghasilan paip dan tiub? Jelaskan.

(30 marks/markah)

3. [a] The effectiveness of moisture removal in extrusion process will depend on four factors which include the exposed melt surface area (degree of screw filling) and resident time.
- (i) Discuss how to maximize the effectiveness of moisture removal based on the two (2) factors.
 - (ii) Suggest a method to assist in moisture removal which is usually used in industry.

Keberkesanan penyingkiran lembapan dalam proses pengestrudan bergantung kepada empat faktor termasuk luas permukaan leburan terdedah (darjah pengisian skru) dan masa pemastautinan.

- (i) *Bincangkan bagaimana untuk memaksimakan keberkesanan penyingkiran lembapan berdasarkan dua (2) faktor tersebut.*
- (ii) *Cadangkan satu kaedah untuk membantu penyingkiran lembapan yang biasa digunakan di industri.*

(50 marks/markah)

- [b] (i) Describe briefly three (3) types of blow mouldings.
- (ii) How to control the thickness of the product produced during blow moulding?
- (iii) Why high viscosity melt is needed during blow moulding?
- (i) *Jelaskan secara ringkas tiga (3) jenis pengacuanan tiupan.*
- (ii) *Bagaimana untuk mengawal ketebalan produk yang dihasilkan?*
- (iii) *Mengapa leburan berkelikatan tinggi diperlukan?*

(50 marks/markah)

PART B / BAHAGIAN B

4. As a Senior Engineer in a plastic company, you are required to produce three layers plastics film to pack chili sauce. Prepare a report to your manager on:
- (i) Material selection.
 - (ii) Method to produce the film.
 - (iii) Four (4) tests to evaluate the quality of the film produced.

Sebagai seorang Jurutera Kanan di suatu syarikat plastik, anda dikehendaki menghasilkan tiga lapisan filem plastik untuk membungkus sos cili. Sediakan satu laporan kepada pengurus anda tentang:

- (i) Pemilihan bahan.*
- (ii) Kaedah untuk menghasilkan filem.*
- (iii) Empat (4) ujian bersesuaian untuk menentukan kualiti filem yang dihasilkan.*

(100 marks/markah)

5. [a] In an extrusion production line, an engineer has decided not to use screen pack because he believes that it will affect the productivity.
- (i) Give your opinion on that decision.
 - (ii) What are the precaution steps that should be taken if screen pack is not used?

Di dalam barisan pengeluaran pengestrudan, seorang jurutera memutuskan untuk tidak menggunakan "screen pack" kerana dia percaya komponen itu akan mengganggu produktiviti.

- (i) Berikan pendapat anda berkenaan keputusan tersebut.*
- (ii) Apakah langkah berjaga-jaga yang perlu diambil jika "screen pack" tidak digunakan?*

(60 marks/markah)

- [b] Explain four (4) typical problems in extrusion.

Jelaskan empat (4) masalah lazim dalam pengekstrudan.

(40 marks/markah)

6. [a] Clearly explain what are the general features in the injection moulding mould and describe its function during molding cycle.

Terangkan dengan jelas apakah ciri-ciri umum di dalam acuan penyuntikan dan jelaskan fungsi-fungsinya semasa kitaran penyuntikan.

(70 marks/markah)

- [b] With the aid of schematic diagram, illustrate a conventional injection moulding machine.

Dengan bantuan gambarajah skematik, lakarkan pengacuanan suntikan konvensional.

(30 marks/markah)

7. [a] (i) Explain why co-extrusion process is very important in plastic processing.
(ii) Explain briefly two (2) different dies in co-extrusion.

(i) Jelaskan mengapa proses ko-pengekstrudan sangat penting dalam pemprosesan plastik.

(ii) Perihalkan secara ringkas tentang dua (2) jenis dai dalam ko-pengekstrudan.

(50 marks/markah)

- [b] Based on Figure 2 and Figure 3, give your comments on the root cause and remedies of the defects.

Berdasarkan kepada Rajah 2 dan Rajah 3, berikan komen anda tentang punca masalah dan penyelesaian bagi kecacatan tersebut.

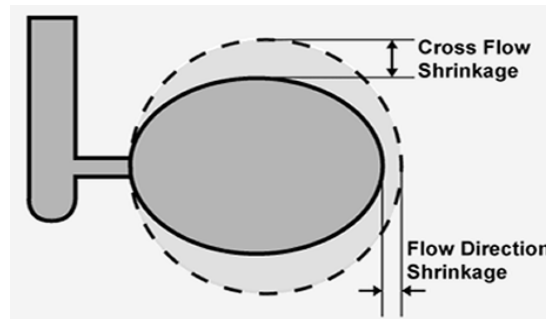


Figure 2: Shrinkage in Injection Molding

Rajah 2: Penyusutan dalam pengacuan penyuntikan

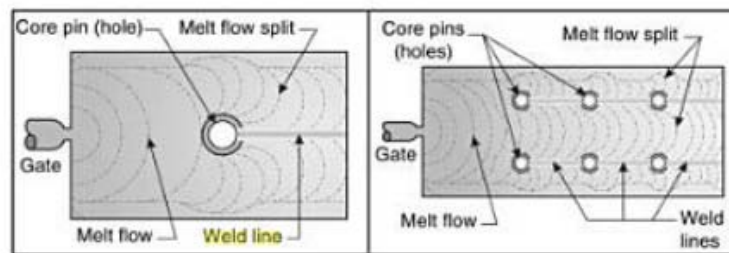


Figure 3: Weld line formation

Rajah 3: Pembentukan "weld line"

(50 marks/markah)